ADVISORY COMMITTEE FOR GEOSCIENCES

 ADVISORY COMMITTEE MEETING

 October 10, 2012

 9:00 A.M.

 National Science Foundation

 Room 1235

 4201 Wilson Boulevard

 Arlington, Virginia 22230

 P A R T I C I P A N T S

COMMITTEE MEMBERS PRESENT:

Dr. Louise H. Kellogg, Chair

Dr. M. Lee Allison

Ms. Vicki Arroyo

Dr. Daniel N. Baker

Dr. Mary C. Barth

Dr. Margaret L. (Peggy) Delaney

Dr. Donald J. DePaolo

Dr. Scott C. Doney

Dr. Karen M. Fischer

Dr. Steven D. Gaines

Dr. George M. Hornberger

Dr. M. Susan Lozier

Dr. Norine E. Noonan

Dr. Walter A. Robinson

Dr. Roberta L. Rudnick

Dr. David S. Schimel

Dr. John T. Snow

Dr. Harlan Spence

Dr. Brian Taylor

Dr. Orlando Taylor

Dr. Joseph A. Whittaker

SPEAKERS PRESENT:

Dr. Marge Cavanaugh, AD, GEO

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 P R O C E E D I N G S

Introductory Remarks

 DR. KELLOGG: Hello everyone, and welcome. We are still getting the Web or the virtual telepresence people to be telepresent, but that will be happening over the next few minutes. So, my name is Louise Kellogg, and I’m the chair of AC-GEO, and I welcome you all to this meeting.

 We are doing, as you know, an experiment of having some of the members of the committee participate remotely, and our goal there is to essentially limit the amount of travel funding we -- so more of it can go to other worthy activities such as having program officers go to meetings and having panels be able to meet in person. So, we’ll evaluate the experiment at the end, but meanwhile, the technical staff and Melissa are -- heroically, actually -- are working really hard to make this work, so I really, really appreciate it, and I appreciate everybody coming.

 We traditionally start our meeting by having everybody introduce themselves, and since we -- and since the committee mostly knows each other and since the people in the telepresence won’t be able to hear the people in the back of the room anyway, we thought we might just start that introduction around the table and continue through for everybody who’s in the room so that you can all meet each other, and then by then, perhaps all the telepresence people will be back. So, I’m Louise Kellogg, from UC Davis. Should we go this way? Yes. Oh, please use your microphone, because the remote people won’t be able to hear us otherwise.

 DR. DELANEY: Hi, Peggy Delaney from UC Santa Cruz.

 DR. DE PAOLO: Don De Paolo from UC Berkeley and the Lawrence Berkeley Lab.

 DR. SCHIMEL: Dave Schimel from the Jet Propulsion Lab.

 DR. LUNIGER: My name is Guido Luniger. I’m a guest to this panel. I’m a program director for Geosciences back in Germany, at the German Research Foundation, and, well, I’m just joining this meeting. Thanks.

 DR. KORSMO: Fae Korsmo, deputy office head, Polar Programs.

 DR. FALKNER: Kelly Falkner, Polar Programs.

 DR. CONOVER: My name is David Conover. I’m director of the Division of Ocean Sciences, and let me also say that in my career, I’ve always been an experimentalist, so I’m thrilled we’re doing an experiment during this meeting, and as I’ve always told my students, accept the results, however they turn out, and then use them to improve your knowledge. So, that’s what we’re going to be doing.

 DR. KELLOGG: That’s exactly what we’re doing.

 DR. HARRISON: Wendy Harrison, division director, Earth Sciences.

 DR. ABRAJANO: Jun Abrajano. I’m the acting deputy assistant director

 DR. MORGAN: Michael Morgan, division director of Atmospheric and Geospace Sciences.

 DR. TAYLOR: Brian Taylor, dean of SOEST and vice chancellor for research at the University of Hawaii, Manoa.

 DR. HORNBERGER: George Hornberger, Vanderbilt University.

 MS. ARROYO: Vicki Arroyo, Georgetown.

 DR. ROBINSON: Walt Robinson, North Carolina State University.

 DR. CAVANAUGH: Marge Cavanaugh. I’m the acting assistant director for the Geosciences.

 DR. KELLOGG: So, let’s continue, actually, now.

 DR. WHITCOMB: Do you want us to use the microphone? [inaudible]

 DR. KELLOGG: I don’t know how [inaudible].

 DR. WHITCOMB: Okay, I’m Jim Whitcomb. I’m a section head in the Division of Earth Sciences.

 MALE SPEAKER: [inaudible] Sciences.

 DR. SHOWSTACK: Randy Showstack, [inaudible].

 [inaudible introductions]

 MALE SPEKAER: [automated] Welcome to the conference calling center. At any time during this message, please enter your pass code, followed by the pound sign. Your pass code has been confirmed. If you need technical assistance during this call, press star-zero. There are six parties in conference, including you.

 [inaudible introductions]

 MR. SHERMAN: Matt Sherman, National Capitol Contracting. Glad to be here.

 [inaudible introductions]

 DR. KELLOGG: Okay. So, as we -- as we sort of prepare for today and tomorrow, as I said, I appreciate everybody’s willingness to undertake this experiment. There’s a great deal going on in -- at NSF and in general and in GEO in particular, and I -- we’ll hear in a few minutes from Marge about the -- about the state of GEO, and there are some slides available, which the people on the -- online will hear. So, if we don’t see them as a telepresence, we will hear them as voices from the ceiling. In fact, maybe I should have people online introduce themselves. It’s going to be a little chaotic. Will those online sort of speak up?

 DR. NOONAN: Louise, this is Norine Noonan. I’m on by teleconference because I couldn’t get the video to work.

 DR. KELLOGG: Hi, Norine.

 DR. TAYLOR: This is Orlando Taylor. Ditto.

 DR. KELLOGG: Hi, Orlando.

 DR. TAYLOR: Hey.

 DR. KELLOGG: I couldn’t hear who that was.

 MALE SPEAKER: Exactly.

 [laughter]

 DR. KELLOGG: And I see a few people on the -- yeah. Okay. So, would those of you online like to introduce -- we just went around the room to introduce everybody, but they weren’t speaking into the microphones necessarily. We see you, [unintelligible]. Can you hear us?

 DR. NOONAN: Yes, we can hear.

 [talking simultaneously]

 DR. KELLOGG: Okay. All right. Thanks, everybody --

 MALE SPEAKER: I can hear you.

 DR. NOONAN: A little garbled, but -- I think that’s because there’s so many people on.

 DR. KELLOGG: [affirmative]

 DR. NOONAN: There’s so many people.

 MALE SPEAKER: Right. Is everyone -- everyone is back in again?

 DR. KELLOGG: Looks that way. We have some people on the -- on by voice only, and some people on by video. Okay. So, I think we are in pretty good shape. So, one of the main things that’s happening is -- actually, maybe I could ask the people who are online to mute their microphone unless they’re going to speak. Otherwise I have to hear myself, and everybody has to hear me twice. Thanks. Okay.

 So, one of the very large things that’s happening is a -- an upcoming merger of GEO and Polar and the Office of Polar Programs, and so we have many people here from Polar Programs today and appreciate your being here, and this will be a very important part of our discussion. Can we just have Marge start, essentially?

 DR. CAVANAUGH: Yes. I can do that. Do you want me to stay here?

 DR. KELLOGG: So, I think because, to allow lots of time for -- lots of time for questions, we’re going to have Marge start the “State of GEO” presentation a little bit early, and that will allow plenty of time for discussion.

 DR. CAVANAUGH: Okay.

 DR. NOONAN: Louise? Can I ask a question before we start?

 DR. KELLOGG: Please.

 DR. NOONAN: How do we -- how do we ask questions if we’re on the line? There’s this WebEx meeting thing. Do we just send a note, or -- how does that work?

 DR. KELLOGG: I will try and make sure to ask you if there are questions at various times, but you can also -- can you email Melissa? And she’s sitting next to me and will let me know when there are questions.

 DR. NOONAN: Okay. Melissa, do you have -- are you -- are you watching the chat on the WebEx meeting thing, or are you watching regular email?

 MS. LANE: I’m watching email and anything else. I’m losing my mind. Just email me, and that’ll be the fastest way.

 DR. NOONAN: Okay.

 DR. LANE: Okay?

 DR. NOONAN: There’s a lot of static on the line. I don’t know what’s going on.

The State of GEO

 DR. CAVANAUGH: Okay. All right. Good. Well, maybe we should go while we can. Well, good morning, everybody, and I want to --

 DR. NOONAN: We can’t -- I can’t hear you at all. There’s so much static on the line.

 DR. CAVANAUGH: Is this on? Okay. Hey, Norine? Can you hear me now?

 DR. NOONAN: A lot of feedback.

 DR. KELLOGG: You can tell if your microphone is on by the red light. If it --

 DR. NOONAN: Yeah, yeah.

 DR. KELLOGG: -- you’re not speaking, you should turn it off.

 DR. CAVANAUGH: What about this one?

 DR. KELLOGG: Oh, perhaps not everybody heard. I’m going to ask the people online to mute if you are not actively asking a question. That’ll help reduce the feedback.

 DR. CAVANAUGH: Okay, you want to try this again? Okay. Well, welcome, and I can tell already that this is going to be one of those meetings that’s going to test us in a way that we aren’t usually tested, I think, at these meetings, but nonetheless, we really appreciate your willingness to participate in this experiment in having a hybrid virtual meeting. We expect that we’ll be doing more of this, frankly, at NSF for some of our panels. We have a lot of experiments going on related to virtual panels, and so -- and then we think there are advantages to this, obviously, for involvement and diversity of panelists, as -- and participation of folks who perhaps couldn’t travel to a particular meeting, so in addition to the benefits to our travel budget, we hope that it enables people who might otherwise not be able to be involved to be involved. So, we’ll be looking for your help as this goes on, and we’ll be looking for your comments afterwards, and we’ll be trying to make improvements along with the technology for years to come, I suspect. So, it’s a new -- it’s a new world we’re all getting involved with.

 Now, you may remember that at the spring meeting, Tim Killeen was here, and at that time, what he did at this point in the meeting was to give a preview of what was going to be the director’s review report that he gave a few days later very successfully, and very well received, by the way. But as a consequence of that, we didn’t do a sort of a -- our normal kind of update for you on a lot of the things that are going on at NSF and some of the people who are here, et cetera. So, what I have this morning is that update, and it does go back somewhat longer than the ordinary six-month kind of timeframe than we -- that we usually do, but nonetheless -- so, we didn’t really talk so much even about the FY13 budget request, so -- or I think we did, but not in any depth -- so I’d just like to remind you that we did have some guidance from the Office of the President, from OSTP and OMB, and how to construct that budget, priorities to put in that -- into that budget, and you can see some of those on the left: manufacturing, innovation, education, cybersecurity. All were very prominent in the -- in the priorities of the administration, and you know, they fit very well with a lot of NSF’s priorities, or if you like, our priorities align very well with those priorities because of our emphasis on fundamental research, on STEM education, on innovation, on cyberinfrastructure and a diverse workforce.

 So, those are the kinds of things that shaped the request that went in last -- wow -- February. Quite a while ago. And the request overall for NSF was for a 4.8 percent increase over the FY12 inactive level, and this is the summary of that -- of that request. I guess one of the things that’s always of interest to the -- those directorates that are heavily involved in facilities is not only the R&RA line that’s related to science activity, science and engineering activities, and the education activities that we do within the directorate, but also the major construction, major equipment and facilities construction line, and of course, we have lots of partnerships with education and human resources as well, so you can see what happened with those. It’s not unusual for the MREFC line to fluctuate considerably from year to year, depending on what projects are in process and what their budgets are for that particular year of their -- of their build.

 Also in this budget was a concept or a framework called One NSF. This is something that the director included. He’s -- he wanted to communicate a comprehensive vision for NSF that was focused on the ability of the Foundation to do the kind of research and education that stimulates discovery and addresses societal problems and is usually very interdisciplinary for that matter. And so he looked for ways -- often not very expensive, by the way, but process-oriented or collaboratively oriented -- for NSF to respond to these sorts of challenges and to leverage the resources that we have for maximum impact. So, that was -- and he considers NSF, of course, a leadership organization, as I’m sure we all do. And so under that framework were a number of specific initiatives, and GEO is involved more heavily in the first five or so on this list. I don’t know if he put SEES on the top, but we of course do. [laughs] It’s our -- one of the ones that we’ve helped to shape and promote very heavily. We’ll come back, by the way, to each of these and say a little bit more about them in general and also about what GEO is doing in each one. But we have the efforts and sustainability in cyberinfrastructure, interdisciplinary research, and promoting that research in society, if you like, and also education, as some of the things that we’ve -- we’re most involved in.

 SEES, just to remind you, is Science, Engineering, and Education for Sustainability. It’s been around since FY10, and it does focus on research that informs societal actions related to environmental sustainability. It’s an NSF-wide activity. Overall, in FY12, I think it’s $157 million, if I recall. The request, I think, for ‘13 was for $202 million. So, it’s a major activity, and it’s managed in a portfolio manner, so that there are around -- there are 16, now, activities that are new activities under this umbrella. And the ones that are coming on right now or have come online since we last met is one related to Arctic regions that came out -- was -- came out as -- in the summer as a -- I think a “Dear Colleague” letter for your information and response. We have some that are coming out very recently, some solicitations; one in sustainable chemistry, which does include a piece that has to do not only -- you might expect this to be related to materials development, and it is, but there is a piece that’s related to the whole lifecycle, if you like, including natural resource development and rare metals and the whole mining -- that sort of thing as well. Small piece.

 There -- coastal regions is now on the street as a solicitation, as is a solicitation on hazards and disasters, and another one on information science and engineering. I’m pointing out the ones I think you might tend not to focus on, so you might take a look at the CyberSEES ones, which does include some material related to data management, analytics, and sensors and sensor networks, which things that I think might be of interest to this community.

 INSPIRE. I don’t know if you’ve heard about INSPIRE, but this is sort of a -- this is a -- we have our -- we have an expert on this in the room, I believe, in Rich Behnke, who was on the leadership group and foundation that shaped this. And essentially, these are very high-value awards up to the ones -- CREATIV ones up to a million dollars over five years in order to support high-risk, high-reward interdisciplinary proposals. And what’s different about this is actually the review process, which is a more quick turnaround process to get these out the door. Rich will add later, I’m sure. Okay. But what’s happening now is that we are going in FY13 to mid-scale INSPIRE proposals, and these are up to $3 million over that kind of time period. So, this is a really novel kind of adventure for NSF, and you can see the -- see the One NSF touch here with the emphasis on interdisciplinarity, on innovation, and high-risk, high return.

 ICorp is a very interesting program, and essentially these are small grants, these are $50,000 grants, but the idea is that they support a team of an academic researcher, a student entrepreneur, and a business mentor in order to learn more about how it is that you would take some -- something that you learned or developed in your research and take it to a commercial stage. And I went to the -- to a session that they had where a number of the grantees came in and talked about what they were doing, and we actually have a group that had a product that they took to market that’s already been bought out by a major company already, so it’s just very interesting. What they’re -- what they’re looking for now in these solicitations are actually nodes, places that are going to continue the educational and training aspects for these grantees. That’s what’s going on there.

 Cyberinfrastructure is something that’s been going on for a while. It’s CIF21. And the part that GEO is contributing to this is called EarthCube, and we’ll come back a little later to talk about EarthCube, but the -- there is an emphasis here on multidisciplinary research again, on taking advantage of -- on leveraging opportunities and on looking -- on simulation and modeling is also -- for complex problems is an emphasis, so you can see why it’s of interest in GEO.

 Science is the -- under -- again, under One NSF, is a piece called Expeditions in Education. This is one that has undergone a lot of internal discussion, and it seems to be focusing now clearly on the undergraduate educational experience, and it has always had these two threads involved in how -- in its formation. One that -- one that has a -- an emphasis on taking cutting-edge science or cutting-edge frontier research experiences and marrying those with the latest educational theory in order to provide a very high-quality educational experience that draws on both of those. And this is more challenging than you might think, even -- it’s certainly a challenge to do, and it’s also challenging to describe and manage in a solicitation; so I think we’re in the final stages of getting a solicitation out, and I hope that will be out by the end of the year.

 So, we’re moving now to talking about -- more specifically about what’s happening in GEO, and this is the -- what happened to -- what the president -- what the 13 requests look like for GEO. It’s 2.4 percent above the previous year, and it’s distributed in the various divisions in this way. It’s fairly evenly. And in what -- then we have -- we have, of course, an opportunity to describe what we want to do in the FY13 budget, and so we emphasized, of course, some of these -- some of these cross-directorate initiatives, including SEES, but we also -- I also wanted to remind you that we are benefiting from the MREFC budget at this point because we’re building, still, OOI. Notably, in FY13, there’s a $65 million increment for OOI in that -- in that request, which we certainly supported strongly.

 Let’s see. So, I promised to come back to EarthCube, the CIF21 effort in -- within GEO. And this is really -- I don’t know -- if have some of you gone to any of these charrettes. I think Louise, I know, went to one. I don’t know if other people have gone to these. But the -- this is really looking at the -- well, it’s -- I think the first principle in many ways is that it’s really engaging the community in how to -- how to do data management and access across the -- across the geosciences. And so there have been two charrettes, if you like, and we can talk about the -- we can go there with the French, but let’s not -- at any rate, but two large community meetings that were -- that have been held in the last year and a half or so, and the idea of these meetings was to engage the community very broadly in identifying the issues in bringing together the diverse data sets across the geosciences and also to begin to identify the major problems or concerns or design principles, whatever, that needed to be confronted first. I think people generally consider that these were very successful. Large numbers of people participated in these, and they have now resulted in a number of EAGER or small proposals, research proposals, or workshop proposals that are in this, you know, late ’12 time period, that are taking those identified issues or problems further, and we are in the process of putting together a solicitation for larger grants to take some of those ideas even further. The near-term investments that are ongoing now generally are aimed at involving the various subdisciplines within the geosciences and getting -- and enabling them to be involved in this effort, and the longer-term efforts will be looking at the government structures, at the architecture that might be needed, and how to cross various domains and partnerships activities. So that’s what’s going on there.

 In the budget request, we actually have -- GEO actually had $12 million in the E Squared activity that I mentioned before, and we had the -- we aspired to being involved in E Squared because we wanted to be sure that we were doing the -- we were involved in frontier activities that did try to use these best practices; so we thought that that would be a way to up our game, if you like. And we have -- are involved in an analysis of what we have been doing.

 This isn’t all of the education activities in GEO, but we had a set of named activities that were GEO-wide, and they have been going on for about 10 years now, and so we thought that it was time to stop and take a look at them. We -- in general, I would say that we have fund -- it had been very successful. We’ve funded many groups, and this committee has heard reports of the projects that those folks have been involved in, and they’re terrific. But the question that we’re asking ourselves now is, now that we feel that actually there’s a very strong community in this area, what can we do more? Can we -- can we bring this more to scale, if you like? Can we have more impact? And so we’re thinking about GeoEd and OEDG taking a little pause to refresh and reframe, and you actually have a -- there was actually a D.C. -- “Dear Colleague” letter issued inviting people to send ideas for these next steps in by November 1, so we’re looking for those. And Jill is -- Jill is anxiously waiting for those ideas to come in from the community so that we can, you know, just take this all to the next level. And we’ll be doing that in a -- in this context, in this partnership, with the rest of the foundation with the E -- with E Squared. So, we’ll see what happens.

 I’d like to move on a little bit to what -- to infrastructure, just to remind you about OOI. That big milestone this summer was the fact that the power nodes were installed on the seafloor successfully, and that retired a major risk in the project. We all breathed easier after that. But next year is sort of the year of the build, if you -- if you like. If you look at what’s happening with the Cabled Observatory, or with the global arrays, or with the coastal arrays, all of these are having big years with builds and deployments, so there -- you can tell that we’re making progress on this -- on this fantastic, revolutionary infrastructure.

 The big -- the most important thing -- a couple important things on this slide. Number one, this is not a -- one of those schematic conceptual drawings of the ship that we’ve been looking at for years now. This is actually a picture of the ship. [laughs] So -- that - -- and I think that this was taken on the day that it moved out, and it is going to launch on Saturday, so we are very excited about this, about this project. And it will be undergoing sea trials during the early part of next year, and by about this time, I guess, next year, it’ll be starting to do some operations and some research and experiments; so we’re very excited about this. And it’s a great picture, isn’t it? I -- this is my favorite slide. [laughs] Well, maybe I shouldn’t say that, because --

 [laughter]

 MALE SPEAKER: No, you should say that.

 FEMALE SPEAKER: Be careful with these. Be careful.

 DR. CAVANAUGH: This could be my favorite slide now. I could’ve changed. Anyway, we’ll -- well, okay, Michael will talk to me later, I know. Okay. Anyway, on Monday, there’s ribbon-cutting for the Wyoming Supercomputer Center, and they’ve named the computer. It’s the Yellowstone, a 1.6 petaflops peak machine, and it’s actually starting to be operational little by little, and will be by the end of the year fully operational. So, this is -- this is happening on Monday, so here’s something you can talk with Dr. Suresh about, right? He’s going to be -- have a couple events here in his -- in his -- this weekend.

International. I think Tim talked with you about the Belmont Report --

 DR. ALLISON: Yup. I’m turning off my --

 DR. CAVANAUGH: A phone call, I think. Hi, Lee. Is he waving?

 FEMALE SPEAKER: Lee, we can hear you. Or we were able to hear you.

 DR. CAVANAUGH: [laughs] He’s leaving.

 [laughter]

 Okay. Anyway, I think Tim talked with you a number of times about the Belmont Forum, which was an international group of funding agencies that he had really worked with to try to work more strongly together on sustainability and environmental issues, and so that’s still going on, and some other things have come from that as well. The Belmont Forum now has quite a few countries involved in additional to the regular set -- the beginning set of folks. A lot of the BRIC countries have come on board, and I think one of the significant things is that the International Social Sciences Council has been -- is involved now, too, and they have -- they are focused especially on environmental change and mitigation, so that’s their focus, and trying to find coordination mechanisms that are global in scale to address these. And they have been successful in putting together the International Opportunities Fund. I don’t know if any of you took advantage of this. They had a call for proposals this spring. They did this in the same style as the G8 Heads of Research Council at HORCs, and they identified two thematic focuses: one on coastal vulnerability, and one on freshwater security. They had -- it was about a €20 million competition for both of these themes. They received 147 preproposals, and they have had meetings. International groups of program officers have gotten together to look at these preproposals and to invite full proposals, and they invited 25 in coastal vulnerability, and 30 in freshwater security. So, I believe those are due in January, I think, so by the time we meet again, we’ll probably know who the awards are going to. So, that’s very exciting.

 This group is also thinking ahead, by the way, about -- this is going so well, they want to keep doing this. And the way they’re approaching this is to identify new themes as it goes along. So, they’re discussing new themes, and if you have ideas or suggestions for those themes, then be sure to let us know or let Louise know, and we can -- we can pass those ideas on. The -- they’re talking a lot right now about food security as a -- as a theme, and I think the -- there’s one that’s related to urban megacities or something, and they have a couple more. So, those are the kinds of themes that they’re looking at, ones that would be of interest to the many partners that are involved.

 They also have, I think, been very instrumental in putting together something that they call “The Alliance,” which involves all these groups that you see at the bottom, and to work together on a joint strategy related to global environmental change. And this partnership is getting started and seems to be pretty firm, so I think we’ll hear more about this. This is really the partnership that Belmont -- I would say, encouraged, and is the one that’s offering formally the International Opportunities Fund. So, it’s very exciting.

 And I think that if you look closely at this picture, you can see Dr. Suresh in the middle in the front. NSF hosted this Global Summit on Merit Review this past spring in this -- in this room. What they had to do was to add an additional leaf to this table so that this table went all the way to the back, and then it was able to accommodate the 50 or so heads of research councils from -- at the -- all around the table. And I believe that Dr. Suresh often says that the group that was there represented 95 percent of the research funding for the planet. So ,it was an impressive meeting, the first one of its -- of its kind. They’re going to continue to meet, and one of the things that they were concerned about -- have taken up as one of their first topics, is this issue of merit review and international standards for merit review on best practices. So, they are going to meet again. I don’t -- I don’t remember. I might be in Germany. I think it’s in Germany, the next meeting.

 DR. LUNIGER: That will be in Berlin.

 DR. CAVANAUGH: In Berlin? Yes. So, it looks like it’s off and running, and as a new international organization, so it’s very exciting. And this is a little more about it. The following-up from this meeting, this will be in Berlin and in ’13, and the co-hosts are Germany and Brazil, and they’re talking about open access to data, publications, and scientific integrity. So, they’re -- this another topic that Dr. Suresh is very passionate about and you might want to engage him on, but he really feels as if -- if the -- that science is now a global enterprise and if to go forward, you need to have international standards on things like integrity, access, intellectual property, merit review, for it to -- for it to do well in the long term.

 And I know that you all got information about the realignment between the GEO -- the director for GEO Sciences and the Office of Polar Programs. You may not be aware that Dr. Suresh announced this -- these realignments. He actually announced three changes, which we tried to indicate here. One is that the Office of Cyberinfrastructure will become part of CISE -- Computer and Information Science & Engineering, and analogously to the way that the Office of Polar Programs will become part of the Geosciences directorate, and then two offices within the director’s office, the one on integrative activity and international science and engineering would be -- would be merged.

 And we want to -- I think this is a -- is a good -- a good time to say some things about this. One is the transition just began on October 1, and so we are in the early stages of meetings between the staff in Polar and the staff in GEO about how we can improve communication, how we can optimize the synergies and scientific and infrastructure resources that we have. So you’re here right at the beginning, and so we’ll -- I don’t think we’ll be able to answer all of your questions about this, and quite the contrary, we may be asking for some of your advice on this. One of the things that we will be thinking about in the next, I don’t know, few months, maybe a year, is the relationship between the advisory committee in the Geosciences -- that’s you -- and the advisory committee for the Office of Polar Programs, which also has an advisory committee. So, we’ve discussed this a little bit, and we thought that the first thing we should do is make introductions. And so, tomorrow, the first thing on your agenda is a presentation by Kelly Falkner, the office head for Polar Programs, who is going to give you an overview of the -- some of the things that are done -- are done there. And then I believe Louise is going to participate remotely -- dare I use that word -- virtually in the advisory committee meeting that the Office of Polar Programs is holding the first week in November. So, that’s our first step, is making -- is making introductions. I guess, so -- we’ll involve you or would like you to be involved in the conversations about how to proceed, you know, but I think there are real opportunities for synergies as well, and that all of the -- all of the ways of doing that are open, and we can talk more about those sorts of details as we go along today.

 So, I had to add one fun thing to this -- I mean, well, a lot of it was fun, I know. Yeah. But, I had to tell you that I did go to a Datapalooza. Now, I’m telling you this mainly so you will think that I am an up-to-date, current person. [laughs] But at any rate, the -- it was very interesting. The federal government has lots of data, and it is trying to figure out ways -- the White House is trying to figure out ways of making that data as useful to the public as possible, and so they are sponsoring these Paloozas, which essentially are challenges to the public to develop apps or other ways of accessing and using the data that’s available to their advantage in their -- in their lives. And so we’re going to have natural-hazards preparedness Datapalooza in -- starting -- I think the challenge goes out in November, and the one that I went to was one on the safety Datapalooza. And I must say, it was very impressive to hear from about 10 entrepreneurs in the community who had developed apps to use existing public data, and one of the ones that was most impressive was from -- I thought -- was from California. It was -- a police chief came, and he talked about the fact that they had developed an app for the folks in their county, of which there were like 17,000 or something, who were trained in CPR, and when an alarm went out that there was a -- you know, someone had had a cardiac arrest or something, the folks who had this app also got the alarm. But they only got it if they were within 10-minute distance from the place where the alarm had gone off, and so they would be -- because that’s a critical time, and often emergency vehicles can’t get there in that period of time, but if somebody was in the same Wal-Mart, they might be able to get there. So, there was not a dry eye in the house when this fellow told this story about how these had changed things there. So, I think there are real opportunities.

 One of the challenges for NSF is that our -- we don’t own data. It’s really owned by the -- by the -- owned, if you like, by the investigator. But we’re not -- we’re not in the sense like NASA, you know, to where you do have data that they’re managing. And so there’s a little bit of the experiment that’s going on here. So, for instance, I think COASI’s [spelled phonetically] making its data available, but they have to -- they have to link to it because it’s not on a government site. So we’ll see what happens. It’s very interesting.

 We have a long list of who’s new in GEO, because we didn’t do this in the spring, and I’m looking at this list and saying, gee, some of these people have been here quite a while. And I don’t know how many are here of these, but I -- if I could just call your name, and if you’re here, if you could stand up and wave, and if you’re not here, we’ll wave back anyway, I guess. Sierra Warren -- we’ll do AGS first. Linda George. Anja Stromme. Okay. Raymond Walker. Linnea Avallone. I do this wrong all the time, just with names. Okay. Wendy, of course, you met. Ni-Bin Chang.

 DR. CHANG: Right here.

 DR. CAVANAUGH: Shemin Ge, I think is here. Christopher Simmons. Okay. Raffaella Montelli. No? Deborah Bronk. Stacy Beharry. I’m not sure I’ve met her. Okay. Well, yeah, I think she’s new. Lew Incze. Krista Henrie. Okay. Stephen Moran. Donna Blackman. James Beard. They’re all -- OCE has some things going on. Marcia Barton. Keith Spangler. Teri Davies, who went to the Datapalooza with me. Kevin Rose. And Eve Gruntfest. Okay. Very fine. And that’s it for me. I know you’re glad to hear that, so if you have any questions, I guess, or we could do that, and maybe I’ll sit down to do that. Okay.

 DR. KELLOGG: Welcome to all the new staff. This really is an impressive list of people. So -- and thank you to those of you who were able to make it here. So, I’m sure there’s a lot happening, so I’m sure there are many questions from the committee, and so I will just sort of let -- let’s see -- let’s ask -- who has a question first. Yes.

 DR. ROBINSON: Oh, I don’t have to go first.

 DR. KELLOGG: Go ahead. I saw you first.

 DR. ROBINSON: All right. So, one of the things that universities always struggle with is how to organize the life sciences, and I happen to be in a department where we have marine biologists. We’re actually aligned with Geosciences NSF. So, I’m wondering what your plans are -- you have -- you have life science programs in OPP, you have life sciences particularly in OCE, but also in EAR. I don’t think there are any in AGS, but I could be wrong. And of course, you have the BIO. There is BIO. So how are you -- how is that -- how are you -- especially with the integration with OPP, how -- what are the plans for making that all work so biologists know where they’re supposed to go for funding, and you know, if they’re a polar biologist, but they do do some genomic stuff, and yeah.

 DR. CAVANAUGH: Well, I don’t know. I think there are some questions we might not have answers to. I warned you already, so -- anyway, but actually, I don’t expect a lot of changes, very dramatic changes in this. Even though we’re talking about these realignments, they’re very internal to NSF, and they’re very much on the supervisory management line kind of side. We’re not talking with -- about changing staff, you know, assignments or offices or salaries or generally what they’re -- what they’re doing, so I think you won’t see anything dramatic.

The other thing I would emphasize is that we have been working -- especially, I think -- I think with BIO very purposefully for quite awhile. I mentioned Eve Gruntfest, who I think has just started yesterday, who -- we established a BIO-GEO, GEO-BIO alignment about, I guess, two or three years ago, in which we -- GEO actually hires a program officer, and Bio actually hires a program officer with the explicit purpose that -- explicit purpose that those two work together on looking for ways for BIO and GEO to collaborate better. And one of the things that they did last year -- we had people for one year last year -- they’re IPAs, Nancy Grimm and Ben van der Pluijm, and they have spent a lot of their time working on the SEES activities, so that BIO was involved in putting -- and GEO were both involved with those. So, we expect that kind of things to continue because we have two new program officers this year with those same kinds of assignments. So, we also have a lot of longstanding collaborations and interactions, and you know -- among the program officers, and I think that Polar in particular has great connections to a lot of the directorates, you know, for -- because so many projects, you know, in the Arctic or the Antarctic involve BIO or they involve MPS or they involve, you know, one or the other directorate, and so they have a very strong network, you know, throughout the Foundation for those kinds of -- making those kinds of connections. So, you know, I don’t see any of those being disrupted, and -- or changed directly, and I don’t think that -- a lot of this depends on program officer relationships, which will continue.

 What we do hope is that within -- with Polar, and more closely allied, you know, with the ocean, earth, atmosphere, that we will have ways to spend more time together communicating about opportunities and research opportunities that we can, you know, do together, than we did before. We’ll -- I see -- I see retreats in our future and meetings and things of that nature in order to talk more about how we can optimize those relations. But I don’t really see anything dramatic. I don’t know, Kelly, you might want to -- you know Kelly, who’s the -- I don’t know if you missed it when we went around -- who is the head in Polar Programs, and -- I don’t know what -- Kelly might have some different ideas. Or the same? I don’t know.

 DR. FALKNER: I think, you know, you expressed it reasonably concisely, Marge. I appreciate that, and the only thing I would add is, as she mentioned, we have extensive networks throughout the Foundation. One of the things we do is to partner extensively in social sciences. And we’ve had integrated system science programs in the Arctic in particular running for quite a long time, but also have begun one in the -- in the Antarctic. But that social science element we see growing and strengthening as a result of a lot of the concerns that Marge expressed and the priorities for U.S. science in a number of ways. So, that’s -- I think we bring that newer element to the table as we merge together, and perhaps there are ways GEO can benefit from the -- that kind of networking that we have in place as well. Having had a geographic focus as opposed to a disciplinary focus for a while, we really do have our hands all over the place, so -- but also with GEO, we’ve had some wonderful partnerships going for quite a long time with GEO, and we look to build on those.

 DR. CONOVER: And to address your question specifically about how PI has nowhere to -- nowhere to sell -- send their proposals, I just want to reinforce the point that we encourage PIs to call program officers and talk to them before they submit the proposal, and one of the great revelations that I learned from coming here is how rarely that happens. So, by all means -- and we’re trying to get the word out on this -- call your program -- the potential program officers who you think might be the right home and talk to them before you submit the proposal. That’s the biggest difference at all.

 But more broadly on this issue of biology integrated into the geosciences, it’s not so much I think an issue so much of where PIs send proposals, but it does cause problems when we try to roll up metrics about the geosciences in general. For instance, if you just want to ask, how many Ph.D.s are we awarding in the geosciences, that’s not quite so easy to add up when you include biology in the geosciences as well as we do in this directorate. So, there are issues that -- relating to that integration, but I don’t think they’re focused so much on confusion among PIs. And if they do have uncertainty, they should call.

 DR. DONEY: This is Scott Doney on the video conference. I had a follow-on question on Polar and GEO. Both units have substantial infrastructure challenges. You know, do you see this synergy of bringing them together -- that might help those, or will they exacerbate existing infrastructure challenges, and do you think there’s going to be pressure once these are combined to reduce costs across this new single unit?

 DR. CAVANAUGH: Wow. I hope there’s no move to reduce our -- reduce costs. No, I don’t see this as a -- I think there may be some concerns that there’s a cost-saving aspect to this, and that really isn’t the case. The -- I don’t see -- you know, I think you described a scenario in which you would bring them together and then that would -- there’d be efficiencies of some sort, and they would get -- you know, be reduced as a result. I really don’t see that at all, you know, as happening. The infrastructure is a very big deal for both GEO and Polar. That’s for sure, and I think it will continue to be a good -- a big deal, because it’s what we need to do to do our science. But we will have to figure out ways to manage each of these projects, I think, in their own right, and I’m not going to say it won’t be a challenge. I mean, we have challenges now, you know, in managing big projects, and so the -- I expect those to continue, but hopefully we’ll learn from each other maybe a little better about some of the best practices that will help us all manage better. But I don’t see this as a -- I don’t see a lot of -- I don’t see movement of funds or -- you know, as a real threat or driver in this, I guess, is the short answer.

 DR. TAYLOR: Marge, you’ve mentioned joining the two advisory committees of Office of Polar Programs and GEO, and as we embark on this bold experiment, as David calls it, today with this virtual or hybrid virtual meeting, I’m wondering if we -- you all might consider how you use advisory committees a little differently, especially in this virtual realm. I think a lot could be provided to us prior to the -- for example, even your whole PowerPoint. Rather than verbalizing that at a meeting, we could already do the homework and come to the meeting already having seen such a thing, and then in this time actually have more of a discussion about issues. For example, rather than hearing about something we could read on a PowerPoint. Specifically, in that regard, I mean, two of the big things that are happening which had no input, to my knowledge, from either the Advisory Committee for Polar Programs or for GEO, was the director just decreed a realignment; and OPP is going to be merged with GEO, as the office for our infrastructure is in CISE. And also there’s big things happening with education, cross-directorate and cross-NSF.

 And it’s sort of strange to me, as a member of this committee, to hear calls coming for input from the community on both of those things, and after the fact -- I guess, I’ll put it that way. And you have a standing committee in both groups that is supposed to be advisory, but I don’t ever see it being advisory ahead of the game. And even when we come together in these sort of meetings, we listen a lot, we appreciate learning more about the directorate. But the advice function is minimal in my experience, now over two years.

 So, I’m really questioning how you use us; and in this virtual realm going forward, or hybrid realm, and in the merging of the two advisory committees, how you’ll both think to use us in the future.

 DR. CAVANAUGH: [laughs] That’s true. It’s true.

We did talk to Louise, you know, earlier -- well not in advance, I guess, but -- and Louise asked the same question when we were preparing for this meeting, you know. And my suggestion to you would be to put it on your list of things to talk with the director about. I think that then he can talk to -- you know, discuss with you what motivated his decision about the various realignments and what -- you know, how he looks at it. And I do -- I can anticipate some of -- what his answer might be. And I think he doesn’t look at this as a -- I think he looks at this as a management kind of decision, and not as something that would change the units themselves. And so I think that that’s his view. But you can talk with him about that.

 The other -- in general, I think that we could probably do better at the way that we use advisory committees. I think that -- and there’ve been times, I think, when we’ve done better, and times when we haven’t at that. I think the most, you know, the most input, or some of the most valuable input that we get actually goes on in the subcommittees. And you may not be aware of how much your input there does influence what happens in the divisions. They really do, particularly on science directions. I think they’re listening hard at those sessions about the directions of science and the needs of science, and how to -- particularly how to balance some of the infrastructure needs with the science needs. I think that those are big issues, you know, for us; and they’re listening hard on those. And I think that they’ve used that advice, you know, in our long term planning, maybe more than you’ve realized.

 I think that, you know -- but I wouldn’t say that we couldn’t do better, you know, in trying to, you know, trying to frame questions, particular questions. Maybe that’s something we should think about. Maybe we should think about having the advisory committees focus more on one or two topics, and go into them in more depth, you know, and identify those well in advance so people are prepared to discuss them. Because we tend to have -- we tend to feel as if we have so much to tell you about that we don’t spend that much time on any one subject. So a redesign of the agenda that might put longer blocks for deeper discussion of a small number of things, might be a response. But there -- anyway, there may be other ideas. I’m sure there are other ideas.

 DR. CONOVER: I might add to that, that one of the ways this committee provides advice is to set up subcommittees on special topics; and we have done that. We’ve set up a subcommittee, for example, to talk to -- to give us advice about our investments in IODP going forward in the future. We use the Committee of Visitor’s reports to give us advice about how we run and manage our programs.

 So there are, besides the general meetings of AC GEO, there’s a whole variety of ways where we get very good advice, very specific advice sometimes, and we do use it. So I think those are other mechanisms that you need to keep in mind.

 DR. CAVANAUGH: Not to mention your strategic plans you’ve put together.

 DR. KELLOGG: So there might be a need for a subcommittee on this merger, or the impacts of it. You can think about whether that can be useful or not. So, have a group focus on that. Yeah.

 DR. DE PAOLO: So, I mean, a good place to start -- and I don’t know whether you would be the right person to answer, or Suresh, is, what was the point of including OPP into GEO, and what changes are anticipated? Because, clearly, it didn’t do it if nothing’s going to change, you know? [laughs] That would be interesting to hear those things. And I think that, you know, the infrastructure and logistical support issues are the obvious thing. I mean, they’re very heavy on that in OPP, and they’re light in the other areas. And this is going to be probably an area where there’s going to be an interesting interface. [laughs]

 DR. CAVANAUGH: Well, but I still think that -- well, like I say, you can see what he says -- but the director had 16 direct reports, and now he has 13. And I think that that was a major driver for him, was that -- and also there are some big challenges here. I mean, for instance, if you look -- not just at the GEO, you know, polar part of it -- but we have, over the years, had a tendency to create a unit in order to respond to some -- a new emerging area. So, for example, we have an Office of Cyberinfrastructure that was created fairly recently because of all of the interest in cyber infrastructure. Well, from a practical point of view, how many times can you use that mechanism to respond to new interdisciplinary areas that develop, or crosscutting themes? And I think that that is the major challenge.

 And I don’t know that I would -- maybe this is one of those in-depth discussions we can have -- but, I mean, I think universities have the same, or similar, kind of discussion. So how do you organizationally manage the emergence of new crosscutting areas, without just piling on reports or units, you know, to the director, or the university president, or the vice presidents, or whatever?

And so, I think his motivation had much -- was primarily trying to figure out a way to manage, you know, the fact that these entities had crept up over the years. And I look at it and say, you know, 13 is still a lot, you know, but at least it’s better than 16, I guess, you know? So I think his motivation is much more like that, and that it’s not -- and that he’s not -- I haven’t experienced at all his digging down into the operations of each of those. You know what I’m saying? That it really has to do with what’s happening in the reporting structure at the upper management level. I don’t know if that helps, but that’s what I’m sensing from him. And Kelly’s --

 DR. KELLOGG: Did you want to add something, Kelly?

 DR. FALKNER: Yeah. I’ll just say quickly, that it was presented to us pretty clearly, as a management issue, that the director has as a right within his purview, as the director of the Foundation, to do -- so, he decided that’s what he wants to do. And he’ll, I’m sure, tell you himself those reasons again tomorrow. He was pretty clear it wasn’t a punishment. It wasn’t a way to have one unit’s budget solve another unit’s budget problems, going either way. And, of course, we’ve heard those fears and concerns from within and outside the community. He has pointed out that he isn’t successful if these units are not successful going forward. So, for example, if polar programs were to founder, then it would be a problem for the director or GEO, likewise. So, from that point of view, he actually went so far as to say, you know, without there being high-level issues that the director has to pay attention to of the negative sort, then going back to a structure that existed in 1993 where we were part of the GEO Directorate, is sort of a testament to good management. There are very talented teams here who are managing things.

 I want to say that we’ve had -- and I’ll talk about it tomorrow at length, so I’m not going to belabor it -- but we’ve had a big review of the U.S. Antarctic Program going on recently that’s formally completed, and we’re working on a response. But, obviously, the timing of that and nervousness about that, was raised in the community: Oh, was it somehow associated with that report? And it most definitely wasn’t meant -- the timing wasn’t meant to coincide with a negative comment on our ability to manage the U.S. Antarctic Program. And there is very strong commitment on behalf of the director to see that some of the very forward thinking recommendations in those reports are supported going forward.

 And I think both GEO and OPP, with their large facilities, face a lot of challenge in figuring out how to sustain frontier science across a number of domains in the challenge of escalating fuel and labor costs. And I think we’ve already got plans in place independently to move out on those things. But as we work forward, we’ll share good ideas about those things as well. And I’ll talk a little bit about that tomorrow.

 Finally, I just want to say, the director emphasized to me, when I was trying to present all the arguments that you might think of as to why we might remain separate, that it’s not so much a matter of sitting in his AD group, as a matter of access to him for issues. And, in fact, I do continue to meet with him regularly, as OPP has things that the director has to be directly involved in. So I’ll leave it at that.

 DR. KELLOGG: Additional questions? I have some of my own. I think that might have been me.

 [laughter]

 How about the people online?

 DR. BARTH: This is Mary Barth from NCAR. I wanted to ask a question similar to Walt’s. He was asking about other groups in NSF. What about what activities and alignments you have with other agencies? You know, not only NASA or DOE, or other departments, but National Institute for Health or agencies that can reach out more to the public, so to speak?

 DR. CAVANAUGH: Well, I’m not sure where to start on all of that. And we have so many relationships with other agencies of various kinds. We have -- and so, I don’t know if you have anything specific. We have terrific alignments, with NIH in particular on a lot of different levels, some of which might be surprising. Of course the BIO Directorate works very closely with NIH.

 But, you might be surprised to know that some of our closest relationship, in terms of grant management, is actually with NIH. So, in terms of technical capabilities like, you know, the FastLane or discussions with them about policy-related matters on merit review; they’re very close relationships, with NIH in particular, and lots of other agencies, too. But...

 DR. BARTH: Yeah. I just think a little bit -- like Walt was asking, you know, from, you know, the PI perspective, and, you know, if you’re trying to combine a geoscience and a health project together, you know, how does -- you know, are there mechanisms that you have started setting up so one could pursue that?

 DR. CAVANAUGH: Well, we have a couple specific programs, right? In ocean sciences there’s one that comes to mind, that’s joint with NIH on ocean health. So, we do have a history of forming, you know, joint solicitations, even, on certain topics with NIH. So...

 DR. BARTH: Thanks.

 DR. CONOVER: Well, I think that all of the divisions in OPP have longstanding relationships with many other agencies, which are going to continue. In the ocean sciences in particular, Marge was mentioning our Oceans and Human Health Program, which is specifically a collaboration with NIH. But also we collaborated with NIH on issues related to human health in the Deepwater Horizon Oil Spill. And also, all the agencies now come together in the National Ocean Council, to talk about joint priorities, and to implement a new strategic plan for how we’re moving that forward.

 So, there are just many dimensions on which -- that’s just what the Ocean Division does, but the other divisions have activities as well. And we certainly intend to sustain all those relationships throughout the directorate.

 DR. CAVANAUGH: Yeah, if there are any topics that you think that -- we’re always looking, you know. And, as I said in the subcommittees, often there are discussions about where science is going in emerging areas. And so, if there are areas of, you know, where you think there might be opportunities with NIH there, please, you know, bring those up. Because sometimes it does take a special solicitation or “Dear Colleague” letter to let people know that it’s, sort of, okay to send something in on a particular topic.

 DR. SPENCE: Louise? May I ask a question?

 DR. KELLOGG: Yes, please.

 DR. SPENCE: Harlan Spence here. Marge, I was going to ask this question of Dr. Suresh, but I’d also like your thoughts on it, too. Just in the last couple of weeks we were [inaudible] --

 DR. KELLOGG: Harlan, we lost you there for a minute.

 DR. SPENCE: Oh.

 DR. KELLOGG: So you’ll have to repeat the question. We lost you at, “In the last couple of weeks.”

 DR. SPENCE: Okay, yeah, so we received a Dear Colleague Letter from Jill Karsten regarding the changes in the GEO Education and Diversity Programs that you mentioned in your presentation and [inaudible] --

 DR. KELLOGG: We lost you again. [laughs] Oh, okay. We lost you again, but -- until he gets back in, I was going to ask Jill a question, or possibly Marge a question. Are you getting a good response to the “Dear Colleague” letter? And could you say a little more about that?

 DR. KARSTEN: So, this has only been on the street for a few weeks, and my understanding is that EOS is going to publish a notification about it, which I hope will get additional responses. I’ve only had a few responses so far. As Marge mentioned, the deadline is November 1. I’ll be leaving tomorrow morning, actually, to go up to the SACNAS meeting in Seattle, and I’ll be at the GSA meeting and the AGU obviously, which will be other opportunities to get some input on what some of these priority, you know, shifts might be.

 I think that, you know, as Marge said, we’re coming up on 10 years with regard to both GeoEd and OEDG programs. It’s a natural time to reassess, and particularly in light of somewhat uncertain and likely reduced budgets for these programs. So asking ourselves what can we do to build on what we’ve already accomplished, that might help with scaling up best practices, providing resources to the community? You know, I think the trend over the last few years, within OEDG in particular, has been a focus on creating partnerships that can be sustained through, you know, institutionalization or, you know, business as usual kind of practices. And really, without sounding too political here, you know, finding meaningful ways to shift some of the assets and resources and capabilities that, you know, some institutions have, and open the doors to those institutions that, you know, may not be able to build similar capacity themselves but, you know, try to build an opportunity for pathways for students who are interested in the geosciences to come in and benefit from some of those resources. We’ve talked a lot in our Geo Education team on how to leverage the capabilities of the large facilities and, you know, major research, you know, center-type activities. They are a natural resource for us to try to leverage. And, you know, so far none of the input I’ve received seems to be arguing for a dramatic change in practice. But really it’s a question of how can we do more with less?

 The other thing that’s a very positive development is -- and I think this reflects some of the pressure coming from OSTP towards greater collaboration and coordination among the agencies with regard to STEM education and work force development -- is we have had a lot of good conversations with other agencies about how to partner and, you know, coordinate, or at least make more coherent, some of our various investments with regard to broadening participation. And, in fact, we had a conversation with USGS, and we’ll follow up with that at the GSA meeting, on some very concrete ideas about sharing centralized-resource-type activities that might help save costs for common activities such as recruitment and trying to provide research opportunities for students, particularly at the under-graduate level. Where if we, sort of, agree to, kind of, work more collaboratively in those areas, we could save money and actually put it where it actually matters, instead of just having parallel infrastructure and process.

 I think we also have talked about a much greater focus on community colleges and also veterans, Returning Veteran Initiatives, which, you know, can help with broadening participation goals. And so, you know, it’s interesting, in terms of trying to translate operations into new directions, when there’s a lot that’s still unknown about what kind of budgets you have. But we do think, that at this point, the community, because we have built a very strong community working in these areas, they have some ideas from being in the trenches that, you know, could help us to shape these programs going forward. Is that...

 DR. KELLOGG: That’s very helpful. Did you -- one of Marge’s slides mentioned that E Squared is a major NSF priority, and how does that factor in to these discussions?

 DR. KARSTEN: So, I have some concerns about E Squared, to be very frank, especially as the emphasis has evolved to being more focused on undergraduate education. As you all know, you know, except for the geology programs, and maybe meteorology programs, GEO primarily plays at the educational level. At the graduate student level we, you know, bring a lot of people in from primary disciplines, and they get into the geosciences at the graduate level. I think GEO has made a very healthy commitment to E Squared. I’m a little concerned that the funding opportunities may not ultimately benefit our community in the way that we would like. But, you know, this is, as Marge says, it’s a rapidly evolving kind of situation.

 So, I think what’s going to be important is that we pay attention to GEO’s interests in working in these cross-NSF type programs, and we also try to help our community be well prepared to compete for those funds when they do become offered. So, there actually is going to be a Town Hall at the fall AGU meeting focused on undergraduate education in the geosciences, and talking, you know, about some of these, you know, both opportunities and, you know, challenges that we face as a community and how to, sort of, shift that, you know -- maybe think disruptively, almost, about how we approach undergraduate education in the geosciences. Broadly written.

 DR. CAVANAUGH: I would really like to emphasize that last point about being prepared to jump in and take advantage of this opportunity. GEO felt that this was going to be an -- E Squared was going to be an important opportunity for us, you know. But as it is evolving into something that looks as if the solicitation may, not so much have focused areas, but be more of a general call, it means that we’re going to have to really encourage people in the geosciences to send in proposals to compete. And one of the things that I was thinking might help us a little bit is the fact that -- so maybe some of the things that might be done at the upper levels, in upper levels of undergraduate experience might -- maybe that’s some place where we really can make some inroads with folks who would then go on to graduate programs.

 So, right now it looks as if the emphasis will be on undergraduate years, but maybe some leeway to talk about -- to work on people just coming into the undergraduate programs, than just going out of them. So, thinking about not necessarily just making the freshman class more attractive or something, but how some novel ways to maybe ease these transitions into the geosciences and out of the geosciences; or how to make some of the interdisciplinary experiences, you know, in BIO or other areas, you know, something that’s, you know, helping the field as well. So, I think we all need to pay attention; that town hall could be really important.

 DR. KELLOGG: Harlan’s back, so I’m hoping if he had any additional questions he could ask them. Harlan?

 DR. SPENCE: Yeah. Thanks so much, Louise. I am back on.

 DR. KELLOGG: Okay.

 DR. DELANEY: So, I’m just going to try and summarize what I think I just heard from the two of you. I would say that our last meeting, the Expeditions in Education, was probably the most confusing presentation that we heard. And I’m not -- you don’t have to agree with that, I just, I think it did not --

 [laughter]

 You can’t. You’re all looking at me with a very good, straight face. But it was very unfocused. I felt that the presenter was unresponsive to our questions, and I had a lot of concern about this. So --

 DR. TAYLOR: [inaudible]

 DR. DELANEY: [laughs] Yes. And I think as it’s evolved, you’re saying, it has developed a more specific focus. But it’s coming back -- yeah, it was a low moment.

 FEMALE SPEAKER: But it’s a [unintelligible].

 DR. DELANEY: You might’ve just blocked it out in one of those -- yeah, it’s kind of -- and so, I think what I’m hearing is that it has evolved in ways that might not align well with geosciences. But we need to keep the pressure on, in the sense of seeing whether our community, that’s grown under the programs in Geosciences Directorate, can get an influence on that program, and get funding on that program.

 DR. CAVANAUGH: I can say a little bit about the evolution, in a general way at least. And if you go back and you look in the budget request related to Expeditions in Education, the initial ideas were played out in terms of having topical areas, okay, that would be in place for a while and then, in an expeditionary kind of way, right, move on -- the implication was that you would, say, identify a couple topical areas; and then, say, a couple of years later you would have a couple more topical areas. And you should have this kind of -- I don’t know how to describe that -- but expeditionary, you know, kind of effort. Well, one of the -- a couple -- in discussing how to operationalize that, there were some major questions that came up. Number one being, how long do you think it will take to make a change in a particular area? And I think that this kind of idea of shorter-term expeditions, you know, that became, you know, sort of unworkable. I mean, because if you were going to start on some and keep some going, and then add others how -- in a constrained budget environment, how is this going to work? So, that was one thing that happened.

 Well, that affects GEO, because one of the early topics that was described in the ‘12 budget request was on sustainability. And so, once you back off from having emphasis areas, you know, then it means that -- and they become more general -- then it means that the communities, as we just said, are going to have to be out there to, you know, to bring their proposals, in order to be able to get a -- I don’t know, what word should we use? Fair share -- shall we -- of the emphasis in that project. So, that was one of the things, and I think it’s quite understandable.

 The other, and it goes along with the idea that there’s been an increasing concern about using evidence-based practices in education. So, I do think there are some real opportunities to take advantage of some of those things that we have learned about learning and to modify what’s being done, you know, in a way that would be more effective and lead to a more quality educational experience; and maybe even increase the number of students, you know, who persist in the sciences.

 So I think those main principles are still there, and I think the decision to emphasize the undergraduate education is -- with maybe some fringes on it -- is probably a good one for that because you still have the -- you still do have the Education and Human Resources Directorate, you know, that can focus on, you know, other, you know, K-12 or other groups. You know, but if the frontier science and the excitement of field work and research experiences is an important part of what we want to do in this one, then I think the undergraduate experience is one where the community -- our community, you know, can bring a lot, or has a lot to bring.

 So, that’s where it is. And there is a group that’s working on drafting a solicitation, and I haven’t seen it yet so I don’t know, but those are the lines that they’re thinking along. Does that help? And it’s a little -- hopefully it’s a little more clear now than before.

 DR. MORGAN: I just wanted to add one other point to this. And I think that fact that the focus of this has maybe moved away from issues, specific issues like sustainability that was in the initial call, I think it’s even in the budget description of it.

 DR. CAVANAUGH: Cyber was in there.

 DR. MORGAN: Cyber was in there as well. GEO’s making a significant contribution to this as a -- in terms of the budget, the fraction of the budget to this activity. And it’s really important that this committee and our community is aware of that and that there should be opportunities for them to be able to play quite well in this particular arena. But we have to make sure the word gets out in a very deliberate fashion.

 DR. DELANEY: Right, I agree. Marge used the phrase “fair share,” and I think more like “proportionate share.” It’s just -- it’s a little funny that the whole directorate that has the largest number of areas that actually go on expeditions --

 [laughter]

 -- has the program kind of moving away from us and how it’s articulated. They are the ones that go on expeditions. So...

 DR. TAYLOR: One of the related things, as it gets more specific and somewhat more general, is the nature of who proposes. And I’m wondering, is this sort of headed towards, you know, a community of practiced, sort of, approach. Especially, do you think even in the decadal review of the GeoEd and OEDG programs, is this looking to almost require collaborations across many universities, or many groups of, let’s say it was undergraduate meteorological programs? Do you need to get a consortia of folks from a whole lot of different universities teaching similar things, to actually put in a proposal how to change the way undergrad MET is taught? I mean, I’m just -- you know, is it forcing things away from small group proposals? Is it institutionalizing a different kind of proposal? And -- because if it is, the how you prepare for this and how you get the proportional shares is dependent on the nature of the proposal that you’re trying to write.

 DR. CAVANAUGH: I don’t know if I have an answer to that one. Maybe Jill has an answer to that one. But there is a big trend. One major trend is towards evaluation. And I think that in terms of, you know, planning, you know, a proposal for almost anything related to education anymore, you need to have some, maybe, partnerships or collaborators, you know, who can help with that kind of thing. I do think that’s a major trend. Size of the group proposing I’ll leave to Joe.

 DR. KARSTEN: So, I guess I would say the evaluation piece is less of a driver. You know, in fact GeoEd and OEDG, for several years, have required evaluation as part of the proposal process, so that project level evaluation is not the driver. Program-level evaluation does seem to be a concern to OMB, and we’re all waiting for the Committee on STEM Education “Five-Year Strategic Plan for Federal STEM Education Investments” to come out. It was supposed to be out in July; it’s going to come out after the election now. And there is a strong emphasis in there on program-wide evaluation, and common metrics across all of the agencies that support STEM education activities.

I think one of the hallmarks of E Squared as originally envisioned, which, you know, I have personal experience with through the Climate Change Education Partnership Program, is this idea of bringing together different expertise. It’s not so much the scale at the institutional level, but it has to do with people who really are wedded in the learning sciences, research; and understand cognition and how people learn; and how to teach effectively with the disciplinary scientists and researchers who basically bring the content expertise and the access to the cutting-edge, you know, research questions. And how do you bring those communities together? And Walt, you know, may want to comment here, but, you know, it takes a while to bring those types of people together to have a meaningful, productive collaboration. But the -- and so, you know, this is -- one of my main concerns is that when we start creating funding opportunities that are trying to require that kind of expertise, you have to prepare the community to have that -- they’ve already had to have had that conversation to be successful in those kinds of proposals. And unless the funding opportunity, you know, has that, you know, phase one really to, kind of, get people having meaningful, productive conversations, then it’s going to be hard for any community to do that.

 Now, I would say, you know, the geosciences has one advantage in that they are, you know, inquiry educators by nature, because it’s the nation of our science; and so they already speak some of that language. We have built a PI community through the GeoEd and OEDG programs that already do this kind of work, so hopefully they will jump on these opportunities when they do become available. On the downside, though, we are a small community. And so when you start going up against the engineering, you know, masses and biological sciences masses, just the sheer proposal pressure makes it hard for us to, you know, pursue that fair share, even if we’re ready to pursue it. So these are some of the challenges that we face. And, you know, I’m not part of that group that is preparing solicitations, so I can’t, you know, raise objections about specific implementation, you know, pathways, but these are some of the concerns that I have just conceptually about where this may or may not go. So...

 DR. CAVANAUGH: One thing I might mention in a general way about the program, or the agenda for the meetings, is that we still have I think, sort of, some crosscutting, topical areas that -- I don’t know if they met last time or the -- anyway, education, international, facilities and -- what’s the fourth one?

 DR. MORGAN: Data.

 DR. CAVANAUGH: Data. And it strikes me that a number of the questions could be grouped along those lines, and that you might want to consider whether -- at your next meeting you might want to -- we couldn’t do it this time -- but at your next meeting, if you might want to have sessions that line up with those topics, and even sacrifice some of the time that you might spend in your divisional subcommittees for those sorts of topics. It’s just a thought, but there might be a lot to talk about. I mean they’ve come up -- facilities has come up, international has come up, education has come up, cyber came up a little bit. But those might be some areas that you’d want to dig into. And then, it might also help Brian, you know, in a response to Brian’s question about giving advice, you know, and working in advance, giving advice, and being in front of things instead of behind the curve. I don’t know. It’s just a thought.

 DR. ROBINSON: This is a, actually somewhat different, question, but it gets back to SEES. And since I am now the head of a geosciences department, and I have on my desk a couple of documents: One, I think, is called “Daedalon,” and the other one is “Transitions.” And these are sort of using Deep Time information to inform issues of our -- or understanding of issues of future global change. And I was wondering where those were going. And particularly, you know, is there a plan for sort of a Deep Time SEES?

 [laughter]

 DR. CAVANAUGH: I just don’t know what to say.

 [laughter]

 Okay, let’s see. I would say I haven’t heard anyone talk about Deep Time SEES before, so it’s sort of an exciting idea. But it doesn’t mean there couldn’t be one, I guess.

 DR. HARRISON: If I -- based on my limited time here, I would say that part of our new solicitation in SGP includes a track called “Earth Life Transitions,” which is definitely oriented in that direction, and draws very tightly from the “New Research Opportunities in Earth Sciences” document.

 DR. KELLOGG: So, it’s actually time for a break. We will have more discussion later. And then from here we go on to the division breakout groups. We’ve typically actually had two of the crosscutting breakout groups discussed at the last two meetings. So we’ve covered them over the last year, not this year.

 [simultaneous talking]

 Not this fall, because we have the polar programs bringing them in. So, at this point we will break for coffee or tea, and people will move to the location of their breakout groups, which is listed on the program.

Those of you who are online, you have instructions on what to do to be able to join the breakout meetings in about 15 minutes. So thank you.

 [break]

Division Subcommittee Reports

 DR. KELLOGG: Okay. I think we have everybody back more or less, so let's reconvene and start. So, we're going to start with the -- actually, just a couple of logistical things first. Can you do it later? Thanks. Just a couple of items. I asked Melissa to put up the "Dear Colleague" letter that Jill mentioned earlier, which is asking for feedback on changes in the education program. So, that's now, for the committee members, easily available to you on the site that has all the presentations and so on so you can find it without too much effort, and I encourage you to read it and respond to that.

 Okay, so we are going to hear the division subcommittee reports, and I think we'll just do them in the order that they're listed on the agenda, which means we start with Atmosphere and Geospace Sciences and with Walt. So I'm going to turn the meeting over to Walt.

 DR. ROBINSON: Hi. I'm going to ask the committee members to chime in to correct me, chide me for omitting things, and I'm going to -- we had a pretty wide ranging discussion. What I'm going to do is mostly report on the things that we spent most of the time discussing. We heard about ongoing developments in AGS starting with the ACCORD [spelled phonetically] program, which is Atmospheric Chemistry -- fill in the rest, Michael, for me please.

 DR. MORGAN: Chemistry, observations, research [inaudible].

 DR. ROBINSON: Okay. And, okay, so there's only one C. Okay. So, and that's -- that was developed in response to reviews, I guess a site visit to the --

 DR. MORGAN: [inaudible]

 DR. ROBINSON: [unintelligible]

 DR. MORGAN: [inaudible] I guess. It's Atmospheric Chemistry Center for Observations Research --

 DR. ROBINSON: Right.

 DR. MORGAN: -- and Data.

 DR. ROBINSON: Okay. In terms of NCAR we had some discussion about the budget process for NCAR. Right now it looks like they will take a 1.6 percent cut, but originally it looked like it was going to be 6.4 percent. And we heard from Michael about that process, and we had some discussion about the -- about community responses and where there were the opportunities to have -- for the community to have input, and I think the key message there is the community has to -- needs to be engaged with the process in advance, but cannot expect realistically to reverse cuts that have been made, and this was in response to my question, actually, about a particular -- a group that was cut at NCAR, and you know, a flurry of emails get sent out, or people were trying to organize a letter writing campaign, at which point it's much too late. And so the idea is to get the community engaged early on, and maybe that's a message for us to get to the community.

We talked about One NSF investments that relate directly to AGS, and there is a significant increase in the AGS budget of -- I had $15.7 million. Is that correct? But much of that is actually designated to go towards One NSF initiatives that we heard about this morning, the SEES initiatives, EarthCube, and INSPIRE. We talked a little bit about the E Squared, Expeditions in Education. We visited some of the concerns that were expressed about that initiative here this morning, and I think the bottom line for us was the community is going to need, particularly probably the Geo community in general, but particularly the AGS community, will need not only to be informed about the opportunity, but will really probably need some guidance about how to respond. We discussed the ideas. It would be useful to have webinars that would help them respond effectively.

 We had an extensive discussion of the INSPIRE program. Rich Behnke filled us in on how that's changing this year. I don't think I will review all those details. The discussion related to -- but it is being changed. There's going to be three tracks of INSPIRE this year with deadlines. The discussion, I guess, was two parts. One is the concern that was raised that people who are already doing interdisciplinary things are -- in some sense, if they are in a program that's interdisciplinary, in some sense handicapped, because they are already doing it. And I think the point there was people should -- I think -- the bottom line was people should not be bashful about proposing these ideas. They should not rule themselves out a priori. If they have -- if they meet the requirement of a connection with a -- intellectually significantly different discipline they should go for it.

 There was a question I raised actually about this sort of testing a hypothesis -- the INSPIRE program is a test of a hypothesis that conventional peer review leads to overly cautious outcomes and penalizes interdisciplinary research. That was my take on it. The -- it was pointed out that well, yes, ultimately, you know, we'll see how the results work out in a program like INSPIRE, but was reminded that it is a very, very small portion of the over NSF -- it's not NSF budget, so it's not like huge amounts of resources are begin taken out of conventional peer review programs and put into INSPIRE.

 And let's see, another interesting thing for AGS was a National Center for Environmental Prediction, which is the NOAA folks who do all our prediction of weather and climate and so forth, their labs. There is going to be a visiting scientist program for PIs to apply to visit NCEP and a "Dear Colleague" letter is in the works, and that's really to build -- to create research operations.

 I'm going to pause here to let my committee members chime in before I go on to Hazard SEES. Anything I've missed up to this point?

 Okay. All right. We had an extensive discussion of the Hazard -- Natural Hazards program and SEES. The history that goes back to a disaster reduction document that was produced 2005, and a program Frontiers and Earth System Dynamics. It was very geocentric and -- or relatively geocentric in 2010, and then the idea of Hazard SEES is to really get from the Geoscience -- I guess we're the makers of the hazards in the geosciences. We're the source of the hazards. It's a natural phenomena. It’s interactions with the built environment, and then it's interaction with society and societal responses that would lead to disaster resilience. And there are six directorates involved, but a very substantial amount of the money is coming out of GEO. So, the expectation is that GEO is going to be a major player in this.

 There are two types or two tracks, a sort of more smaller kind of planning initial work track up to $300,000 for two years, and then a track two up to $3 million for four years. The -- one of the reasons to have the two tracks is to address -- to lower the barrier to entry for early -- relatively early career investigators. The requirement is to have three PIs, and they should really be associated with, intellectually at least, with different directorates in the Foundation. And that, in fact, led to a lot of discussion about, what about people who are already working in the natural hazards sphere, and if they're working with policy, if they're working with communications, if they're working with policy, if they're working in law or people in the law, across the disciplines, are they going to be ruled out from competition? And I think the answer was no. The -- that said, I am going to quote Brad. Is Brad still here? Brad Smull? [laughs] He did say, "People who have established -- having an established relationship with an existing NSF program will help." So, I think it'll be interesting to see how this works as the proposals come in. One of the issues I raised is that SBE NSF tends to favor the very quantitative social sciences, whereas there are more narrative descriptive areas of social science that are relevant to hazard response.

 Okay. So, but the plan is to really to get from a map from our understanding of the natural hazards to applications and resilience to hazards, and to create a community of people, or to build a community of people working on that. There was a lot of discussion on that, so I'm going to give my committee a chance to -- anything they want to add.

 Okay. [laughs] Okay, I guess I haven't -- okay. And I'm going to skip actually -- going on chronologically now, because we talked more generally about the SEES effort and whether it's producing the outcomes that NSF had hoped for, and what the motivation was from the Foundation. And certainly it was very strong championed by Marge's predecessor, but also it was responsive to the administration, to OSTP, to getting our science to the point where it's actionable in the environment and the sphere of the environment. And so scientists down in the trenches might say, “Wouldn't it be great if we could just all get more money for our core programs?” The reality is to actually bring money, resources, to increase resources, and you have to be responsive to the administration and also the -- and the administration presumably is responding to what they certainly see as societal needs. So it's not something that just comes from inside the Foundation. I think that was one of the points of that discussion.

 And, you know, I think I pushed a little bit on a question, is SEES, the programs we're seeing, are they succeeding in building these communities? And the answer was -- that I was hearing particularly in the second round of the EASM proposals are in review now, is that yes, it looks like -- it's early days, but the trends are positive that the second round of those proposals were more responsive, and it looks like the community is kind of starting to get it, and there's hope that the community is -- this is obviously a lot of overlap between the Coastal SEES, the Hazard SEES, EASM, the Earth System modeling part of SEES that the cross-fertilization will lead to a community that's -- as each one of these opportunities comes along that is more responsive. But it is -- it's early days. It is something really new.

 Okay, then the other thing we talked about was the need for mid-size or mid-scale, I heard both terms used, infrastructure to fill the gap between the MRI programs and MREFCs, and that's a very big gap from something from 4- to 9 million [spelled phonetically] or $450 million, depending on how you could count; so it's a big gap. And the mid-size program in AGS -- well, it was preceded by the AMIZER [spelled phonetically] program, and then really led to the mid-size. It's produced the A10; the mid-latitude SuperDARN for the upper atmosphere folks; and the Cosmos program, which is a novel technology for measuring soil moisture using cosmic ray scattering. And I think those programs have viewed -- well, the A10 we don't know. It's just -- that's a work in progress, which we heard a little bit about, but we're certainly optimistic. It meets a community need. We're optimistic it'll be successful. So those have been successful programs, and couldn't have been done without a mid-size program.

 And there are ideas out there. There's a lot we heard earlier this morning. There were lots of ideas for the upper atmosphere -- sorry, the Geospace science community. [laughs] I should get my terms right. There's a feeling that there are also ideas from the atmospheric science community, and there might be more if they thought this opportunity was going to be around, but hasn't -- those funds were used to prevent -- to mitigate cuts to the core programs, and so the opportunity hasn't been there, so it's likely that the demand is building. There was discussion in National Science Board. This is out of the realm of my expertise and Marge could correct me, but from one discussion I understood -- the National Science Board decided not to do an NSF level mid-scale effort, but that it should be left to be taken -- handled at the divisions and in directorship, and in -- yeah, directorates.

 Let's see. The -- and one idea that was actually floated, I don't know if it's going to get any traction, is that some fraction of the Science Technology Center competitions would be converted to mid-size competitions. That idea was raised. I don't know if it is really on the table.

 Okay, then there was some -- I'm almost done -- discussion of -- sort of philosophical discussion about some of these big efforts like the SEES effort and the tension. The question was raised about the tension between things that are top-down versus bottom-up, and it seems like there's a greater fraction of resources that are made available to the community in these sort of big solicitations. And where the pressure from that is coming from, and I think that gets back to the SEES discussion, the pressure is coming from the demands of the federal government, of the administration to see the science address problems.

 Let's see. This is maybe impolitic, but I'll mention it because it was raised. It was questioned if there was any news about the search for the associate director, and [laughs] and --

 [laughter]

 -- and there was --

 DR. CAVANAUGH: George wanted to know, actually.

 [laughter]

 DR. ROBINSON: Okay. That was raised at our group as well, and it was felt that it was no rush, Marge, but people are just curious I guess. It's probably more as curiosity as anything else.

 DR. CAVANAUGH: That's a good cover.

 DR. ROBINSON: Yeah. Well, actually what was the concern, actually, you know, you're sitting here. I don't mean to embarrass you. The concern is to -- were you -- was it being -- was your effectiveness reduced by having the word “acting” in front of your name? And the conclusion was, no, that wasn't the case. It wasn't a problem, and so really people seemed happy with the current management situation. So they didn't feel there was any urgency about this, but the committee, of course, is curious always. It's the type of gossip you hope to take back to your home institution from these meetings, you know? I know who the new -- okay.

 DR. CAVANAUGH: Okay.

 DR. ROBINSON: And of course we don't, because we didn't hear anything, except that it's ongoing, I guess. Finally, there was discussion about -- two discussions. One was continuing from this morning about what is the purpose of meetings like this and how can we use our time? This followed directly -- picked up on comments Brian had made this morning. And it was felt, particularly in the subcommittees, but also in the group as a whole, that the more -- that issues that are raised in advance that we know are going to be addressing information provided in advance, so that we can do our homework and, of course, there's a responsibility on the committee members that we'll do our homework if it's assigned, that that would really be using our time more effectively, and we heard from the program officers that that would make us more useful to them. So, I think that's something to strive for, both at the big committee, advisory committee level, and the subcommittee level. Just having the slides in advance, hearing about what's going to be discussed gives us a chance on the committee not only to think about it ourselves, but probably more importantly to talk to our colleagues. And so we represent not just the individuals in the room, but we are really supposed to represent a broader community.

 And the final thing we talked about was this meeting, and whether it was working to have a hybrid of a cyber -- virtual meeting and a face-to-face meeting and the people, particularly on the phone, said they didn't think it was working, and I think the people in the room agreed. It is actually remarkably hard to remember to look at a screen or to query someone on the phone. And that -- so the -- a couple of points were raised. One is that -- and the people on the phone or on the computer remote felt they -- it was really second-class participation. So I would say two things about that. One is it's possible, and several of us suggested that a hybrid format might be the worst of all possible worlds, because people have participated in virtual meetings where everyone's at a computer and they worked well; although it was pointed out that usually in those cases it's pretty focused. You have a task, and it's less free-wheeling than these meetings are. And -- but there is reason to make, you know, this is my personal bias, aside from the cost, there -- some of these things can be made better by technology. The technology will advance if we push on it and we use it more, and it's not only a matter of money, it's also a matter of environmental impact. It doesn't seem popular in this country anymore to talk about greenhouse gas emissions, but we emit a lot of greenhouse gases when we get on an airplane.

 So I think the feeling is if we’re going to continue the experiment it's going to have to be significantly tweaked that this -- today has not been -- today has been less than satisfactory. I'll leave it at that. And I'll just open it up to things I might have omitted from our committee discussion.

 DR. SCHIMEL: Just to expand on the -- how to make better use of us in conjunction with the virtual conversation, at least in subcommittee, it's fairly common in our subcommittee, for the division to queue up specific issues that they'd actually like advice on, and I think doing that more in plenary where we have some material in advance, some time to think about it, and we know that you're going to ask our advice about a specific decision that has not yet been made.

 On the virtual, my feeling is that fully virtual meetings, perhaps quarterly rather than twice a year, or three virtual per one physical or some combination like that, where the meetings drop down to more like two or three hours and focus on specific issues, is a viable alternative to having two face-to-face meetings a year. I do a lot of my business that way, and more shorter, more frequent virtual meetings with limited agendas work pretty well. This type of meeting I don't think works very well virtually where there are a lot of different topics. You're spanning a lot of time zones, which means if you're doing an all-day meeting somebody is out of luck; whereas if you're going to schedule three or four two-hour meetings you can actually pick the time slot that works for the entire suite of time zones. But you can't maintain people's attention for an inordinate amount of time so that meeting would have to address a topic or two topics, but wouldn't cover the whole sort of breadth of agenda that you do here. I think that would be more viable than this hybrid model. I think the hybrid model is hard on everybody.

 DR. KELLOGG: If we were going to go that direction I would want to know -- hear from the program officers, the people sitting in the room and listening, about whether that would work for them or be harder for them. My guess is it would be fine, but I'd want to know that. Anybody online want to weigh in on what you just heard on any of Walt's report?

 DR. KEENE: Hello. This is Bill Keene, Atmospheric Chemistry. It is hard to participate in a virtual meeting for long periods of time. So if that's the MO, both financially and from an environmental perspective, then I agree that shorter meetings with a more focused agenda make a lot of sense.

 DR. KELLOGG: So I'm going to suggest that we table that topic of conversation until the end of the meeting, because otherwise it could become the topic of the meeting. So, we will carry on with our current format. Are there any other comments or questions or additions to what Walt said about -- in the rest of his report?

 DR. CAVANAUGH: I have a feeling the AD question may have come up in other sessions, too, and not to put this off, but this is another one that you might want to ask Dr. Suresh when he meets with you tomorrow, because it's actually the director's, you know, search for an assistant director. There was a search committee that was put together last year. It's been a year ago now, and they generated a fairly large number of names, as I understand it, I mean 50 or, you know, 70. Something like that. And I think that they -- the search committee contacted some people. I think they talked to people about people, and eventually helped identify a smaller set for the director to pursue. They had interviews in the -- gee, I guess in the spring, and there was -- no one came out of that particular set of interviews. I think that there were mutual, you know -- I think there were -- it wasn't as if they were not satisfactory on this end, you know. It's -- there has to be a match on both ends, and so I -- my understanding is that these -- those didn't work out. So, the director and especially I would give credit to the deputy director, to Cora Marrett, for having continued to look for additional names and to invite additional people in for interviews. So, I think that since that initial round there have been about four or so, maybe five, people who have come in for interviews. So, they continue to look for names. They continue to interview people, and so I would urge this committee to continue to identify people, and however you want to do that, if you want to send them to Melissa or you want to send the names to Louise, whatever, to me, however you want to do it, and I'll pass them on to the director's office. And they may be names that they have already. They may be the names of people who they have talked with already, but I don't think that should discourage you from turning the names in. And they'll keep looking. I think they're quite -- I don't know. I don't know how diligent, you know, how you characterize the search, but they seem to be very persistent in going about this, and to be very, you know, dogged in looking for names and continuing to identify people who they feel they would want to interview and who would come in for interviews. I know that they have asked many -- talked to a lot of people about their potential interest in the position who have said that they, you know, they weren't interested or they couldn't do it now or, you know, whatever. So, as you might imagine, I'm sure you're all involved in searches at your own place and you know that it can be difficult. So, that's the story as I know it.

 DR. KELLOGG: Thank you. Thank you, Walt.

 DR. HORNBERGER: Chairs of this committee have turned out to be pretty good.

 [laughter]

 DR. KELLOGG: George, you're up for your report next.

 [laughter]

 Thank you, Walt, and thank you, Marge, and thanks to the people with the questions. So I'm going to turn it over to George for the EAR.

 DR. HORNBERGER: Okay. Lots of similarities. I could just say ditto or that to Walt's report, or note that everything of importance has already been said, but not by me, so I will persist. We heard from Wendy, our new director, who gave us the status. She also acknowledged that she's going to need at least two weeks to a month more to figure everything out here. [laughs] She did point out several -- very honestly, several things that she has on her agenda, at least now until she sees how things play out. One of them being that she doesn't think that the portfolio of investments in energy and mineral resources is very visible to the outside world, and she thinks that that is clearly of strategic importance just looking at one of Marge's slides, what the White House thinks is important, as well as lots of other people. She also pointed out that she thinks there is work to be done on the assessment end of broader impacts, at a more disaggregated level that individual investigators could actually do more that would provide lots of good information. Several other things are mentioned.

 Let's see. We heard -- also heard about Hazard SEES. In the interest of turf I would only point out one thing. It originated from EAR, not AGS. [laughs] It was the CaMRA initiative that Bob Detrick and others had put together.

 DR. ROBINSON: That mistake was mine, actually. Brad actually mentioned CaMRA.

 DR. HORNBERGER: Okay. I was joking, of course. There's no turf within GEO.

 FEMALE SPEAKER: We’re One GEO.

 [laughter]

 DR. HORNBERGER: One GEO. [laughs] But obviously that's -- it's quite an interesting program and it's great to see that off to a start. It's obviously broader. It's cross-directorate. We had some of the same questions that came up about the necessary -- the necessity of having these different players from different directorates as PIs and how that was going to work out in practice, and we'll have to wait and see.

 We also heard from Paul Cutler about the Coastal SEES, which is another cross-directorate initiative that, again, it's certainly of great interest to OCE and AGS, as well as EAR. And so that's another, I think, really interesting program.

 Leonard Johnson talked about a new initiative Integrated Earth Systems, IES. The continental dynamics program is being, I don't want to say folded into this, but it is basically an expansion to look at Integrated Earth Systems modeling, recognizing that there are connections primarily now, this is not FESD, it's not to replace anything broader, but there are connections between what we refer to the solid earth and the surficial earth processes and focusing on earth system dynamics in that domain.

 We had a pretty extensive discussion with Raffa Montelli about innovation, I-Corps, and the opportunities for Geo pointing out that the community -- there's a belief that the community actually is ready to really do lots more in this area, but that a passive approach, expecting people to come in fully knowledgeable about this, is probably not the way to go. And so she -- well, as we know, Dr. Suresh is really interested in this innovation, and so she is taking -- Raffa and colleagues are taking a very pro-active stance and going out and actually engaging with people and really trying to get people to propose and to understand how one does an I-Corps proposal and others.

 We then went on to some discussions about issues. Wendy said as long as we can give clear advice on how to solve the infrastructure versus operation and maintenance effects -- if we can solve that for her by next meeting she would be happy. [laughs] So this is an issue, again, that transcends EAR. It's an issue that we face, and I think the whole Geo directorate faces, if not the whole Foundation. So that's something that is on our plate.

Roberta brought up the point that we have this issue with -- because matching funds are no longer allowed, there are some opportunities for these intermediate -- what did you call them? Intermediate scale facilities?

 DR. ROBINSON: Mid-scale, mid-size.

 DR. HORNBERGER: Mid-scale, mid-size. That some opportunities may have gone by the boards, because we don't allow matching funds. That's, of course, a pretty touchy issue, because of various things that the NSB has said. But, just pointed out, because I think the MRIs are clear exceptions to that, where a 30 percent match is called for.

 We had a little discussion about EAR and the impacts of OPP joining GEO and OCI coming in to CISE. I love it. You only have to come to about three meetings and you just talk in acronyms.

 [laughter]

 Most of the acronyms I don't know even know what they mean.

 [laughter]

 It's how I know the programs. And I think that from the EAR standpoint it looks to be, I think, pretty transparent, because people at program levels have collaborated and will continue to collaborate, and the question probably, if there is -- if there are issues that they would arise at a higher level. Leonard, I guess, pointed out that the collaborations with the Office of Cyber Infrastructure, OCI, has been direct and now that they will be in within the -- it's a separate division, separate directorate, that it adds -- potentially adds another layer of management that could be, but probably won't be problematic. Just a question.

 The E squared. It is a significant investment, again, as Walt pointed out, and the key is going to make sure that we get community engagement, and any way that we can think of to build that would be a big help. We also, of course, talked about Brian's -- what should we call it? [laughs] Challenge. Brian's challenge to us and, again, really had some similar feelings, at least for the EAR subcommittee that if there were -- if we could formulate some questions -- specific questions that EAR would like advice on ahead of time, that would probably stimulate richer discussion at the subcommittee meetings, and just concluded that a similar thing would probably also hold at the GEO level.

 We did question Brian's fundamental assumption that if all the material were put on the web ahead of time, all of the members would read every word before they arrived at the meeting. [laughs]

 [laughter]

 DR. CAVANAUGH: He has a long plane ride.

 DR. HORNBERGER: But it's an assumption. That's all I have. I welcome committee members to weigh in with anything I may have missed or misstated.

 DR. KELLOGG: Anyone else from the EAR group want to weigh in? Especially the people who are remote?

 DR. FISCHER: I think that was a great report. One other issue that we discussed to some extent was the potential budget for fiscal year 2013, and we had questions at some of the items in that, though we do realize that with the continuing resolution that budget might actually never come into play.

 DR. KELLOGG: Thank you.

 DR. CAVANAUGH: I'll chat if nobody wants to [inaudible]. Okay. A couple --

 DR. KELLOGG: [inaudible] reports, yes.

 DR. CAVANAUGH: Right. Well, no, but some things have, you know, trigger certain things. One of the things I thought would be helpful, especially, I think -- I thought of it partly, you know, when Walt was talking about top-down and bottom-up and all that, and then Karen’s brought up budgets. You know, we really pushed in the budget development stages here for a lot of things related to hazards and disasters, and the reason we did that was because this group had expressed interest in that area over many, many years. And so, it -- it's not as if it turns up in SEES from the top down, you know, totally, as if it came from the head of Zeus or something, it really was, you know, a concerted effort, I think, over more than one year of our saying, you know, this is an important topic, and also talking about it with people in other parts of NSF, so that when it came forward it wasn't coming just from GEO, you know? And so there were folks in bio and there were folks in social sciences that expressed interest, too, and so that's how it begins to be something that becomes, you know, an initiative, if you like, or is funded that way. And so then when we -- and I do think it builds the budget in the end, because there is a stage in the budget development in which you identify what you want to spend, you know, what you want to spend your funds on over a very low level, actually, base level. And you don't always win in those. You don't always win. And I think if we hadn't, you know, had a topic like that that we had -- were able to describe that well, and which had support not just from one directorate, but from more than one directorate, then you wouldn't have seen, you know, the allotment, if you like, coming back in our direction for that topic. So, it's a dynamic. You've all been involved in budget developments, and there is a lot of back and forth, and a lot of it that's very -- I don't know what -- I won't try to look for an adjective, but I think that we do listen.

 Now, if you look at the budget development there is -- I think that you could -- there's probably some utility in talking about emerging science areas at the fall meeting as opposed to the spring, and so one of the things -- I know you do it all the time in your subcommittee meetings, but I think it's, you know, it's an important thing to do and we do listen, and maybe it's at the fall meetings in those subcommittees where you could, you know, focus a little bit more time or -- I think you do already, but you know, more -- have part of your discussion in a more focused way beyond where you see emerging areas, and where you see gaps in what we're doing, and that kind of thing, because that puts it in the -- on the table when the -- in the early part of the year, you know, and in the January to April time period when the division directors are doing a lot of thinking about that topic -- about that sort of thing. So, anyway. I just thought I should say something about the fact that we do listen.

 And right now I'm not sure what I'm hearing as a theme, by the way -- I do listen for it, you know, and I'm not sure what I'm hearing. Disasters was one that really was very powerful for a while, hazards and disasters, and I'm not quite so sure what I'm hearing now from the community. So, anyway.

 DR. TAYLOR: Yeah, Marge, just a follow-on. Concerning how the GEO directorate decides to put funds into programs in various SEES initiatives, in the education initiatives, how -- on the other side of life in the management of those programs once they've been funded and calls go out for proposals and proposals come in, is there the oversight of what has been termed earlier in this meeting proportion [inaudible]? So GEO funds 40 percent of Hazard SEES, say, or -- I don't know what the number is, but whatever that number is, and then the, you know, how that Hazard SEES funding portfolio of proposals get funded, does that, you know, does GEO control 40 percent of -- I mean, how is that -- is it just a moral imperative that there's some, you know, proportionality of funding that leads to some proportionality of things getting funded, or is it much looser, you know, how does that really work?

 DR. CAVANAUGH: You need to come here as a program officer for a while so you can be in on those discussions. A lot of that happens, you know, in -- among the program officers essentially, once they're looking at the proposals. And so -- and there's a lot of back and forth there. I think one of the things that's really important is what happens up front, actually, and that's why I think you had probably in all the sessions, you had Brad and David and -- talking about that the solicitation itself. Because when you -- when --

 DR. TAYLOR: You get what you ask for.

 DR. CAVANAUGH: -- yeah. There is a sense in which you get what you ask for and they -- if you've written the solicitation well, and so -- and when they're writing that solicitation they know what the interests are from the various directorates, and so there -- with any luck, there's some match between the funds that the various directorates have put in, the way the solicitation is written, and the distribution, rough distribution of funds as they come out. Now, that said, there is genuine interest in doing interdisciplinary things. And that isn't all that formulaic, you know? So, I think there's a lot of give and take on those committees and it's important to look at more than one year. You might do -- if you're looking at the money, you might do better in one year than the other. But I think in general you -- it ends up pretty well, you know? And sometimes it's because you gave in one year that you get back the next.

 So, you know, and in any case I think our real goal here is to do good science, and GEO has so much to contribute to so many of these things that the value that society or the research enterprise gets out of it, you know, it may not really align that well with the money in the end. DR. KELLOGG: Well, a lot of these programs are new, and so they haven't had a solicitation yet, and it seems to me that we've heard about some where the match -- where they, you know, the participation of geoscientists is always -- is going to be really obvious like Coastal SEES and Hazard SEES, and then we've heard about some other programs that are -- where there's a lot -- well, there's just more effort being made and necessarily being made by the program officers to educate us about those programs, and it would be interesting to see in the long run. I mean, a lot of these cross-cutting things are new, but over a few-year period how it balances out.

 DR. SCHIMEL: I was going to change the subject slightly if that's okay.

 DR. KELLOGG: We have one more report to hear from, too.

 DR. SCHIMEL: Yeah, well it's related to the report. One of the things that came up, I think, in both of these reports was the OCI move, and you know, the anxiety that that raises in this little corner of the community is for a long time there was a real challenge that the directorate funded things that were exciting to computer scientists but didn't necessarily provide the advance cutting edge research to provide the infrastructure that was needed to support the other sciences. OCI addressed that pretty forthrightly. Do you anticipate that that type of partnership will continue as unencumbered? George raised that concern and it came up in our group as well.

 DR. CAVANAUGH: Does anybody want to talk to these things besides me? You know, I will just say that OCI, as I understand it, has heard from the community -- from quite a few people in the community that concern expressed. So you're not alone in raising it, if there's any consolation in that. But we have -- our major effort with OCI has been EarthCube, and we have talked with them since the realignment about their involvement in EarthCube, and -- in which they contribute, by the way, both staff and money, and they don't have any intention of changing that. So, I'd say that that's a very good beginning and a good sign to us that the kind of partnership we've had with them will continue. So, I don't know. Scott?

 DR. BORG: So, those of you that don't know me, I'm Scott Borg. I'm division director for Antarctic Sciences for a few more days. But actually this point -- it's worth noting that this concern goes the other way as well. OPP has gotten questions from social scientists and astrophysicists and biologists asking the question, you know, will it be harder for them to compete in those areas in polar programs? And the answer that we've tried to convey back is that, you know, we are aware of the concern, but it's our job to make sure that management here doesn't get in the way.

 DR. CONOVER: I just would add that several times today you've raised questions that are -- that are great questions to put before the director when he visits with you, including the one most recently asked.

 DR. KELLOGG: I'm compiling a list. Yeah, I'm ready. We're ready. Yeah. So, Peggy, if you would report on the Ocean Sciences.

 DR. DELANEY: Yes, I have a few slides.

 DR. KELLOGG: We might have to keep the director here for a couple of hours, although I don't think we have that option. We have no --

 DR. DELANEY: We have a lot of questions.

[talking simultaneously]

 DR. ROBINSON: Before you begin I would like to say how I impressed [inaudible] you've got slides ready [inaudible].

 DR. DELANEY: That's why it's good to be alphabetically last. No, it's how I take notes. We had a very interesting discussion in the subcommittee and I think maybe this was shared across the other groups. It was a little bit hard to distill everything down into what we wanted to talk about to the whole group. I think there were -- and we also want to not have it go without saying to say how grateful we were to David Conover for his presentation and to the program officers, and all of the work that they've done that's reflected in the progress we'll talk about here. Many things stood out as real positives. That's not mostly the purpose of the subcommittee report, but certainly a really difficult topic is the kind of dealing with the facilities, and we just saw a lot of progress in the modernization of infrastructure, even in a very difficult budget time. We've had the JR Refit that's in operation. The Sikuliaq is like an actual ship now instead of just a diagram and a scale model. The Alvin upgrade is on track. The regional class vessel call is out and there are essential elements of the OOI network being completed. So I think that's all really a plus and I think fleet renewal is something -- it's a phrase that's been in the community for a long time, the awareness of the aging of the vessels and that we're not quite at the right size fleet necessarily. And it's funny, once you start dealing with ships for those of you that don't do this is that they're almost as expensive to tie up as they are to run, and by now most of our ships are so old that if you tied them up in any significant way that would save money it's likely that not everything would restart when you start it again. They'll keep working as long as you keep driving, but they won't work if you turn them off. So, it's a tricky thing they balance here. Oops. Wrong way. The other page down.

 One of the topics we've heard about at every meeting and, again, David has made significant progress on this, is the notion of doing an Ocean Sciences decadal survey for, I think, the areas encompassed by NSF's portfolio. And he's gotten support from a number of groups on this. It's been quite a while since we did a decadal survey because we don't take time that seriously, I guess, as a community, so we don't do it every 10 years. And there's a lot of pros and cons, and rather than trying to say do it or don't do it, we talked amongst ourselves as to what we thought some of the success factors might be for doing one, and what some of the real dangers were. Certainly you would have to have a pretty carefully crafted charge. There's lots of tradeoffs that need to come at the program and NSF level that might not be well balanced by a group of people. You'd really need a key group of people that had the breadth of the field in mind. In the past when we've gone through planning efforts like this we've had a series of community-based workshops, either by disciplinary theme or by other things that gave a lot of broad community input. We were also concerned that if you had a set of themes that were too narrowly defined or too rigid you might limit funding opportunities for science that is actually very exciting and of high priority, because it didn't match a certain set of things that came out; so inclusive flexible areas. And this was a case where we kind of maybe played out in advance the potential dangers of a decadal survey committee in that it's necessary to be able to balance the need for infrastructure, the types of infrastructure and the operating costs with the science budget, and it was hard for us to even decide how to phrase this item. So we just see a committee getting kind of mired in this.

Some of the dangers if it takes too long and, you know, the document doesn't come out in a timely manner, it can be really difficult. Too prescriptive -- this could've been more briefly stated as the ocean sciences community could look dumb if we didn't do a good job of stating priorities, and that that could lead to real funding challenges. If you -- we have tremendously exciting science that's of importance to a wide variety of areas that are important to NSF, and if we didn't capture that in the decadal survey I think that could create a real challenge. Sometimes these things don't go right.

 And the boundaries, I think, for what has to be done this is the counterpart of the carefully crafted charge. The boundaries need to be really carefully set. And just for example, Marge gave a set of priorities for the geosciences. David gave a set of tradeoff priorities for Ocean Sciences, and for example, these were the seven that he had as this is what's in his head about managing the different priorities at NSF. For some of us you could see that the charge to the decadal survey community might only encompass the first four, and the ones marked in red didn't belong in a decadal survey. Others said, “Oh, no wait, that absolutely belongs there.” So even just defining what's in the charge or out of the charge, which I think will be important, wasn't something on which we reached consensus quickly at all.

 Like some of the other subcommittees, we talked about the incorporation of OPP into GEO, and we thought it was an interesting step to take the most facilities-dependent program into the most facilities-dependent directorate. Sorry, shouldn't say division, directorate, and say good luck to you all with operating all those things. Clearly --

 FEMALE SPEAKER: [unintelligible]

 DR. DELANEY: -- yeah, maybe there's one more --

 DR. CAVANAUGH: There's MPS.

 DR. DELANEY: -- there is MPS, right, so we could do --

 [talking simultaneously]

 DR. DELANEY: -- yeah. This is expensive stuff. Obviously this is very early in the process. We don't have enough information to evaluate. I think it would be of importance to this committee to hear about what's going on and to hear about, well, do you keep a separate advisory committee for opposite polar programs? Do we come on a path towards merging? Certainly an area of high concern and importance, and even the best laid plans can have some unintended consequences. I don't think we know obviously what those might be yet, but I think that there will just need to be attention to that paid as this kind of management decision plays out into structures, proposal evaluation, funding, all of those other things.

 This -- we had a hard time stating briefly, just as geosciences I think can play a leadership role in NSF, we think that there are ways in which Ocean Sciences -- we can be a little bit guilty of talking an insular language, but we actually contribute to these cross-directorate programs and in both science and facilities and education, and so we have a lot to contribute to these things. Our support of facilities within OCE isn't just for OCE. Lots of programs use them, and lots are dependent on them. And so, again, this was one where we struggled some with the language, interdependency of efforts, but again, I think GEO sets the standard in NSF. It's -- over the years I've watched it go from geosciences being a little bit more separate and as the focus at NSF became show us how you all led up to the big picture, geosciences really stepped up to that plate. I think OCE really contributes to that big picture and we need to make sure we get that across.

 This is the alphabet soup, and you know, George -- I heard David, too. I told David I thought he'd been here long enough, because he had some sentences that were fully acronyms, and then George reached the same level of achievement, you know?

 [laughter]

 Maybe a preposition or two, but really not much else in the sentence. Even -- I get to hear this regularly because I'm here. I read the "Dear Colleague" letters. I follow this, but there are many new programs with a rapidly changing mix and new acronyms for principal investigators to try and cope with. Many of those rely on OCE funded infrastructure and this is -- you know, I don't like the word, “fair share,” maybe “proportionate share,” but we've been scientific leaders in trying to get some of these programs going. We really need to enable the community to know they need to apply, to know that it's time to apply, to know how their science can fit in there, to do the thing that no one ever likes to do, which is call their program officer and say I'm thinking of doing X, how might that fit in? Because I think we have a lot of ways to have our science, our high-profile quality science garner resources through these new sets of acronyms. And one in particular I think we're concerned about how would we promote is EarthCube participation. OCE's not very much in there, and we could argue about why when you pick the word "earth" to stand for everything, oceanographers get a little snippy. "Oh, did you mean us?" Because [laughs] it's called Geosciences at NSF.

 But I think that, in the world of Big Data and in the world of how to use these tools to support the community, that ocean sciences really has a very important role to play, and I'm not sure that our community yet is at that level in EarthCube. And so it's ‑‑ we have to help promote that. And I ‑‑ my guess is, again, as ‑‑ you know, I've been at a meeting where, I think, except for IODP‑U.S. meeting, really among the junior scientists or people closer to their PhD, there were ‑‑ was more awareness of EarthCube, and then there was, like, me and one other old person that were members. And we promoted it to everyone at that meeting. You need to join because we need to shape this effort. We need to be part of it, and I think that's ‑‑ we're in a really critical time. I think that's it.

 DR. KELLOGG: Thank you.

 DR. DELANEY: A couple minutes over.

 DR. KELLOGG: Questions, comments, additions.

 DR. DELANEY: Oh, yes. Additions for my committee members.

 DR. ALLISON: This is Lee Allison. Could I make a comment. I'm chairing the EarthCube Governance Steering Committee, and we are engaged in a very aggressive effort to reach out to the larger community. And one of the things we've identified was that we don't have a good connection with the wide base in the oceans community.

So after this call or after this meeting, I'd like to follow up with the oceans community and identify targets ‑‑ meetings, organizations, institutions ‑‑ that we could work with to get more engagement between the Ocean's community and the EarthCube initiative.

 DR. ROBINSON: So something that only came up tangentially in our meeting, but I was reminded ‑‑ so we have the SEES initiatives, we have things like EarthCube where ‑‑ it was actually ‑‑ or the E Squared where there's a need to sort of actively reach out to the community from NSF, and these are tasks ‑‑ either management tasks for these large initiatives or outreach tasks for program managers.

 And so I've ‑‑ at some point in this meeting, and so I thought I'd bring it up now, I did want to get back to this issue of program officer workload and whether you feel, Marge, that ‑‑ you know, what shape is that in, I guess?

 DR. CAVANAUGH: Well, it would be different if you were here, Walt.

 [laughter]

 Well, I ‑‑ well, let me ‑‑ what I was thinking, by the way, on another track -- now I’ll come back to this ‑‑ is that the advisory committees that have at various times done things to promote, you know, to do outreach themselves or to let the community know about activities that are going on ‑‑ and they have taken a lot of different forms at different times, but I just ‑‑ maybe it's a good moment to remind you that you can write articles. You can, you know, support workshops. You can be involved in town halls. You can, you know, do a lot of these sorts of things or ‑‑ and I'm sure beyond webinars or ‑‑ which has come up a number of times. And so maybe one of the things you ‑‑ since it's come up so many times today, you know, I don't ‑‑ I think there's some time towards the end of the day tomorrow for the committee to think about some of the actions they might want to take, and then it seems to me this issue of outreach and what the committee might want to do or urge us to do or if you have specific suggestions, it's a really good one to come back to.

 Workload [laughs]. I don't know. It's ‑‑ I think that the workload issue is ‑‑ well, it's complicated, for one thing, but I think that program officers find that they are doing more and more in these cross‑Foundation kinds of activities, and they're doing a lot more in various kinds of working groups. And so those things are added on, if you like, to what they're doing in their base programs. And so I think it's a lot. I mean ‑‑ and I don't ‑‑ I don't know how you handle it. There are lots of ‑‑ and people say, "Well, let's cut down on working groups," you know? But then it turns out, of course, that some of the working groups are exactly the things that the programs are most ‑‑ officers are most interested in and committed to because those might be the things that enable them to be involved in some of the foundation‑wide activities or some of the foundation‑wide programs or to meet people, program officers in other parts of NSF, and they really enjoy those.

 And so, I don't know. We keep trying to go get better technology to help, you know, with the processing. And I think we've made some progress with that, and we're putting in some better technology that I think will help program officers with some of the budget actions that they have to take. But technology only goes so far, you know.

I think what they're ‑‑ what people are looking for is more time to ‑‑ time to think, time to, you know, spend more time with their communities, and it's really difficult to find that time, and it's not obvious where it would come from, frankly.

 I don't see, you know, a lot of hiring on, you know, increasing our numbers on the horizon. And so there ‑‑ if you're not going to do that, what are you willing to ‑‑ what are you willing to cut back on, you know? So you look at ‑‑ Leonard, you know, has, you know, is working with Continental Dynamics having a different look that is integrated with other things. You know, we had to give up some of the ‑‑ some of the way Continental Dynamics was done in order for something that maintains that community but does it in a different way.

Well, you know, it's ‑‑ I'm not saying that's the example, but there is an issue of how are you going to ‑‑ what are you willing to change or give up if you can't do everything, you know? So ‑‑

 DR. TAYLOR: Presumably at least the bubble of ARA has gone through, and that extreme overload pressure is no more.

 DR. CAVANAUGH: Yes. That's more or less true.

 [talking simultaneously]

 Yeah. That was good. Thank you. Thanks Brian.

 [laughter]

 FEMALE SPEAKER: [inaudible]

 DR. CAVANAUGH: Right. That was an amazing year. [talking simultaneously]

 ‘09 was amazing. There are still reports that the program officers have to do on all ERA funds though; so that still takes time. So something like that comes up and, you know, some of our friends who are in the Division of Grants and Agreements, I think, you know, I have to tip my hat to them because they try to look for the easiest way for people to be able to comply with the requirements. But it's still ‑‑ it's still time that they have to spend making sure that those funds are being spent well. I don't know. Anybody else?

 DR. KELLOGG: Well, we're actually due for a break here; so I'm going to suggest that we take a break and resume at 4:00.

 [break]

2012 COV Reports

 DR. KELLOGG: So welcome back, everybody -- [laughs] -- and we're going to have two COV reports. One ‑‑ the first one is on Ocean Science, Research and Education. And so we ‑‑ we're actually having Peggy and Walt do double duty today.

 [laughter]

 So, Peggy, we're going to turn it over. I know, I know. You don't get off easy on these committees. So I'm going to have Peggy take it away.

 DR. DELANEY: Well, I actually did get off easy in a sense because David started by having me potentially be chair of the COV and then found someone else to chair; so I ‑‑ it always felt like a tremendous relief.

 This is the org chart for the Division of Ocean Sciences. If you follow the link on our AC GEO web page, you can find the org chart. I've color coded it to show you what the COVs were. The two green ones were last year's COV that did ocean facilities and the technical support for the ships, and we saw that, I think, a year ago this time. The current COV did everything else: all the Ocean Sciences' ocean section programs, all the Marine Geosciences' section programs, Oceanographic Education, and Ocean Tech, and Interdisciplinary Coordination; so essentially did the majority of the division.

 You can read the report in detail. It's following the template format. But we had some areas of concern that arose from this. Diversity overall in the panel in the proposing community and the funding community and the students, including geographic diversity, probably like every COV at NSF. We had seen a great deal of progress in how program officers and others dealt with the Broader Impacts Merit Review Criteria, but you could see the proponent community and the reviewer community still struggling with how to do this, how much money was reasonable in a budget, were you supposed to do it for free, what type of activities counted.

 We did see the program officers very explicitly including comments on it in their summaries, which was good, and also being able to provide a little bit of leveling of expectations across the kind of range of some reviewers setting the bar really high on that and some proposals ‑‑ setting it really high, they were able to give a kind of more balanced evaluation. You'll see this as one of the urban legends, but we were looking particularly at how did multidisciplinary proposals do well. I think one of the facts that's true is, when the proposal submission pressure is as high as it is for NSF and the success rates are what they are, there's a lot of myths that accrue about, in what ways is your program really unfair? And mostly what we found was that it was pretty fair. It's just success rates are low.

 This differed a little bit -- by program, we had some concerns about how well did proposals that needed to be submitted more than once to get funded ‑‑ how well did they do? And I won't out the programs, but in some areas, it was clear that proponents thought you just got something in the first time for your proposal, and then you did a really good job the second or third time. And, you know, that adds to an enormous workload for everyone without really creating value, and so we were trying to both see if proposals went in more than once, did they get funded and stamp out that behavior?

 [laughter]

 I mean, all it does ‑‑ right? As ‑‑ I've been a journal editor. I mean, all it does is it increases the number of people asked to review, and it increases the workload on the program officers for zero added value to the community.

 So we looked at high‑risk/high‑reward and transformative proposals. There is a coding they can do for high‑risk/high‑reward that didn't seem to be uniform across program officers whether they used it, but we were also just interested in how did these things fair, and we've looked at pretty much all of the RAPID awards to see how they did and found ‑‑ those were often things that went without peer review because the need to respond quickly to the earthquake or to the gulf oil spill, and the division had done an outstanding job on those RAPID awards and on the evaluation and funding of those things.

 Some comments on the process, you can read all of our specific recommendations. I don't know if you remember last meeting we were talking about an upcoming COV, and someone said, "Well, no. Of course, the panel members can't see the proposal jackets in advance. They won't have had the Conflict of Interest Training.” And I was looking a little puzzled because, thanks to the wizardry of Brian Midson, I knew our COV already had access to our proposal jackets; so I decided it was better here not to say, "Wait. We're seeing them in advance." [laughs] And for someone like me who has done COVs in the old days when we got all those stacks of brown jackets in the room, this was wonderful. We did take an online conflict of interest training and then had advance access to the jackets, and that was really ‑‑ combined with the fact that I wasn't the chair ‑‑ was really ‑‑
 [laughter]

 ‑‑ an outstanding bonus for the process. Our chair got the assignments out really early. We, in fact, did all of our jacket review before we got to NSF.

We filled ‑‑ we gave the chair text for the template before we got to NSF; so we came to NSF with the template essentially filled out and were really able to use the time in talking to the program officers. And every group process like that is going to come up with some pretty silly recommendations or misunderstandings at some point, and what that allowed us to do was to straighten out most of our misunderstandings and, again, through the tact of the chair, not me, straighten out some of the more silly recommendations that might have come from someone on the committee with a great deal of passion behind it but really was not appropriate in the longer run.

 So I felt like we were able to give ‑‑ have a lot of interaction with the program officers, spend a lot of time figuring out what were our specific recommendations because it's great to write a really lengthy COV report on the template, but unless there are recommendations that the programs can look at and can say, "Yes, we did it," "No, we didn't," "No, we're not doing it because of this" ‑‑ so you've written another great lengthy report, you know. Good for you.

 The composition of the COV, I thought, was really interesting. There were some old dogs like me in the room, but there were some younger scientists as well. There were some program people from other agencies. And I thought it was really incredibly helpful because you forget if you've been on a panel and been on AC GEO and done this for a long time, you forget how little the community might understand about the process of proposal review, and I felt like the composition of the COV, which spanned a whole range of experience with NSF, really opened the eyes of some of our articulate ‑‑ more junior colleagues who, I think, will be very powerful at carrying messages to their ‑‑ to the broader community. So it was a really good combination of people who'd done this before and people who'd never done this.

 Again, I can't say enough. The program staff were helpful at all stages of this ‑‑ made themselves very available to us over two days of time and helped straighten out a lot of our misunderstandings. There was ‑‑ not me ‑‑ a very active and organized chair who ‑‑ and we were able to really give some specific report recommendations that you'll see.

 In advance, also I should say the helpfulness of the program staff ‑‑ we had a targeted point of contact, and we had a great deal of statistical data and graphs and tables that we were able to digest in advance and to ask, "You know what? We'd really like to see this plotted instead," or "We'd really like to see that." So we had a lot of really good back‑and‑forth.

 Once we accept the COV report, the committee has ‑‑ and I will say a couple members stayed very active with the chair after their time at NSF as well. The committee has a piece drafted for EOS, called "Urban Legends," and our report ‑‑ this had happened before in OCE with a publication where we told the community about what happened. Some of the OCE subcommittees saw some of these, but basically we dealt with ‑‑ they're much written out in more detail in the report, but we dealt with things, like, we collected kind of urban myths just from among the committee, basically, and from preconceptions that ‑‑ "success rate proposals at OCE was tremendously low." Well, looked a little better than NSF overall. "You can't get something multi‑ or interdisciplinary funded." Well, that wasn't true either. "Asking for ship time decreasing your chances of being funded." Apparently not the case. And this, I think, was an example of the very ‑‑ this came up in last year's COV as well. The very lengthy lifetime of an admonitory word from NSF. At the 2005 AGU town hall ‑‑ forgotten his name ‑‑ got up to say, "We have too much pressure on ship time. If you're asking for ship days, you're not very likely to get funded." And it was a very public set of graphs and slides at the town hall. Everyone backed off. Not everyone, obviously. Some people still applied for ship time. Lots of backing off. There was never as public and single point of saying, "No longer true." And so I think we've seen some challenges about ship time requests.

 The other thing ‑‑ and you have to be very cautious ‑‑ you can look at plots of days of ship time requested from the UNOLS data, and it looks like there's a huge drop at some point. It's also where they went to a different form that counted ship days slightly differently.

So, you know, EarthCube will face the same problem with data quality. You have to be ‑‑ you have to really figure out what question you're asking.

 DR. TAYLOR: But, Peggy, I would actually say that message has been reinforced and, I mean, Rose Dufour, who's not in the room to defend himself, but Bob ‑‑ certainly, Bob is ‑‑ I mean, there had been other messages to the community ‑‑ you know, "No, you can't submit ship proposals this time around," right, Bob? I mean, this is not a message that was only given once. It's been reinforced. And you just have to look at the budget that Dave put up before in terms of the fleet support which has gone down 10 percent in the last two years to know why there are issues. There are less ship days, and there is less budget for those shippings [spelled phonetically]. So, I mean, it is a real phenomenon that the community is dealing with. So this is not urban myth. This is a consistent message coming from NSF.

 DR. CAVANAUGH: Well, maybe [inaudible] ‑‑

 MALE SPEAKER: Yeah.

 DR. CAVANAUGH: ‑‑ and then [inaudible] ‑‑

 DR. DELANEY: Our behavior is reinforcing that urban myth and creating higher ‑‑ I mean, we ended up to the point of almost not using the ship days that were available ‑‑

 MALE SPEAKER: Yes.

 DR. DELANEY: ‑‑ right? So that ‑‑ yes.

"Can’t get funded at the start." Doesn't appear to be true. "Broader impacts, you have to be a genius in all areas." Nope, not really. "Might as well ask for more than you need because everything gets cut by 10 percent." Not necessarily. Yes [laughs], well, and, you know, this ‑‑ yes. "Proposals never get funded on the first try; so get in the queue." False. And this was certainly ‑‑ I'm not going to name names about programs within OCE, but there was one program where people really felt the thing you did was throw something in the door the first time because you weren't going to get funded. You didn't really do a good effort on it. Others of us were like, "Are you kidding me? We don't submit that way." But it had been a kind of presupposition in that area.

 We've all been in this case. "The more reviews you end up, the less likely your project is to be funded." Again, when we look statistically, that did not appear to be true. And you could see cases ‑‑ you know, again, having been editor of two different journals, when you read hundreds of reviews, you recognize how much the review text does not necessarily match the categories that the reviewer has checked off, and you have a broader perspective in your head, and that's exactly true for the program officers. We saw them fund things that had one negative review if it was appropriate overall; so it wasn't ‑‑ they're not slaves to the categories that are checked off. They're looking at the text. They're looking at programmatic needs.

 "Takes over a year to find out if your project will be funded." No, pretty much not. "Projects are not funded for as long as they used to be." Not statistically true. The old days always seem better. "One bad review and your proposal sunk" or "As a reviewer, if you don't give the proposal an 'excellent,' it will never get funded." Also not true. "I got mostly excellents and was not funded. How can that be?" And we give a longer explanation of that. "An underrepresented status of the PI effects the likelihood of a proposal being funded." Based on the data available, no, but the sample size is very small; so it's hard to tell.

 One of the recommendations ‑‑ NSF's response is also on our website. One of the recommendations ‑‑ and I'm going to talk about the reason behind this recommendation because I can't say this is one that I wholeheartedly embraced ‑‑ but the program response to the ‑‑ or the set of programs' response to this recommendation said this should really go to AC GEO to see if you want to do it. The concern was that there is not in a way that is accessible to NSF's statistical ‑‑ or data collected about gender and ethnicity of panel members and, I think, reviewers ‑‑ in a way that would allow you to say review panels were X percent female and Y percent this and whatever. And so some members of the COV came to a conclusion ‑‑ and it became one of our overall recommendations ‑‑ that NSF could ask OMB to get this information in a way that would shelter confidentiality, I guess, to identify areas of improvement in panel and reviewer makeup. We should consider it because the ‑‑ see, I mean, again, I'm not the proponent of this one; so I'm having a hard time going, "Yes, we definitely have to do this." I think the concern was ‑‑ and this is when we looked across OCE and looked at proponent composition in education areas, we could see that there were successful PIs. Women were successful PIs, minority scientists were successful PIs, and that same mix, in those same proportions, did not stay as you moved towards more science programs within OCE. And it's not to say education wasn't as important to us as the science programs, but it was to say we have a relatively diverse pool of proponents who are motivated enough and successful enough to get funded in OCE education programs were not seeing that same mix in the science programs, and why is that? And so it was really to call attention to that and to call attention to how do you make the panel and reviewer pool sufficiently diverse.

 I think that's it. So depending on how much length - -- there's two figures that go with it, and depending on how much length EOS is willing to tolerate, hopefully, that will be appearing in EOS relatively soon.

As soon as we accept this report, I think David will give the chair the green light to submit. Yeah.

 DR. KELLOGG: So first, are there any questions? Thank you, Peggy. That was a very, very interesting report [inaudible] ‑‑

 DR. DELANEY: It was ‑‑ it was really a very fun COV. And, again, compared to the days where you got here and had to shuffle proposal jackets, doing things in advance and really being able to engage with the program officers was really fruitful for the committee.

 DR. KELLOGG: And thank you to the NSF staff [laughs] for making that work.

 [laughter]

That sounds like it was really a major effort. So it's appreciated.

 DR. SCHIMEL: Normally, you'd expect her [inaudible] ‑‑

 [laughter]

 DR. DELANEY: It was really ‑‑ it was very useful. It was great.

 DR. KELLOGG: So are there any questions or comments from the committee, including the people online?

Yeah, Walt.

 DR. ROBINSON: I think this ‑‑ I really like this ‑‑ the urban legends, and the debunking them had some very valuable ‑‑ and I ‑‑ maybe that's an outreach effort that this committee should take on because we might be seeing ‑‑ if NSF does it themselves, they might be saying, "Well, of course, they're going to say that."

Whereas if we say it [laughs] ‑‑ and I'm not saying just for this program but in general and having the data because, yes, those urban legends, they ‑‑ you hear them dally [laughs]; so that's very, very useful. I can see that. Thanks.

 DR. RUDNICK: I have a question. Is it ‑‑ for future COVs, then, are the proposal jackets going to be available ahead of time, or what's the status of that?

 DR. DELANEY: As I understand it, there were some concerns about conflict of interest, and they had been resolved almost in a pilot program with our COV, and I think it is a mechanism more widely available now.

 DR. CONOVER: We might have been breaking new ground without knowing it, but I've not yet been fired for letting jackets out before the conflict of interest training took place.

 DR. DELANEY: Brian can describe ‑‑ Brian did something to negotiate it.

 DR. CONOVER: Yeah. So I ‑‑

 DR. DELANEY: Right?

 DR. CONOVER: I think now we know we can do it and ‑‑ but it's up to the ‑‑

 DR. DELANEY: It set a precedent.

 DR. CONOVER: ‑‑ other divisions as they do their COVs to follow that same process. We'd be happy to ‑‑ Brian, I'm sure, would be happy to inform others as COVs begin about how to get the right permissions to do that.

 DR. DELANEY: Right. And we did it ‑‑ each of us had to do an advanced training.

 DR. CAVANAUGH: Right. Online and conflicts [inaudible] ‑‑

 DR. DELANEY: Conflicts training. But I also have to say that in the system was 100 percent on identifying our conflicts. So you were locked out of any proposal In which you had a conflict just as if you were on a panel with the jackets we were looking at for that. It was 100 percent. None of us had strayed into anything. Yeah. It was very tight. It was good.

 DR. KELLOGG: Other ‑‑ anything ‑‑ any other concerns? So we have ‑‑ this is the only sort of required action that we take is to accept these reports. That doesn't necessarily imply that we're accepting all the recommendations, but we are accepting the reports. So if someone would like to ‑‑

 DR. TAYLOR: I so move.

 DR. KELLOGG: Okay.

 [laughter]

 DR. KELLOGG: Thank you. Do we have a second?

 DR. ROBINSON: Second.

 FEMALE SPEAKER: I second.

 [laughter]

 FEMALE SPEAKER: Yay.

 DR. KELLOGG: Okay. I'm going to call the question. All in favor?

 MULTIPLE SPEAKERS: Aye.

 DR. KELLOGG: Any opposed? Okay. I believe it's unanimous.

 DR. CONOVER: I just want to add one comment. Now that we can give the committee the green light on pursuing publication of the ‑‑ of their findings, it'll be a ‑‑ it is an abbreviated version with just a few of the many, many graphs that are in the full report. And one of the things community doesn't realize is they can access those COV reports once they become public, and they themselves can go through the data and read the full analyses, and I hope that we encourage the community to actually do that, not just rely solely on the EOS's short version but look at the full report.

 DR. TAYLOR: [inaudible] presumably you'll have a web link.

 DR. DELANEY: Yeah, in the EOS [unintelligible] there will be a web link.

 DR. CONOVER: Yeah. We'll make sure that there's a ‑‑ in the EOS paper that there's a link to where you can read the full report, because we want people to see that report.

 DR. DELANEY: Yeah. The graphs are really fascinating.

 [talking simultaneously]

 DR. CONOVER: That's right. And those responses ‑‑ there's ‑‑ the responses are already there, and it will be alongside the full report, and then every year we update those, and those are also available to the community.

 DR. DELANEY: One the great recommendations -- this is one you'll be able to, like, implement almost immediately is that for people who came for the COV who were not as familiar with NSF, even though they got introduced to the program officers when we were sitting in the room with them, they didn't know them all, and so they're hoping the program officers would wear name tags when we come for a COV again [laughs] so ‑‑ yeah, that's right. So it's a good suggestion. I said, "I think they’ll wear name tags." It's okay. Yeah.

 DR. KELLOGG: Thank you.

 DR. DELANEY: Thanks.

 DR. KELLOGG: I'm inclined to defer sort of the further discussion of that recommendation just in the interest of time because we have another COV report. So Walt is going to give us a COV report on NCAR and facilities.

 DR. ROBINSON: Okay. Okay. So I think this is a very different type of Committee of Visitors ‑‑ or program to ‑‑ it's NFS, which is, of course, is a confusing set of initials [laughs] but ‑‑ well, just NSF with a letter transposed. NFS and NSF. Managers, of course, they're responsible for NCAR, the National Center for Atmospheric Research. And so it's ‑‑ we dealt with ‑‑ we did not have a statistics of jackets to deal with. There were five awards and one declination; so we would always look at every action of the section during the period of ‑‑ under consideration. And I think something which is not in the report but maybe is useful as background for this committee is there was a, of course, three years previous, another Committee of Visitors, and there's been over a period of time ‑‑ and some of this I saw when I was a program officer here ‑‑ an evolution, at least from my perception, of a much tighter engagement between NCAR and this building and particularly the ‑‑ but not just the NSF section but the ‑‑ but AGS in general over a period of several years. And that process has ‑‑ I think it's reached a very satisfactory conclusion. There are obviously stresses that were discussed downstairs earlier today, and I mentioned in my report about, you know, budgetary stresses.

 In terms of the relationship and working being responsive ‑‑ NCAR being responsive ‑‑ in particular being responsive to the community and being responsive to NSF, that really is going very well. So I'm not going to really say very much because we looked over everything they had done that was feasible. There were no serious issues raised. Of course, you bring some professors together in a room with some things to look at, we could find some things, some fairly minor suggestions, but they're really pretty much down in ‑‑ down in the weeds. The reviews, for example, they've ‑‑ they do big things. So for example, the new Wyoming Supercomputing Center, which is going to open officially this weekend, right?

 DR. CAVANAUGH: Yes.

 DR. ROBINSON: I mean, it's already opened but, I mean, it's ‑‑

 DR. CAVANAUGH: Monday.

 DR. ROBINSON: Monday. Okay. The reviewing and major radar facility like CHILL, obtaining an aircraft, a storm‑penetrating aircraft, from the military to be used for research ‑‑ and that's something else that's ongoing statistically. Those are complicated things that take a long time. They're not the simple sort of ‑‑ you set a proposal, and then you get it reviewed.

 So the A‑10 process began back in 2007 and 2008, and the aircraft now is undergoing the ‑‑ as I understand it ‑‑ is undergoing the modifications. It's having the weaponry taken out, which may be too bad. You know, NSF could have a [laughs] little more clout if they kept the canon in there, but then they'd have less room for instrumentation.

 So these are ‑‑ that's not a ‑‑ it's not a simple thing to do. It doesn't ‑‑ and it requires a lot of discussion, negotiate, determination of what's feasible or not. It's not a ‑‑ someone sends a proposal in the door and you review it, and you're done.

 So general comments about the management of the program. We said, overall, the COV found the section's management of a complex suite, I might just point out, a facility's program's national ‑‑ in the national laboratory to be proactive, forward looking, and effective. The management of NCAR and the observing facilities is greatly enhanced by the effective engagement of science discipline program officers, especially those in the Atmospheric Section, AS; and the involvement of those programs is especially important for NCAR's annual and budgeting process. And I think that gives us optimism that the management of NCAR will be ‑‑ and the center itself ‑‑ will be resilient in the face of some genuine budget pressures in coming years.

 Let's see. Was there ‑‑ I think ‑‑ really there was ‑‑ I think I'll just give some concluding comments and then take any questions people have.

 We suggested ‑‑ and there's a lot being done already, and there are workshops and so on, but there's a need because of the broad use of communities to do everything possible to ‑‑ whether we say conduct surveys in these communities to keep ‑‑ to maintain the community engagement and get the community feedback. As was discussed earlier today in a different context, that's easily said. It's not so easily done. Often community members assume that the facility or the resource they need is going to be there, and they only respond when they perceive a threat, and then they get excited.

 So I'm just going to lead our closing statement. We got great help from Steve Nelson and Bernard Grant and Sarah Ruth and Jim Huning, who has since retired, as I understand it, and support from Carolyn Walton. And I did just want to add, I ‑‑ we put this on our ‑‑ including in our ‑‑ in conclusion of our report, noted that Jarvis Moyers served as section head from May 2010 to July 2011, and this culminated his long distinguished service to Atmospheric Sciences, generally, and to the National Science Foundation. And we wanted to acknowledge ‑‑ so I'm taking this opportunity to do it again ‑‑ the great courage and commitment he displayed in returning to this important work while he was battling cancer, and a lot of his effort and the success of NFS and the national lab are evident in his ‑‑ are evidence of his work and leadership. That's all. DR. KELLOGG: That's a very nice report and nice acknowledgement of Jarvis as well. Are there any questions, comments, additions? [laughs] You were so thorough.

 [laughter]

 And again, thank you to NSF staff for supporting that work. So do ‑‑ any thoughts about accepting the report? Would somebody like to take an action?

 DR. SCHIMEL: I move we accept it.

 DR. KELLOGG: Okay. Is there is a second?

 DR. HORNBERGER: Second.

 DR. KELLOGG: So let's call the question. All in favor?

 MULTIPLE SPEAKERS: Aye.

 DR. KELLOGG: And the hand's up over there [laughs]

 FEMALE SPEAKER: Lee.

 DR. KELLOGG: Lee, we can't see you. Okay.

 [laughter]

 DR. KELLOGG: Thank you. Any opposed? All right. So I think we have ‑‑ we have done that. We're all good. Sorry?

Wrap Up

 DR. KELLOGG: So we're ahead of schedule.

 DR. CAVANAUGH: I have a topic if you want something to talk about.

 DR. KELLOGG: Yes. So we did have a ‑‑ we did have a question at the break. Is that what you wanted to mention, or do you want to mention something else?

 DR. CAVANAUGH: Oh, no. I think this was another one.

 DR. KELLOGG: Okay. Please bring up the topic.

 DR. CAVANAUGH: Okay. All right. Okay. Well, no, this is a very serious topic, and this is the right group to think about it, I think. And I was thinking that I might pose it now prior to conversations that might take place over dinner. I think it's one of those sorts of topics, but I think we could jump in here too. You ‑‑ some of you may be aware that a number of divisions and directorates within NSF are involved in various experiments or pilots related to the Merit Review process. And some of these involve using virtual panels, but some of them go well beyond that. And one of the reasons why people, you know, are trying some of these things does have to do with the workload issue. And so I think it might be a fruitful conversation or, you know, to have some brainstorming ‑‑ as I say, not necessarily here; it can be over dinner ‑‑ you know, about some of the things that people are doing and get some feeling for what you think about it, what the community thinks about it, and maybe it's one of those subjects that would be one that might be a more in‑depth topic for the next meeting, you know, as opposed to now, but for one of the things that many, many divisions in NSF have done is to go -- many parts of NSF are managed similarly in the sense that they carry out -- they have two deadlines a year. They carry out sort of a hybrid review process in which they obtain ad hoc or individual reviews and then have followed that up with a panel that looks at those review and add some of its own and gives a summary of their advice. So there are, of course, many other ways that people go about doing this, but that’s a pretty common format throughout NSF.

 So, in many divisions now instead of having two deadlines a year they have only one deadline a year as a way of obviously controlling the number of -- hoping they control the number of proposals that come in. The number of proposals that NSF receives has gone up tremendously, and I don’t know if I remember the numbers now but it’s over 50,000 a year now, and it wasn’t all that long ago that it was 35,000. I mean, it’s really gone up considerably, and it’s not just a function of having more solicitations and cross-directorate activities. That isn’t the only factor, and --

 DR. HORNBERGER: Inversely related to the success rate.

 DR. CAVANAUGH: -- and exactly, and that’s the other thing that happens, of course, is that the success rate is actually a reflection -- you know, the number of proposals is actually involved in that equation. And so, if you think about it, as long as proposal size, which isn’t true exactly, but from a -- if proposal size stayed the same and NSF’s budget went up, the number of proposals we were funding would be -- awards we were giving would go up. And it is, in fact, true that we give more awards now than we did 10 years ago, too. So, success rate is actually reflecting not a decrease in the numerator but an increase in the denominator.

 So anyway, so one deadline a year is something that folks are doing. AGS is one of the parts of NSF that has maintained a -- did not go so much to a review -- to a panel process for part of its review and depends on ad hoc proposals from the community and the judgment of program officers. One of the benefits of that approach is that you generally don’t have deadlines, and deadlines themselves that drive proposals, you know. So, there’s that -- so I should acknowledge that not even all parts of GEO do this the same way.

 Okay, and another experiment that is going on that’s fairly simply stated is, some divisions in biology now have a deadline I think every eight months. So they took themselves off of the twice a year cycle and put themselves on a one and a half year kind of twice a cycle --

 FEMALE SPEAKER: Yuck.

 DR. CAVANAUGH: -- thing. Well, there are some benefits to it --

 DR. KELLOGG: Yeah, sure, sure.

 DR. CAVANAUGH: -- and in terms even of the funding of where those timelines --

 DR. HORNBERGER: Wasn’t that because they went to once a year and the community went ballistic?

 DR. CAVANAUGH: Well, I don’t think that’s entirely true because I think -- is there anybody involved in the BIO community at the moment? Okay.

 DR. SCHIMEL: The community --

 DR. CAVANAUGH: If you want to see here a community that is now really in the midst of discussing this kind of thing, it’s in the BIO community, because I think two divisions? I’m not sure.

 DR. SCHIMEL: Yeah, I’m not sure about that, but we --

 DR. CAVANAUGH: Are going to a new --

 DR. SCHIMEL: The annual meeting this year was a hate NSF fest.

 DR. CAVANAUGH: Okay, so --

 DR. SCHIMEL: Two thousand people mad at NSF --

 DR. CAVANAUGH: Right.

 DR. SCHIMEL: -- and not interested in talking about much else.

 DR. CAVANAUGH: Yeah and so, this is what’s going on in the biology community, or part of the biology --

 [laughter]

 -- community. They decided to do -- and I’m not sure I understand all of the ins and outs of this particular process, but they decided to have pre-proposals, which is another thing that some people have done. They’ve just had pre-proposals and, you know, and then use that as the way to select reviewers and invite proposals and do things that way. But what these couple of divisions in BIO, I believe, did was they decided to have pre-proposals, and to have only one deadline a year, and to also limit the number of pre-proposals that any one PI could be on. I don’t know if it’s two or three?

 DR. SCHIMEL: It’s two.

 DR. CAVANAUGH: Two? Two that it could be on, and so it’s sort of a trifecta thing, right? Where if they put in all three of these things at once -- and so if anybody in the community is upset about any one of them, you can imagine how many -- anyway, so that’s caused quite a stir. There are some other things that people are trying.

 The engineering. I think all the divisions in engineering have one deadline a year now, except for one that -- let’s see, how do they do that? They have a -- they’re trying a process. They’re piloting this, and they haven’t put it in place yet. I’m not sure they have even all the approvals to do it yet. But they’re trying a process -- or is this in BIO? Who was doing this? Well, anyway, there’s one of them that has a process whereby 20 -- you know, they don’t -- they have one -- let me think, how did they do this? They have one deadline a year, all right? But, they only spend about 65 percent of their funds in that deadline because they invite 20 percent of the proposals that were declined to come back, you know, a few months later with a proposal that they can, you know, then use the rest of their funds to fund. Now, the people who were declined and not invited back can obviously come back with a proposal the year later like always, but there’s a subset that can come back, you know, earlier than that and possibly get funded in that same year. Did that make any sense? Okay, so there’s one that’s going on like that. There’s another one that’s entirely virtual in nature, and what they do is they have a one day virtual panel for about 40 proposals. It’s a small number of proposals, eventually, okay? But prior to that panel they have released -- all of the panelists have received the proposals and have turned in their reviews. But once they turn in their reviews they can, for a week prior to the panel, engage in an asynchronous conversation with the other people on the panel so that -- you see what I mean? So they can put comments out and other people can put comments in, et cetera. So that by the time they all get online for their virtual panel, they’ve had a lot of conversation about the proposals prior to that time.

 DR. SCHIMEL: Marge, how do they get down to the 40 number?

 DR. CAVANAUGH: They get about -- my recollection is its particular division or deadline gets about 200 proposals a year, and they sort them out sort of sub topically as much as -- they clump them by topic as much as possible, and then have different sets of about seven or -- I shouldn’t say that. A smaller number, you know, probably eight panelists for each group, and then do them by groups, I believe.

 DR. TAYLOR: So, Marge, you’ve been describing a number of different ways --

 DR. CAVANAUGH: Yes.

 DR. TAYLOR: -- of doing things --

 DR. CAVANAUGH: Yes.

 DR. TAYLOR: -- and except for the eight month one -- fortunately I’ve never been exposed to that one -- I mean, most --

 DR. CAVANAUGH: You’ve heard of all these?

 DR. TAYLOR: -- most of the rest of these have been done by some part of NSF at some time.

 DR. CAVANAUGH: Yes.

 DR. TAYLOR: And so --

 DR. CAVANAUGH: Some of them have, some of them are new, but --

 DR. TAYLOR: -- right, the 65 percent and the 20 percent reapply --

 DR. CAVANAUGH: Yeah, that’s sort of interesting.

 DR. CAVANAUGH: That was a new one too.

 [talking simultaneously]

 DR. TAYLOR: My question to you is really, what’s your question to us? So --

 DR. CAVANAUGH: Okay, my question, yeah --

 DR. TAYLOR: -- which, because -- I mean, for example --

 DR. CAVANAUGH: Right.

 DR. TAYLOR: -- STCs and other things have done pre-proposals. I mean, NSF has -- you know, different types of NSF have done --

 [talking simultaneously]

 DR. CAVANAUGH: Right.

 DR. TAYLOR: -- so there’s all these models, right?

 DR. CAVANAUGH: Right.

 DR. TAYLOR: So then what’s the discussion that you want to have?

 DR. CAVANAUGH: Okay. Well, let me just say that there also is a group at NSF, another working group, obviously, that is going -- involved in sort of a, you know, a higher level kind of evaluation of each of these experiments, if you like. And each of the experiments are doing their own evaluation, and they all have different goals, you know, some of them it is work flow. In some cases it’s because they can’t get the number of reviewers that they want, et cetera. So, they might have different criteria for what they consider successful or not. Now, so far GEO has not gotten involved in much of this. We’ve had some virtual panels, but they’re pretty straight in the sense of following the same kind format that we usually follow for reviews. So, my question -- excellent --

 FEMALE SPEAKER: All of a sudden --

 DR. CAVANAUGH: I can see the dog.

 FEMALE SPEAKER: We have no idea where --

 FEMALE SPEAKER: One of you has music on, and doesn’t have mute on.

 DR. CAVANAUGH: Or somebody here does. You can see the dog now. Anyway, but anyway -- so after the BIO experiment, lately, that was so --

 DR. TAYLOR: Pretentious.

 [laughter]

 DR. CAVANAUGH: -- you know, enlivened the conversation in the community so much.

 MALE SPEAKER: Energized.

 DR. CAVANAUGH: It energized the community so much, I wondered what kind of -- I wondered if, you know, if you think that GEO should engage in a merit review or some part. Or, you know, we could do a section, you know. It doesn’t even have to be a division.

 [talking simultaneously]

 [laughter]

 DR. CAVANAUGH: Right. Right.

 [laughter]

 MALE SPEAKER: It’s not a high bar.

 DR. CAVANAUGH: Right. Should engage in some, you know, some different model of a review process and what would it be? What would be -- what problems would you try -- here are the questions, so what problems would you want the pilot to solve? You know, how -- what exactly would it be, and how extensive would it be and, you know, do you think that it’s needed? I mean, what do you think the response of the community would be to the model that you would be proposing? It’s all of those kinds of things that you would want to have some sense of before you actually jumped in. Now the alternative -- one alternative, of course, is to do nothing and to keep things the way they are, and to wait about probably three or four years until we hear the results of all of these other experiments and then see if there’s anything we want to try. But in the meantime, I think it will be interesting to know if you’re hearing from the community an interest in trying anything like this, or if you think the community would be, you know, adventurous about it or, you know, if we were going to do it, how we would do it. You see what I’m saying? Pretty open.

 DR. MORGAN: Marge, just not to -- this goes along with the line of conversation, but just to demonstrate how extreme some of these different approaches are. Maybe you want to talk about the reverse --

 DR. CAVANAUGH: The what?

 DR. MORGAN: -- game theory.

 DR. CAVANAUGH: Okay, that’s right. There is one. Don’t go there? He doesn’t want to go there. They don’t want to go there. Well, the --

 DR. MORGAN: No, that just shows how extreme.

 DR. CAVANAUGH: Well, no, it’s not extreme. Well, it is and it isn’t extreme. There apparently is a whole branch of study that it has to do with -- I think they call it actually mechanical design or something like that. But it’s -- yeah, I think the popular expression is game theory, and so the question was, could you use some of what we know from game theory to design a process that, you know, would make some sense? And so, there is a proposal in one division, not done yet, not approved yet or anything, to try one of these -- an experiment along those lines. And it’s very interesting in the sense that it -- and one of the concerns, of course, that it raises immediately for anybody who’s been at NSF or involved with NSF for any period of time is that part of the plan involves some of the people who have a proposal in the mix, okay, being reviewers of not of any -- of other proposals in the mix with which they don’t have a conflict. And then there are some rules that they have to play by in terms of how they could rank those to try to ensure that there wasn’t -- they weren’t playing it off. But the motivation of the problem that the -- I was reminded of this whole thing because of something someone said in the report. They were -- one the things Peggy noted -- one of the things that they were -- they thought that -- they were having trouble finding reviewers. Well, obviously, the reviewers and the submitters are the same, you know, can be the same pool that way. But they also had a problem with getting, you know, with -- they had a sense, let’s put it this way, that some of the people who submitted a lot of proposals also weren’t doing their fair share of reviewing. And so, it matches up the, you know, the -- what shall we say? I don’t know what words to use -- the privilege of submitting a proposal with the responsibility of reviewing. So, it’s pretty out there, I must say, because all of us who are used to all of these conflict things, you know, immediately have lots of questions about it. And maybe it won’t pass muster in the end. But it does, I think, give some idea of the kind of creativity and discussion and seriousness with which people are thinking about, you know, should we keep doing things the way that we’ve always done them in the face of very low success rates and very high work load? So, I’ve put it out there.

 DR. KELLOGG: Walt had his hand up patiently.

 DR. ROBINSON: So I guess I have, yeah, so I have like four different perspectives on this. One as a program officer, one as a PI who’s had proposals funded and declined, both of course. One as a department head and knowing what the -- and I get to see the data on the success rates of the faculty in my department. It’s a GEO science department, so it’s all the disciplines here. And then I was on the virtual advisory committee looking at peer review.

 DR. CAVANAUGH: Virtually?

 DR. ROBINSON: Yes, I was virtually -- that worked very well by the way. At least a couple -- well, that’s another story, we won’t -- okay, eventually it ended up with technology that did work.

 So, one of the issues I think that’s important to keep in the process is that a proposal submission, if it’s a carefully prepared proposal, and a review, if it’s a carefully done review, is a form of scientific communication. Now, the stakes are high, but the PI, even if they don’t get funded, gets free consulting on their scientific ideas when they get good reviews back. This is what I tell junior faculty when they’ve gotten a decline. But it’s -- and it’s what I told people when I talked to them when I was program manager when they got declined. But it’s true and people most -- successful PIs get that after they get over the emotional reaction to a decline. And what degrades that communication for that working is reviewer overload, which is also happening at the same time that program officer overload is happening. And then low success rates and PIs who view the proposal process as a lottery. So I get to see what my faculty are doing and I see -- I have a faculty member who’s never had an NSF proposal declined. And I have other faculty members who’ve had declined, declined, declined, declined, declined, declined, declined, declined, declined, and they’re still shooting these things in. I won’t say to what it’s a -- which division it is but -- and it’s -- so one of the things we heard about in that advisory committee was, we heard a lot about the process of reviewing, but we also heard about ways in which, sort of softer ways that can be used to try to control proposal pressure. And we heard from someone in the U.K., I think it was U.K. NERC, and there are particular institutions -- and I think mine, and I’m sort of in a mid-tier state university, so I’m kind of in the middle. But there are some institutions in their system that are responsible for submitting lots of declines; read: bad proposals. Bad proposals are the noise in the system. It’s a really unpleasant process to review a bad proposal. [laughs] So you feel you’ve wasted your time, you know, but you’ve got to do it, right? And it’s hard for the program officer, you know, anyway. So they’ve worked -- what they’ve done -- so this is sort of orthogonal of what Marge was talking about, but they’ve worked on this really -- going out and trying to do an educational intervention at the institutions that are responsible for submitting many, many declines; read: bad proposals. And I liked that idea because I think the other thing it would actually give people who are in my current position a little leverage with our faculty to encourage them to get the types of internal peer evaluation, that for reasons of ego sensitivity and self-conscious they’re very, very reluctant to do. And if we could say if we were getting some institutional pressure to be submitting fewer, better proposals -- many institutions do it the other way around. Some institutions you get credit if you send the proposal in, regardless of whether it’s a success -- “Oh, you sent in a proposal, you’re trying,” even if it’s crap. I think that maybe an educational approach -- I don’t know how many sticks you would need behind that education -- to try to move the culture away from shoot a man as a lottery, and we heard about that in the COV report, and towards an idea that every proposal that comes in is really a seriously self-evaluated, maybe peer evaluated institution effort. That would help a lot. And it’s not that -- so it’s really looking at the supply side rather than the evaluation side.

 DR. KELLOGG: George?

 DR. HORNBERGER: It strikes me that one of the things that would be useful as we consider this is to get some idea of the extent to which the workload would be reduced by the options that we consider. So, you have a sense that if you go from two submissions a year to one every eight months, roughly you might save a third. I’d love to know what the workload in AGS is relative to EAR if you don’t use panels. You know, if you could at least get a sense of how much you’re saving by these various mechanisms, I think it would be useful because they’re not all the same.

 DR. TAYLOR: Under the general principle of if it’s not broken don’t fix it, I’d be very interested, even before contemplating any of this, to hear from either the Committee or Visitors and/or the program managers in different parts of GEO whether they see the need for doing something different. I mean before contemplating, you know, let’s go out and try some pilot -- I mean is it, you know, do the external reviewers, you know, like Peggy’s just done on COV, or some of the program managers, do they see the need to change the system or, you know, one could argue that maybe they need to be woken up. But, I mean, if they’re not seeing that need, why ask that question? So, I mean, are you getting --

 DR. CAVANAUGH: Workload.

 DR. TAYLOR: Is the major issue to solve the workload one?

 DR. CONOVER: Let me comment on that. It’s a gradually accumulating problem of more and more proposals, rising more quickly than -- far more quickly than the number of program officers we hire to manage those proposals if you go back 10 years. So the if it’s not broken, why not fix it? Well, it’s virtually -- it’s getting close to an episodic collapse. And if you look at the -- one of the ways we judge this is through the job satisfaction surveys that office personnel management does of all federal agencies. And in the last several times, NSF has dropped substantially below our lofty -- our normal lofty position as one of the best agencies to work for, and I think a lot of that is due to workload stress --

 DR. TAYLOR: Part of that was ARRA [inaudible] --

 DR. CONOVER: It’s continued in the last several years. It’s a trend; it’s not just one bump due to ARRA. So I think we do need to examine this problem and I think if you ask program officers, is there a workload problem that is on the edge of collapse, they would say yes. But you would get different answers if you ask them how to fix the problem.

 FEMALE SPEAKER: Yes.

 MALE SPEAKER: Can I make a comment? As one of the very few --

 DR. CAVANAUGH: A program officer.

 MALE SPEAKER: -- program officers in the room, I think this might be going in the direction of fixing the wrong problem, because the problem is not with our typical business model. It is with all of these new initiatives that have too many moving parts, dance partners across different parts of the Foundation, of cultural differences between them; and, frankly, some turf wars involved in, you know, who gets to pay how much and who gets how much of the pie in the end. So, as a result, these new initiatives are very, very difficult to push through the system to write; and, once we get the proposals, they take I would say maybe three or four times as much work as your regular proposals in your core program. So, if anything has to be pushed on, I think the push should be on keeping these initiatives to a minimum where we absolutely have to have them and run most of our business through the core programs.

 DR. HARRISON: So aggregated over the three divisions, EAR’s program officers have the highest proposal load of the other three. And so, clearly, there are differences for AGS and that must inform what other divisions might do. But we have a situation at the end of the fiscal year that chewed up probably tens of man hours to resolve and it was exactly as you say. It was because of a very complex interdisciplinary proposal with five or six different institutions with different capacities to manage the federal grant process. And, in the end, probably eight or nine different individuals had to spend time to unravel the situation. It’s just not a reasonable workload for the program officer. It’s beyond just the reading and the reviewing. It’s the management and the implementation and the handholding that goes on with less capable institutions that you want in the proposals because that’s the broadening participation part.

 DR. CONOVER: I would add, this -- part of the answer to this question about the cross-directorate programs is -- it goes beyond just this directorate. But we are, I think, at or beyond capacity to manage new cross-directorate programs. So that means, I think, the Foundation, in my opinion, should adopt the policy that before any new cross-directorate programs are added one is removed. We can’t keep adding them. But, at the very least, we should try to not have -- no net increase. But that’s not what happens. It’s very hard to get rid of these programs once they’ve been created. But it’s something we’ve got to do. As I mentioned earlier in my subcommittee about vessels, we can build new vessels, we can modernize the fleet, but it only makes sense if you replace older vessels with newer vessels. Then you can have a process that’s manageable.

 DR. MORGAN: Right, I would agree with David on that last point. I mean, I think one of the issues that was -- that these solicitations that we’ve had in recent years, the ones that GEO has been heavily involved in, we’ve only had one or two cycles of them. And it’s like pulling the rug out from under a community that you’re trying to develop when you have other needs and other interests that you want to do. So it’s finding the appropriate way to timeout, phase out some of these initiatives that we have that are broad across NSF. I think this might be an appropriate role for AC/GEO to look at and, perhaps, to define a process by which we can begin to age off some of the commitments that we have to these solicitations as new ideas come about to try to build other communities within GEO.

 DR. SCHIMEL: I want to provide a slightly different perspective on that. My career has been focused on the global carbon cycle, and without these programs there would have been essentially no NSF support for global carbon cycle science. It doesn’t lie in the divisions. It doesn’t lie in a single directorate. It involves the oceans, the atmosphere, and the land. And without those crosscutting programs, that whole field would have been very awkwardly supported by the other agencies; not in the sort of comprehensive way that NSF has actually, in spite of itself, allowed. So, I understand the desire to keep things tidy and disciplinary. But, honestly, the university community is asking for these interdisciplinary programs because a lot of cutting edge research does not fit into the disciplinary programs.

 And I think that the -- that one of the conflicts here is that, in fact, universities are less and less structured the way the divisions and programs are structured. You know, more and more we see geoscience programs where people are doing geoscience research. They’re not necessarily just an amalgam of atmosphere, solid earth, oceans, and so on. And so I believe that to be true, and to me then the issue is that it is too hard for you to manage these interdisciplinary programs. That does not mean they should go away. It means that this ad hoc creation of interdisciplinary programs where each one is a unique challenge that requires this enormous overhead, I believe you. I mean, believe me I believe you because I watched it as these things were negotiated within my university as well. Somehow the management of these crosscutting programs needs to be institutionalized in a way so that it is not so hard as the science changes to adapt to it. And, you know, in a sense, what I think the community is telling you -- at least to me -- is there is a need for a way to develop large-ish, collaborative, multi-institutional, team-oriented, interdisciplinary programs that address earth sciences and its intersection with other fields. And, actually, binning them into these very prescriptive programs is a big problem because often those programs are what people are excited about last year at AGU, not this year. And I wonder if there’s a way to just regularize the support for these complex, interdisciplinary, multi-institutional programs. I mean, that’s the common element in all of these targeted calls, right? You have to put a team together, you typically have multiple institutions, they need peer review by multiple underlying core programs. I mean those problems come up over and over and over again, and I just perceive that each time the director has a new inspiration you almost have to reinvent these processes, and renegotiate them, and negotiate them one at a time with a new group of individuals.

 So I wonder -- I mean -- so I’ll state a belief. The pressure to do this kind of work isn’t going to go away, either in the science community or through the creativity of senior management. And somehow there’s got to be a better way of dealing with it than is going on now, because that kind of science is -- you know, there is a buyers’ market for that. I mean, that is what a lot of university people want to do. Big, complex field campaigns are growing, I think probably in all the divisions. People want to work with the social scientists to do this kind of end-to-end stuff. They want to work with computer science to build sophisticated information systems; and, somehow, there’s no standard approach that is cookie cutter. Okay, this is a interdisciplinary STC, this is an interdisciplinary large team. You know, a template that your program officers can just take off the shelf and say, “Okay, now we’re doing this type of crosscutting program.” I mean, I feel like the debate about core versus crosscutting, you know, isn’t going to go away. And, so, you can’t solve it the way it’s been suggested here, by saying it shouldn’t happen because, you know, NSF directors like to be known for something, want to have something to do. And there is a large science community that wants to do this kind of work. I mean, these proposals -- you know, these competitions are not undersubscribed, and they’re not -- and it’s not because people are just looking for money. It’s because they want to work in collaborative teams to address big problems.

 DR. CONOVER: I don’t think anybody’s suggesting that we wouldn’t continue to do those programs. But because of the fact of what you mentioned earlier that they are very topical in nature, and by the time we get the program organized and start doing the proposal processing, there’s a new hot topic that needs to be addressed. So, in order to continue to stay relevant and up to speed with the rapid changing dynamics, either in what society needs or what science is capable of providing, there has to also be a way of discontinuing some of the ones you’ve already been doing for quite a long time so that you can do the new ones.

 DR. SCHIMEL: Absolutely, I completely agree with that. What I’m saying though is that after 10 years, or 12 years, or whatever it is of more and more of these projects, are they falling into a couple of patterns? Could you have some sort of an underlying mechanism that makes it easier to roll them in and roll them out so that it isn’t always ad hoc?

 DR. HORNBERGER: David, I think that FESD, which is of course just GEO and not cross-directorate may be a model. FESD is not topical in that sense.

 DR. CONOVER: Just this year in -- not getting into details, but knowing quite a bit about the process that led to the hazard solicitation as opposed to the coastal solicitation, there is a lot of angst that’s folded into the decisions that directorates make, whether to participate or not. And if they do participate, how much they want to control what’s in that solicitation. So some -- it’s -- every one of these from what I’ve seen so far is a different struggle. And you could have the template set up, but the template wouldn’t be the issue. The template would be what’s the substance that we’re putting into this, and what is each directorate bringing to the table, and is it equivalent to the investment they’re making? And oh, by the way, would this mean that our directorate is funding a lot of work that wouldn’t even support our community? Those are the driving points that make this difficult each time you put it together.

 DR. TAYLOR: Can I follow that on?

 DR. KELLOGG: Yes.

 DR. TAYLOR: So, I mean, one of the questions to the AD is, in that respect -- I mean, you mentioned before with Expeditions in Education that, you know, what you get depends on what you ask for. And in preparing -- I mean, this is a solicitation that hasn’t appeared yet, right? So, one of our questions to you is, what are we doing to frame -- and we’ve heard some of the issues from Jill and others about how this thing is morphed, and the expedition thing is getting lost, and participation of GEO in this thing is getting harder. So, how are we positioning ourselves to play in the Expeditions in Education solicitation, and predisposing that announcement to be friendly to a group that’s decided before it’s come out to put a significant chunk of change into that initiative?

 DR. CAVANAUGH: Yeah, yeah, it’s -- well, I can just say that we have, you know, a couple program officer types who are engaged in that conversation. And you can see, it’s not a bad example, I think, of also what David talked about which has to do with the fact that you are writing budgets a couple of years prior to when -- and this related actually to Dave’s comment too, is that you’re writing budgets a couple of years prior to when things are going to happen. And an awful lot happens in that time. So, you say how much money you’re going to put on the table for a particular activity, such as E Squared, and then with the idea that you have an idea what it’s going to -- and then it can change. So there are risks in, I guess if you want to think about it that way, involved. You know, but it certainly is an inspiration to stay at the table, that’s for sure, as that process rolls out.

 But -- and that’s sort of where we -- but, so actually, you’re right, Brian, that if people here have some ideas about what -- I would say at this point, you know, what kinds of innovations would you tend to point to or, you know, draw to for the GEO sciences community in the undergraduate level? And some thoughts about that or words about that or, you know, this would be very helpful to the people -- program officers who are sitting at the table right now. It would be good.

 DR. TAYLOR: One very quick [inaudible] is what’s in a name. If they take expeditions out of the real concept of Expeditions in Education, then we’ve lost it. And from what I heard described today, it didn’t seem like that concept was being maintained.

 DR. CAVANAUGH: No. That’s probably -- that’s my fault I guess because of the way I described, you know, described it. But, because I think the topical expedition thing is not the way that is being thought of. But there certainly is a very experimental kind of, you know, cutting edge kind of, you know, meeting the frontier kind of sense about what they want to happen out of that. And then, so, it’s still an expeditionary in that sense. It’s sort of striking that if you start to look for literature regarding using known, proven best practices, educational practices in undergraduate settings, it’s pretty scant, surprisingly so. Especially when you’ve got this other overlay of trying to bring their frontier research in, which is pretty scant. So, [inaudible] expedition [inaudible].

 DR. RUDNICK: About these cross-directorate or cross-disciplinary initiatives, I’m a little bit concerned I think when I hear that -- I mean listening to Dave talk about how important it is for climate -- or carbon cycle research, okay? That’s a really important point, and it seems to me that these cross-disciplinary initiatives should be coming from the grassroots as opposed to coming from the top. And so, you know, so I’m concerned about that and I wonder if there can’t be a way to stimulate the community to come up with what makes the most sense in terms of cross-disciplinary research, rather than having it come as a directorate from above. Basically put faith in the scientific community to know the directions that it should be going, which is sort of what the Advisory Committee’s all about. But, you know, expanding that out beyond the Advisory Committee to the greater community.

 DR. KELLOGG: Okay, I think I’m going to let that be the last word for the day, and have us wrap up. So, we have just a couple of things. Those who are here, physically here, there’s a reception on the seventh floor, Room 705, between 5:30, ending about 6:45. And many of the program officers will be there, and so I encourage you to go and meet them, and talk with them. And then there’s a diner for some of us at -- what is? A-Town?

 FEMALE SPEAKER: A-Town.

 DR. KELLOGG: A-Town is the name of the restaurant, 4100 Fairfax Drive, at 7:00 p.m. Any idea where they can just grab -- thanks.

 MS. LANE: It’s a one -- if you go to Fairfax, you going to walk east, go one block, and it’s on the corner. It’s in the southwest corner --

 [talking simultaneously]

 MS. LANE: Go to the metro stop, turn right and walk two blocks.

 DR. KELLOGG: Okay.

 [talking simultaneously]

 DR. CAVANAUGH: Go one block past the IHOP.

 DR. KELLOGG: A-Town.

 [talking simultaneously]

 DR. KELLOGG: Okay, so with that, we will be adjourned. We, you know, we can see the whole dog now.

 [talking simultaneously]

 DR. KELLOGG: We’re admiring your dog, Roberta. so, we will start tomorrow at 9:00 a.m. We will have an overview of polar programs and then we’ll prepare for our meeting with the director. So, see all of the virtual use on the -- tomorrow, and everybody else at the reception. Okay, bye.

 DR. CAVANAUGH: Bye, see you tomorrow.

 FEMALE SPEAKER: Okay, thanks.

 [Whereupon, at 5:19 p.m., Day One of the Advisory Committee for Geosciences meeting was adjourned.]

I N D E X

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Cavanaugh, Dr. Marge 11



 ADVISORY COMMITTEE FOR GEOSCIENCES

 ADVISORY COMMITTEE MEETING

 October 11, 2012

 9:00 A.M.

 National Science Foundation

 Room 1235

 4201 Wilson Boulevard

 Arlington, Virginia 22230

 P A R T I C I P A N T S

COMMITTEE MEMBERS PRESENT:

Dr. Louise H. Kellogg, Chair

Dr. M. Lee Allison

Ms. Vicki Arroyo

Dr. Daniel N. Baker

Dr. Mary C. Barth

Dr. Margaret L. (Peggy) Delaney

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SPEAKERS PRESENT:

Dr. Greg Anderson, EAR

Dr. Kelly Falkner, OPP

Dr. Cora Marrett, Deputy Director, NSF

Dr. Subra Suresh, Director, NSF

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 P R O C E E D I N G S

Overview of Polar Programs

 DR. KELLOGG: Okay, let’s get started. I’m going to turn the meeting over to Kelly Falkner who’s going to tell us about the Polar Programs. Thank you for coming and joining us.

 DR. FALKNER: Okay, good morning everybody. I understand your last meeting, when Tim Killeen presented to you, he was rehearsing for what we call a director’s review, and today basically you’re going to see the same thing. I’m rehearsing a talk we’ll give next week for our director’s review.

 So I’m going to start off with an assertion here. Although conducted in places and on subjects seemingly remote, polar science matters to people everywhere. And the many reasons it matters motivate our broad and rich polar research and education portfolio and logistic support systems. So on behalf of the talented and dedicated Polar Programs team at NSF, many of whom are sitting in the back of the room there, I’m delighted to have the privilege of sharing a sampling of our science drivers, exciting science highlights, and aspects of the polar know-how that make it all possible. And by the way, I’ve been told it’s important that an audience knows the credentials of the speaker. These pictures are to illustrate my direct experience at and appreciation of both ends of the earth.

 All right, can I have a show of hands of those in the room who are familiar with the Phoenix Galaxy Cluster? Not too many. So what you’re looking at in this slide is an artist’s rendition of one of, if not the most colossal galaxy clusters yet known in the universe. For those of you who haven’t heard, in August of this year news broke of a surprising and record-breaking high star formation rate in the central galaxy of the Phoenix Cluster. This galaxy in the cluster’s rapidly cooling center contains 3 trillion stars and forms more than 700 stars per year, which is five times higher than has ever been observed before. For reference, our own Milky Way has about 200 billion stars and forms only one to two new stars per year on average. Astronomers were hugely excited about these findings because they may fill in a key observational gap in star formation theory.

 So what does this have to do with Polar Programs? It was Polar Program-supported investigators who first discovered the Phoenix Galaxy Cluster. This is just one example of many discoveries made possible by the 10-meter telescope at South Pole Station. So why take all the trouble to put a telescope at the South Pole? One answer lies in the clarity of the overlying atmosphere there. If you could compress the total amount of water in the overlying atmosphere at the South Pole, it would comprise a thin layer of less than a millimeter. For comparison, the next driest option in the Chilean Andes would have a tenfold thicker layer. The astronomy decadal study in the late 1990s registered a priority desire to exploit the polar vantage point for measuring cosmic microwave background radiation remnant from the earliest moments of the big bang. So NSF Polar Programs completed the telescope in 2007 in order to answer fundamental questions like how old is our universe, what is it made of, how did and how will it change in time?

 So we’re proud of the discovery of the Phoenix Cluster by PIs who we supported triggered imaging studies around the globe including Hawaii, and Chile and Australia and in space in covering x-ray, infrared, visible, and UV wavelengths that identified what has been called a supermom of star formation. Not to displace all of you moms with stellar children in the audience of course. The South Pole telescope would be a very impressive facility anywhere, but the fact that it’s operational at the South Pole is an awesome testament to the successful university contractor OPP partnership that put it in place.

 Another similarly impressive facility at the South Pole is the world’s largest neutrino observatory we call IceCube, which was commissioned in 2010. So that $279 million project was supported mainly by NSF MREFC funds with smaller contributions from Sweden, Germany, and Belgium. Polar Programs coordinated with Mathematical and Physical Sciences Directorate to support and oversee the University of Wisconsin for the construction phase and now to share operations and maintenance cost. Early results are already overturning conventional thinking on its head about high energy astrophysical phenomena like gamma ray bursters.

 Before I present other areas of exciting science, I should discuss some important areas guiding our activities and give you a little background about our operations. Hopefully most of you in this room are aware that 2007-2008 marked an internationally coordinated effort of intensified research in the Polar Regions called the International Polar Year. This spring, the National Research Council published this study which captures scientific highlights as well as lessons learned from the U.S. perspective. By all accounts, the IPY was a highly successful venture. At the closing conference for IPY in Montreal this past spring, the president of the International Council for Science noted that, “Without a doubt, the International Polar Year was a triumph for global science.” Over 50,000 scientists from over 60 countries participated in the IPY. Congress designated NSF as lead agency for the effort and appropriated 60 million to support it. Polar Programs coordinated the development and stewardship of a diverse research and education and outreach portfolio that engaged nearly every corner of the foundation. Some of the science I’ll highlight today results from IPY investments and there appears to be plenty more worthwhile findings to come from those investments.

 I’d also like to stress that we haven’t rested on our laurels since 2008, but are actively keeping an eye toward the future frontiers of polar science and how to best position ourselves to support it. So over the past two years, our advisory committee has helped us to explicitly express our mission in the context of the NSF strategic plan and the legacy of the IPY through a visioning exercise captured in a concise document, the cover of which I’m showing you there on the right. This high level vision requires only minor affiliation changes as we proceed with the realignment into the GEO Directorate.

 So it is clear that we must continue to support and strengthen U.S. participation and leadership in frontier science in the Polar Regions. OPP’s advisory committee urged us to continue to take advantage of a regional focus for nurturing system level understanding while ensuring robust disciplinary science. They also called for Arctic and Antarctic cross-fertilization whenever possible for supporting field science under some of the harshest conditions encountered on the planet.

The vision also calls out our special national and international leadership mandates. A presidential mandate, NSF through Polar Programs is responsible for coordinating the U.S. Antarctic Program on behalf of the entire nation. In executing our responsibility, we have periodically sought independent reviews of the program. These have proven essential for ensuring active and influential U.S. science presence in Antarctica, and thus a governing role in the Antarctic Treaty System. This 1996 report resulted in reconstruction of South Pole Station and related environmental improvements. So just a few short months ago, a new two-part review of the U.S. Antarctic Program was formally completed. The first part was an NRC study to identify the likely Antarctic science drivers for the coming two to three decades. The resulting report, published in late 2011, among other things, stressed the need for an observing network approach to advance system level understanding of Antarctica and its connections to the globe. The study endorses U.S. science leadership as a vehicle to better link and optimize national and international observations for this purpose. It also recognizes the need for enhanced and new observational tools as well as improved integration of modeling, observation, and data systems.

 A high level blue ribbon panel then examined future logistics and infrastructure needed to support such science. That panel, chaired by Norm Augustine, rolled out its report on August 23. The report makes numerous recommendations for improvement across the Antarctic program. So I’m currently coordinating a tiger team comprised of senior leadership from across the foundation to respond to those recommendations. Marge is one member of that team. We will present our response to the National Science Board in early December. Without getting too far ahead of that process, suffice it to say that this report as well as the transition to a new prime Antarctic support contract this year will inspire a number of improvements to streamline and strengthen the future of the U.S. Antarctic support system.

 Now, in the North, NSF provides leadership for Arctic research via the Interagency Arctic Research Policy Committee that the NSF director chairs. This committee has recently been folded under the National Science and Technology Council of the President, and reinvigorated under current NSF leadership. A new five-year plan that identifies Arctic research best accomplished by coordinated interagency efforts is about to be released. It has involved extensive public and interagency consultation over the past year. Not surprisingly, some of the IARPC priorities overlap with those identified in the draft implementation plan of the National Ocean Council which includes the Arctic among its nine priority areas. In addition, the NRC is just now kicking off a study of the future of Arctic science that is akin to what was carried out for the Antarctic. We look forward to the delivery of their report in the coming year or so. And Polar Program staff are also actively engaged with the community through meetings and workshops, the results of which are captured in a number of useful reports.

 So with this brief overview of documents that are guiding our thinking, let’s turn to the field. We’ll start with the southern hemisphere, where our logistic support system involves a complex interplay of ships, rotary, and fixed-wing aircraft and relatively permanent states such as Palmer Station on the Antarctic Peninsula, as well as temporary camps. As we now page through annual maps of our research sites, note that the flags mark our three permanent stations, year-round operation of which is part of our presidential mandate. Blue dots are various sites we occupy on the continent. The green line represents the cruise tracks of our larger research vessel, the Nathaniel B. Palmer, while the orange lines track the smaller Lawrence M. Gould that generally services the Peninsula region. You can see that we occupy widespread areas of the Antarctic continent, which is one and a half times the size of the United States, and that pattern changes from year to year as our science priorities evolve. The data system has yet to ingest ship tracks for 2012, so they’re not showing here. But don’t worry, the ships haven’t gone away.

 And now you’re about to view a similar mapping for our Arctic Program -- whoops. Let’s see -- get this right here. Here we go. It also entails support by ships, aircraft, and at fixed and temporary stations. We operate year-round at Summit Station in Greenland. In partnership with the University of Alaska and the BIO Directorate, we support long-term ecological research at Toolik Lake in Alaska. We also partner with other agencies to support permanent research facilities in Barrow, Alaska, and Tiksi, Russia. Now, in this, the blue flags indicate relatively permanent field installations whereas red dots indicate distributed observations sites on land, and the various color lines correspond to major research cruises. We support research from a variety of ships, including the U.S. Coast Guard Cutter HEALY, vessels from the university-run fleet, as well as those of other nations.

 Once again, while it’s clear that we have an impressively broad geographic reach that is fantastic and arguably essential for science, it is not without considerable challenge, and especially in the face of rising fuel and labor costs. So, in order to meet ever increasing demands for observations by polar scientists, we must actively pursue new and better ways of doing business. So NSF Polar Programs has embarked on a multi-pronged and -- Antarctic strategy to reduce our reliance on costly fuels and human footprint. Among the many elements of our strategy are redoubling application of renewables such as shown in these pictures, the Tower of Power at Summit Station in Greenland on the left, and the U.S.-New Zealand joint wind power generation project for McMurdo on the right. And we also deploy wind and solar power energy systems for remote field camps.

 The strategy further entails leveraging investments through both domestic and international partnerships, achieving more cost-effective fuel delivery using over land traverses made more efficient and safer through robotics, green and low-maintenance station designs, development and application of newer and better observational technologies that reduce the need for human presence, smarter energy and water management. Our efforts thus far have entailed partnerships with the Army’s Cold Regions Research Laboratory, Department of Energy, our contractor, and groups within the foundation. Going forward, we envision invigorated partnerships with engineering and the computer and information science and engineering directorates, among others as sources of new ideas and approaches.

 So operating in remote and harsh locations brings unique oversight duties in the environment, health, and safety arenas. These photos remind you that together with our contractors we are basically responsible for running the equivalent of small towns. At McMurdo, this includes firefighting capabilities and support of extensive aviation activities. We execute a medical screening process to ensure a basic level of fitness for remote deployment and medical facilities to treat things that inevitably arise. We’re responsible for a nice diving safety program. We operate a sewage treatment plant as part of an environmentally responsible operation of McMurdo. We also deliver cold region safety and survival training for program participants, both north and south. In addition to these oversight responsibilities, the Polar Programs team ensures that projects and the program as a whole meet statutory requirements through appropriate permitting and record keeping. Now, all of this is an essential part of the behind the scenes engine that keeps polar research running and successful.

 So from here I’d like to move on to our big science drivers, and I’ll be using film clips so that our PIs can deliver the findings in their own voices and the same time transfer you to the polar regions.

 Clearly the record low Arctic Sea ice cover of this September is an inescapably big story. In this film clip, you’ll hear about it from a number of people, including several of the PIs we support in observation and modeling efforts that complement NASA investments in space and airborne observing, in GEO, DOE, NOAA investments, and earth-system modeling.

 [video playing]

 MALE SPEAKER: On September 19, 2012 the National Snow and Ice Data Center declared the annual sea ice minimum with the lowest extent of Arctic Sea ice ever seen in the modern record.

 FEMALE SPEAKER: The white stuff in the -- that you can see in the middle of the ocean here is the ice that’s over nine years old. As you go up into the bluer shades, the ice gets younger and younger and starting -- you can see the date here. We’re still in the 1980s -- you can see how that thick ice is being driven right out into the Atlantic Ocean. There’s less and less of the old ice now -- we’re here still in the 1990s. And as that AO continues to drive all the thick ice out of the Arctic Ocean you see that we’re left with less and less of it. Getting up into the 2000s now, the Arctic is mostly filled with much younger ice. As we get right up to the present day, practically -- and here we are today. Basically, you see that there’s hardly any of that thick ice left.

 FEMALE SPEAKER: The volume of ice at the pole naturally goes up in the winter and down in the summer, but it’s been declining over the last 30 years. It’s now at the lowest level since records began.

 MALE SPEAKER: The rays of the sun land on the bright white surface of the ice, most of the energy is reflected back into space, and the region stays cool. But when the ice retreats and melts, those rays fall on the darker surface of the ocean. That energy gets absorbed, warming the ocean, melting more ice -- a vicious cycle then begins -- what the scientists call positive feedback.

 MALE SPEAKER: The graph on the top right there -- what that talks about is Arctic Sea ice volume. It shows this pretty long-term trend here. That long-term trend is down.

 MALE SPEAKER: A lot of focus has been on the area of the ice and how much there is, but what’s also been happening is the thinning of the ice, and so it’s becoming more vulnerable in two different ways. This year, there’s been indications of storms occurring, and storms start churning up the water; that churns up the ice and breaks it into smaller pieces, and that causes damage. So as you open it up and you have open water, which can bring heat to the surface by churning and mixing it and everything else, you’re only adding more energy to the atmosphere, and so you have more potential for storms. So this is a very interesting phenomenon that I think people really haven’t thought much about.

 FEMALE SPEAKER: There has been some research that suggests that storms have been more numerous and slightly more intense and probably that’s because the ice edge, as it moves northward -- that ice edge is a big temperature discontinuity in the surface, and so just like storms like to ride along the gulfstream along the east coast, they also like to ride along discontinuous temperature areas or big differences in temperature like we see at the ice edge.

 FEMALE SPEAKER: Certainly the storm in early August helped to break up the ice in the Chukchi and the Siberian Sea, but now, where the ice had melted out anyways, probably, because it was already pretty thin and there was a lot of open water areas already between ice flows, so the storm just sort of took it away really quickly. I think it would have melted out anyways though.

 FEMALE SPEAKER: The amount of sea ice that was lost this year compared to any year we can look at going back even a couple thousand years --

 [end of video]

 DR. FALKNER: Is the lowest on record. So, obviously the sea ice is retreating -- so what? With our support, Jennifer Francis has examined how trends like the sea ice over relate to our weather and argues that we can expect to see more extreme weather stuck for longer over the U.S. as sea ice continues to retreat and the area snow cover on land diminishes. The idea is that the wave pattern associated with the jet stream will elongate as the temperature gradient between the Arctic and the northern hemisphere diminishes. So Rossby wave theory suggests that larger waves forms will propagate more slowly from west to east and so cause extreme weather dragged in from the north and the south to linger longer. Jennifer attributes the extremely cold winter in Europe last year, the deadly heat wave in Russia in 2010, and drought conditions this past summer in the central U.S. to such phenomenon. There are many things that remain incompletely understood including the effects of moisture transport in cloud formation. So clearly this is an area ripe for additional research.

 As weather and precipitation patterns change, we’re seeing significant alteration in the plant cover, and that in turn spells challenges for higher life forms. In one study of phenology in Kangerlussuaq in Greenland, Penn State PI Eric Post and his Danish colleagues observe that earlier blossoming of vegetation is favoring musk ox, who deliver their young in late winter, over caribou whose babies come later, and so miss out on the needed nutrition and are experiencing elevated mortality rates. Issues like these raise concerns of food security for northern subsistence hunters. The Arctic is becoming increasingly covered by shrubs while the snow cover is decreasing, habitat ranges are changing such that native residents are reporting first-ever sightings of bluebirds in Resolute, Canada and salmon at Barrow, Alaska. John Wingfield, who heads up our Biology Directorate here can relate numerous challenges experienced by migratory birds that he studies.

 As species migrate northward, so do some of the diseases associated with them. Just last week in fact, the first ever occurrences of the often fatal, to birds, avian to avian malaria transmission were reported in Alaska. I’ll touch on changes to marine ecosystems vital to the U.S. food supply in a moment. But for all these reasons, Polar Programs expects to continue to support a robust program of ecological and biological research in partnership with the Biology Directorate, our marine partners in OCE, and with other agencies and nations around the globe.

 So before we move on, let me return briefly to the topic of weather. So in June 2011, a new generation of satellite sensors was fully integrated into global operational weather prediction systems, reducing the delay time for updating the models with global observations from a little over a few hours to less than one with greatly increased forecast accuracy. That was achieved through a remarkable partnership of NOAA, NASA, European Space Agencies, and NSF, with the U.S. Antarctic Program at the heart of its success. Not only did we provide essential support, we partnered in a very aggressive satellite calibration and research effort that ensured a rapid transition from launch to an operational system.

 So let’s take a look at what that entailed. Now, it turns out that McMurdo is ideally situated for launching balloons into the upper atmosphere in Antarctica because they tend to encircle the continent and return to the general area. And NASA, in partnership with OPP, has taken good advantage of this for long duration balloon-based studies of the upper atmosphere and space for several decades. To calibrate the infrared atmospheric sounding interferometer, which is the principal instrument on board the METOP-A satellite, the French supplied super-pressure balloon expertise. NCAR developed and supplied dropsonde technology that was carried in the balloon payload and remotely triggered to profile the atmosphere. NSF’s McMurdo Station hosted the 20-person Concordiasi field team, providing transportation logistics, field research facility infrastructure, launch infrastructure, and payload recovery support. So we’ll take a look at an example launch now.

 [video playing]

 MALE SPEAKER: [inaudible]

 DR. FALKNER: [over video] This project entails collaboration between government institutes and universities in U.S. and Europe. A campaign consisted of 19 super-pressure balloon flights conducted from McMurdo Station during August through October of 2010. It launched 639 driftsondes soundings in lower stratosphere during Antarctic over-flights of METOP-A. The flight program also included GPS radio --

 [end of video]

 DR. FALKNER: -- occultation soundings of the troposphere both from the balloon and from the cosmic satellite system, polar stratospheric cloud studies in support of atmospheric modeling, and algorithm validation of the sensor over iced-covered terrain.

 So what you’re looking at in that clip are balloons and black lines as they were launched over this period. And the black lines change to a red dot when the balloon stops transmitting. What I like about this clip is that it depicts how the atmosphere circulates over the continent in so-called polar vortex pattern. You’ll note, as you approach the end of the height of austral summer, the vortex pattern tends to break down and allow penetration of lower latitude air masses, at least briefly, over the interior.

 The picture on the upper left corner is the downlink station that now receives the temperature data at a hillside site overlooking McMurdo. The data are then transferred by microwave link to nearby Black Island in order to transmit them by satellite to the receiving station in Germany. I bet you had no idea that the Antarctic figures so prominently in the ever-improving weather forecasting in the -- that the world has come to rely on.

 Turning away from weather toward climate, I’d be remiss not to cover land ice loss. For this, you need to know that if global sea level rises by a meter by 2100, which is in the range of currently plausible estimates, it would displace 145 million people and affect the lives of two billion others living in coastal areas around the world. The IPCC identified rapidly changing ice sheets as the main source of accelerating sea level rise, but emphasized that poor understanding of the processes responsible for recent changes prevents accurate projections of future sea level. Sea level changes will occur on a somewhat longer time scale than the sea ice changes, but these could be game-changing stories for our children and grandchildren.

 The science community has been loud and clear on the importance of the problem and the urgency of advancing understanding, so this is why we invested in the science and technology center we call the Center for Remote Sensing of Ice Sheets, or CReSIS, to develop a new family of technologies for imaging ice sheets. While that center is currently winding down, it’s been highly successful in meeting targeted technological objectives while at the same time leveraging cyber-infrastructure in new ways that have significantly brought in participation of polar science as you’ll see next.

 [video playing]

 MALE SPEAKER: Glaciers were always intellectually interesting, but if they didn’t change for hundreds of thousands of years, then maybe it wouldn’t be of highest priority. If they’re changing in the time scale of 10 years and on the fashion of which has huge societal impact, they suddenly become extremely important. This field is very interesting. There’s now a bit of a scientific field that was actually created by global change.

 MALE SPEAKER: Understanding the role of polar ice and climate change is an issue of international importance. Ice cover and glaciers are changing throughout the world. They are melting much faster than expected. As a result, ocean levels are rising and threatening populated areas along sea coasts. Collecting accurate measurements of the world’s ice has become a critical task. The National Science Foundation is sponsoring a family of related programs that enable the continuous recording and analysis of ice sheet data from remote locations in the Greenland ice sheet and the west Antarctic.

 The Polar Grid Cyber-Infrastructure Project is developing state of the art tools to gather data from remotely placed ice sheet sensors. Scientists from Indiana University and Elizabeth City State University in North Carolina are working together to support the mission of CReSIS, the Center for Remote Sensing of Ice Sheets. They are providing new electronic infrastructure to rapidly gather ice sheet data from the north and south Polar Regions. These data can then be quickly analyzed and used by CReSIS scientists to update climate simulations and make real-time adjustments to the sensors themselves. Censors on the ground gather data on temperature, thickness, and seismic movements. Airborne radar can look deep within the ice. Polar grid will be integrated with the TeraGrid, a coordinated national system that makes the power of large-scale supercomputing and data storage resources available to the scientific community. Researchers involved in ice sheet science will have easy access to advanced computing tools through the TeraGrid.

 MALE SPEAKER: In very certain near term, it allows the experimentalists to more easily analyze their data while they’re sitting freezing in the Arctic or the Antarctica so they can take the most effective data.

 MALE SPEAKER: The Polar Grid Cyber-Infrastructure will transform this situation by enabling the collection, processing, and evaluating of huge amounts of data in real time. Data are collected in the field from mobile sensors and are returned to a massive base camp computing facility for examination. The process data are then transferred electronically to CReSIS scientists working at university simulation and analysis centers. The data are used both to check and to refine sensor operation and to create up-to-the-minute climate models.

 MALE SPEAKER: I love telling people that I’m going to save the world, and being on that bloody edge, so to speak, of technology, there’s some challenges. Sometimes it can get frustrating, but there’s no greater joy than seeing that technology used somewhere else. It’s amazing.

 MALE SPEAKER: Cyber-infrastructure is a very democratic technology, so we can have a very small university, Elizabeth City State, leading the cyber-infrastructure for that experiment.

 FEMALE SPEAKER: The techniques that we are developing here, the capability that we’re developing here will bring aboard those institutions that have in the past not had the opportunity to participate in these scientific investigations.

 [end of video]

 DR. FALKNER: So I apologize for some glitches in that film. We’ve got to work on some technical stuff there, obviously. But anyway, in addition to CReSIS, Polar Programs made several related investments during IPY that will require more time to come to fruition. We supported internationally coordinated projects to emplace high precision GPS recorders around Greenland and throughout Antarctica in order to provide direct measurement of land surface elevation changes. Models of land rebound rates are used to correct gravity signals of the gray satellite pair in order to tease out land ice loss signals. The GPS data requires several years of collection to attain full accuracy, but already they’re showing that we need to go back to the drawing board for land rebound models in several key places including the Antarctic Peninsula where large ice shelves are disintegrating and the ice on the land behind them speeding up. We also invested in new technologies and interdisciplinary teams to directly examine ocean ice sheet interactions in the world’s fastest moving glacial systems including Pine Island Glacier in Antarctica and Jakobshavn in Greenland.

 So access to Greenland for scientific research will remain a high priority for U.S. science for the foreseeable future. An important part of insuring that access is to cultivate mutually beneficial relationships with our Danish and Greenlandic partners. The clip you’re about to view summarizes a program that is building critical science capacity and appreciation for science in Greenland.

 [video playing]

 FEMALE SPEAKER: While most of the U.S. was battling record July heat, some students were seeing world-class research up close in one of the world’s coldest places. Here in Greenland, they experienced science in the field, joined researchers measuring methane releases from Arctic lakes to send it into a vast underground ice drilling complex and learned about a massive radio telescope examining the nature of the upper atmosphere. Along the way, they also experienced the hardships of conducting science in one of the most remote corners of the planet, flying on huge ski-equipped military cargo planes, helping to unload and store essential supplies, and braving intense cold to help maintain sensitive experiments.

The U.S. students from the states of Alaska, Arizona, Colorado, Idaho, New York, and Washington were here in Greenland as part of the Joint Science Education Program, JSEP, a cultural and scientific exchange between Denmark, Greenland, and the United States under the guidance of teachers from all three nations. For two weeks in Kangerlussuaq, Greenland, the students conducted their own field measurements --

 MALE SPEAKER: We have students from the U.S.A., Denmark and Greenland get together to experience science and get to meet scientist groups that are doing research here in Kangerlussuaq in Greenland.

 FEMALE SPEAKER: -- and observed and interacted with scientists as part of the Greenlandic-run field school, leading up to presentations of their findings. They also experienced some historic moments: a very unusual melt across the ice sheet that caused a river they were sampling just days before to rise to record levels; the completion of drilling by the climate researchers at the Danish-led North Greenland Eemian Ice Drilling Project; and the chance to measure what might happen to rain on the ice sheet only days before they arrived it had rained at NEEM. From descending into a pit to see how annual snow turns into layers of ice to learning how to extract ice cores from the Greenland ice sheet to using off the shelf scientific tools and a distance-learning pilot project with students in Idaho, the hands-on exposure in JSEP’s U.S.-led Science Education Week also helped students to build a conception of real world science.

 FEMALE SPEAKER: I have been interested in science my whole life and I did an internship at the University Corporation for Atmospheric Research in Boulder, Colorado last summer, and that really tuned in to my appreciation for meteorology and weather studies, and so I was hoping to find a way to interpret weather data and combine that with technology on this trip.

 FEMALE SPEAKER: The experience also had its benefits for the researchers who worked with the students.

 FEMALE SPEAKER: All the students point out that their favorite parts of the snow pit wall really allowed me to see it through a fresh perspective again, and they were so excited and that [inaudible] allowed for me to be even more excited about my research.

 FEMALE SPEAKER: Though the expedition only lasted three weeks, the students will come away with not only memories of their peers and other cultures, but with a new appreciation for the realities of research and a renewed interest in science as a career.

 [end of video]

 DR. FALKNER: So while small in scale, I can’t emphasize enough the value of capacity building and goodwill this program has and continues to engender. In addition to very focused education outreach programs like these, Polar Programs is partnering with EHR and GEO to build on our successful IPY ventures in polar education and outreach. We’re particularly interested in melding state of the art polar science with the science of learning to advance STEM objectives for the nation. You heard about that a bit yesterday. By partnering, we hope to bring some of our efforts to larger scale and ensure that they benefit from the latest expertise in evaluation and assessment.

 Another area in the north where we have special responsibilities to residents and native populations is the Alaskan Arctic. In a creative partnership between OPP, the North Pacific Research Board, and NOAA, we sponsored a major study of the response of the Eastern Bering Sea shelf ecosystem to changing sea ice cover. Our part of the program is known as the Bering Sea Ecosystems Study, or BEST. This ecosystem contributes more than 40 percent of the annual U.S. commercial fisheries catch valued at up to $1 billion as well as significant subsistence harvests for local populations. A 10 percent drop in the pollock harvest results in $100 million loss to the national economy and many hundreds of jobs.

 BEST is currently in its final synthesis phase and appears to be on the verge of success in the form of a fully integrated physical ecosystem model that includes the fish of interests. The accuracy of the new model based on preliminary hind casting efforts suggests that this effort will be a true breakthrough for understanding the system under changing climate systems. The model seems to be capturing the essential inter-annual variability of the important fish species. The output of this model is then used as input for models of marine mammals and birds as well as for management strategy evaluation models used to develop approaches to fisheries management under different scenarios. Now, we look forward to taking a similarly fruitful approach including social science elements and partnerships further north in the near future as we answer to the call to accelerate research in the Chukchi Beaufort region that is of considerable interest to resource development. In recognition of the need to prepare for the future, we launched an Arctic SEES competition this fall that -- or in the summer; we just got the proposals in. Marge mentioned this yesterday. And that entails partnerships within NSF, with other U.S. agencies, and with foreign partners. This program is aimed to push the nexus of social and natural science in moving towards a sustainable future and it’s intended to involve the private sector and resident stakeholders in defining problems and research approaches. The proposals just came in and we’re very much looking forward to advancing new frontiers in sustainability science.

 This slide illustrates an investment in core polar social science and its ability to reveal new understanding in human development and migration. In this publication, Ben Potter overturns previous social models for early colonization of the new world. Until this work, it had been thought that migration at this time had been driven by mobile hunting groups following big game such as mammoths. The site Ben and his team excavated shows a much more diverse economy and social organization that supported a ritual surrounding the death of a child and more contemporary hunting and gathering semi-permanent structures similar to many remote indigenous people today. As we strive to support the forefront of Arctic research, it remains more vital than ever to support both core and system social science efforts, and we’re looking to build on our existing relationship with the Social, Behavioral, and Economic Sciences Directorate to more fully integrate the SBE perspective in research intertwining social and environmental change.

 We also look forward to enriching our partnerships with BIO as we strive to encourage application of forefront tools in molecular biology and genetics by polar scientist. This film clip captures an example in that realm produced by sustained Polar Programs research support that provides a textbook example of the wonders of evolution.

 [video playing]

 MALE SPEAKER: To see one of the most dramatic examples of how this occurs, we will follow a voyage of long ago that will take us 1600 miles off the southern tip of Africa to one of the most remote places on the planet, Bouvet Island. A speck at the edge of the Antarctic, it’s pummeled by water so wild that getting there was no sure bet, especially in 1927 when this Norwegian steam ship left port.

 It’s cold, it’s windy, it’s rough waters, and they’re far away from civilization; so it was a really long and arduous voyage from Norway to eventually the shores of Bouvet Island.

 Norway had dispatched the expedition to claim the island as an outpost for its whalers, and after two months at sea, on December 1, the crew finally rode ashore and erected the Norwegian flag. But that’s not the most important achievement of this expedition.

 MALE SPEAKER: One aspect of their voyage was to understand all the sea life that was there, and so there was a zoologist on board, Ditlef Rustad, and Ditlef’s job was to really just throw a net over the side and trawl up, see what he found. But one day -- in fact the day after Christmas 1927 -- he pulls up a really unusual looking fish.

 MALE SPEAKER: A creature that many years later would illuminate our understanding of how evolution works. A creature so unexpected, it is still barely believable today when taken from a freezer at Northeastern University by a biologist who spent much of his career trying to make sense of it.

 DR. DIEDRICH: Well, Shawn [spelled phonetically], it’s easy to see why the fish was originally called the crocodile fish. Notice the very big protruding jaw with lots of teeth.

 MALE SPEAKER: Incredible. But it’s so translucent; it seems like I can see inside the fish.

 DR. DIEDRICH: Well, the reason you can see inside the fish is that this is a scale-less fish, and in fact if you --

 MALE SPEAKER: What’s that?

 DR. DIEDRICH: Well, that’s the brain.

 MALE SPEAKER: Oh my goodness!

 DR. DIEDRICH: You can actually see the brain through the skull, and you can also see, projecting from the brain, the optic nerves going over to the eyes. And Shawn, for comparison, we can take a look at a cod and when I pull back the gills of the crocodile fish --

 MALE SPEAKER: Creamy white. Look at that!

 DR. DIEDRICH: And here, if we take a look at the cod --

 MALE SPEAKER: Oh, brilliant red!

 DR. DIEDRICH: Yeah, very, very red.

 MALE SPEAKER: So that would have surprised Rustad because all the other fish he had seen would have red gills.

 DR. DIEDRICH: Absolutely.

 MALE SPEAKER: But that wasn’t the most incredible thing about Rustad’s find. That came to light when Rustad, like any good Norwegian confronted with a strange fish, fileted it as I’m doing today under Bill Diedrich’s watchful eye. Unbelievable. Everything’s white; everything’s colorless.

 DR. DIEDRICH: Yep.

 MALE SPEAKER: All the organs, all the soft tissues, the heart, even. Every other fish he had opened in his life was full of red blood, but not this fish. And he wrote in his notebook, boldly, “Colorless blood; blod fargeløs [spelled phonetically].”

 The crocodile fish, or icefish as they’ve come to be known, had a dilute liquid almost as clear as ice water flowing through its veins.

 DR. DIEDRICH: Okay, and here’s your icefish blood.

 MALE SPEAKER: That’s amazing.

 Except for the icefish, all of the vertebrates on earth, reptiles, birds, mammals, and all other fish like this cod have red blood coursing through their veins.

 MALE SPEAKER: So what’s so incredible about having no red blood cells at all is that, for example, our blood -- 45 percent of our blood by volume is red blood cells. So we have an enormous number of red blood cells in our blood, as do most other backboned animals. And when our red blood cell count decreases a little bit, we call that anemia. And if it decreases a lot, that’s life-threatening. So it’s stunning that an animal could get by with no red blood cells at all.

 MALE SPEAKER: Why would a fish abandon a way of life that’s nourished its ancestors for 500 million years? It has to do with the extreme habitat in which it lives.

 DR. DIEDRICH: The more cells that are present in blood, the thicker it becomes at cold temperatures.

 MALE SPEAKER: So this watery blood allows the fish to live in really cold temperatures. So if it had blood like this, it’d be all gummed up?

 DR. DIEDRICH: That’s correct.

 MALE SPEAKER: All right.

 Blood is red because it contains hemoglobin, a protein that delivers oxygen throughout the body. Yet the icefish have not one hemoglobin molecule. The fish absorb enough oxygen from the sea through their scaleless skin so that they can make do without hemoglobin. But the lack of red blood cells still doesn’t full explain how any blood flows in oceans this cold: below the freezing point of fresh water and almost at the freezing point of sea water.

 FEMALE SPEAKER: And fish cannot generally live in that sort of environment because the freezing point of the blood is higher than the freezing point of sea water.

 MALE SPEAKER: Yet fish thrive in these waters; icefish and other species, all members of a group called the notothenioids. To show just how different Arctic notothenioids are from other fish, husband and wife biologists Arthur DeVries and Christina Cheng dunk one in water as icy as the ocean outside their lab on Antarctica’s McMurdo Sound. The temperature, minus 1.8 degrees Celsius, is so cold it’s below the freezing point of fresh water and blood.

 DR. DEVRIES: So, as you can see, this fish is doing fine at this freezing temperature in the midst of ice crystals.

 MALE SPEAKER: How these fish thrive in such cold waters baffled scientists until the 1960s when Art DeVries found that Antarctic fish had invented something that protects them from freezing: antifreeze.

 DR. CHENG: These fish have a certain protein, and what it does is bind to the ice crystal in the fish, and by binding to it and preventing it from growing any bigger, the fish doesn’t freeze.

 MALE SPEAKER: So only one group of fish in the Southern Ocean, the notothenioids -- icefish belong to that group -- have antifreeze. So it’s an invention unique to this group and that’s allowed those fish to invade a space that other fish couldn’t live in. And these are nutrient-rich waters full of food, so these fish are thriving now where other fish couldn’t thrive.

 MALE SPEAKER: Antifreeze proteins give notothenioids a clear edge where the live. But their existence poses an evolutionary mystery: When and how was antifreeze invented? The waters around Antarctica were once a temperate 10 degrees Celsius. But 34 million years ago, Drake Passage opened as Antarctica broke away from South America. Now a continuous current circled a new continent, isolating its surrounding waters. As a result, those waters chilled to minus 1.8 degrees Celsius. So notothenioids and antifreeze evolved in the last 34 million years. But traits are encoded by genes. Where did antifreeze genes come from? DeVries, Cheng, and Liang-Biao Chen worked out part of the mystery in the 1990s by noticing that parts of the antifreeze gene, labeled in red, strongly resembled a different gene. That one gene gave rise to the other. The process began when the ancestral gene was accidentally duplicated. While one copy remained the same, the other accumulated mutations that eventually gave it a new function: to make antifreeze proteins.

 MALE SPEAKER: The invention of antifreeze is a crystal clear example of inventing something new from something old, borrowing sort of the code of a preexisting gene and then altering that to create a protein that has entirely new functions. And this story we see again and again in evolution; inventing something new from the old.

 MALE SPEAKER: Notothenioids invented antifreeze genes, but one family, the icefish, went a step further and eliminated red blood cells and hemoglobin altogether. As for how that happened, the answer has also been preserved in DNA, and Bill Diedrich found it when he compared globin genes from icefish and other fish. Globin genes encode the hemoglobin protein.

 So what do we see here?

 DR. DIEDRICH: Well, as you go from left to right here, for the normal red-blooded globin gene is shown in the sequence on the top. Down below, we have the sequence of the icefish and as we move from the left you can see, there, dots. These are exact matches in the sequence.

 MALE SPEAKER: [affirmative]

 DR. DIEDRICH: However, at the arrow, we see we get virtually no match. This is essentially genetic gibberish.

 MALE SPEAKER: So it’s broken right there?

 DR. DIEDRICH: That is exactly right.

 MALE SPEAKER: At some point in history, a mutation wrecked this gene, and since hemoglobin was no longer necessary to icefish, the mutation wasn’t weeded out.

 DR. DIEDRICH: And this is the fossilized remnants of that gene.

 MALE SPEAKER: So if the gene has become useless, it will eventually be lost as these mutations pile up and just erase what used to be there?

 DR. DIEDRICH: That is exactly right.

 MALE SPEAKER: So genes are born and genes die as species find ways to survive in an ever-changing world.

 MALE SPEAKER: What this remarkable fish that Ditlef Rustad dredged up 80 years ago has taught us is that evolution doesn’t always come up with the best solution imaginable. It just comes up with the best solution available, and that sometimes means getting rid of things that worked in our ancestors as well as inventing new things like the antifreeze. And that record of changing habitats and changing lifestyles and changing genes is etched in the DNA record of life.

 [end of video]

 DR. FALKNER: So if you -- as you’ve just heard, we’ve known of the icefish since 1927 and we are proud of our support for the PIs who figured out the evolutionary story behind its unusual characteristics. Now in principle, what they’ve learned about specialized proteins could well result in practical applications for things like preservation of food and medicine. Just when we begin to think that we’re thoroughly familiar with our polar worlds, they remind us that we’re far from knowing it all.

 What I’m about to show is an accidental discovery recently captured by an underwater video camera of a whole new ice shelf-affiliated ecosystem in the Ross Sea. The camera was deployed on an autonomous vehicle to investigate a possible follow on a marine sediment coring site for the ANDRILL Program. It sure surprised the geologists and the drill folks to see ice-anchored anemone and, for lack of a more sophisticated name, a living Antarctic eggroll, which I presume may be bloodless and has antifreeze for dipping sauce. It most definitely surprised the biologist. The team managed to collect specimen which have been confirmed to be completely new species. To make such a discovery in our own backyard, so to speak, simply awaited deployment of the right tool. This is an excellent reminder that new discoveries often result of new ways of observing. We in Polar Programs view it as very important to always be on the lookout for new ways of seeing including adapting existing tools for use under challenging polar conditions.

 So in closing, I want to emphasize that the Polar Regions are clearly in the public eye. Some of this results from the concerted efforts to bring about polar -- to bring polar science to the public during IPY, and some results from the enduring fascination of the public for the spirit of adventure that’s represented by Polar Regions. This year, Science Magazine decided that polar science is sufficiently important to devote a writer full-time to a new polar beat. Dr. Carolyn Gramling, who’s appointed to that duty, met with us here a few weeks ago. She took copious notes on subjects that I discussed today, but also many that I haven’t had time to talk about, including the important role of polar regions in driving global ocean circulation, findings from new spectacular climate records in the Ross Sea and Lake Elgagitkin [spelled phonetically] in Siberia, unprecedented mapping of mountain ranges and sampling of long-isolated liquid water bodies deep beneath the ice sheets, the potential for significant methane releases from the Arctic, the rush to document endangered languages and cultures, and observations of ocean acidification outpacing predictions, among many others.

 Now, this cover of The Economist illustrates that media attention is also reinforced by global interest and resource development and social change. This special section of this issue did an excellent job characterizing a broad range of economic implications of the major environmental changes underway in the Arctic and, despite the title, I can assure you the North is not going anywhere. It is undeniably changing and needs science now more than ever. So, finally, we concur with the title of this important work, and in conclusion, let me finish where I started by restating that although conducted in places and on subjects seemingly remote, polar science matters to people everywhere. Thanks.

 [applause]

 DR. KELLOGG: Thank you for that presentation; very interesting. So I’m going to ask us to spend a few minutes -- just a few minutes with questions, and then I wonder if we continue to have questions if you would be available later in the afternoon and any of your senior staff --

 DR. FALKNER: Certainly. Yes. And you do need to prepare yourself for the director’s visit, so I understand that.

 DR. KELLOGG: So let’s take a few minutes for some, you know -- for some questions and then we’ll see where that goes.

 DR. KELLOGG: I have a question. Can you hear me?

 DR. KELLOGG: Yes, Roberta. Go ahead.

 DR. RUDNICK: Okay. This -- well, first of all, it’s fascinating. This is a great presentation; I really enjoyed it. What’s going on in terms of the science and the Arctic and the Antarctic. One of the things I didn’t hear in your presentation at all was about energy resources, and with the melting back of the ice sheets, of course, it’s looking like there might be a, you know, a gold rush, so to speak, of companies trying to go in and harvest some of the natural fossil fuels plus other things that might be there. So does NSF have any plans to do research related to energy and also perhaps the impact of extracting energy on this fragile environment?

 DR. FALKNER: Yeah, so my reference to that was maybe a little too oblique. I did mention that we were looking forward to taking our approach that we had taken in the Bering Sea northward to the Chukchi and Beaufort, which really at the moment is the place where the energy rush is going on. So we have a lot that we hope to do in the future in that regard, but right now, for example, we have collaborated with the North Pacific Research Board and some of the oil companies in a competition to conduct synthesis of existing information that’s government-produced, that’s industry-produced, and so forth to get an understanding of the Chukchi-Beaufort region. And we provided review expertise for that; the oil companies stood up the money to support the synthesis activity. And we will leverage that going forward for this follow on effort that I was mentioning in terms of, you know, figuring out what to do next in the Beaufort-Chukchi region.

 So, there’s a lot going on and the Arctic section is following all of this very closely. You probably followed the fact that despite this retreat in the sea ice cover, Shell had a heck of a time this season trying to get in and do drilling, and in fact, they didn’t succeed to do the deep drilling they hoped to do. There were many reasons for that, but one of them was actually ice [laughs]. So despite the fact the ice is retreating, bits and pieces of ice that are dangerous to ships, and particularly with the increasing storms, are around. And that reinforces this need that we have for ice-breaking capable, ice-worthy ships in this region.

 DR. DE PAOLO: Just had a quick comment. So it occurs to me -- and this maybe my own strange orientation in this business -- is that -- so, I mean, for the most part you talked about climate change and ecological change related to climate change, okay? I seem to remember when that wasn’t the only thing that Polar Programs was about, but it’s an interesting evolution that, you know, this issue, because it’s so critical to the world, has kind of taken over the mindset of what polar research is about in many ways. I think that perspective in itself is worth something because there are other things that can be studied in the polar regions and it’s not just about climate, although I can imagine now, it’s hard for it not to be mostly about climate.

 DR. FALKNER: Well, Don, an answer to that, we do have a quite, as I said, broad and rich portfolio, and with only an hour to talk about things, I try to hit on the things that are in the public eye for at the moment, but indeed, we have ongoing, you know, basic science studies in -- let’s pick earth science, for example, tectonics, and that sort of thing. So there’s no intent here by some of the things I’ve highlighted to suggest that the emphasis has moved completely in that direction. We view it as very important that our core discipline programs remain robust because it’s only those pillars that allow us to do some of this more interdisciplinary climate sorts of research.

 I should probably let you prepare for the director.

 DR. KELLOGG: Yes, thank you very much.

 DR. FALKNER: And I’ll be around this afternoon.

 DR. KELLOGG: Thanks for that presentation. Appreciate you coming. We do --

 DR. FALKNER: Okay.

Preparation for Meeting with the Director

 DR. KELLOGG: Okay, so thanks everybody for the online -- also for your patience with the technical challenges of the morning [laughs].

 So we -- next up, essentially, is our visit with the director who will be arriving at 10:30. So in order to use our time wisely, we traditionally try and formulate what we think are the priority questions in advance, and even ask people to -- who’s going to ask which questions. And so I sent around to the committee what I’d heard last night at -- what I’d heard over the meeting so far, and I came up with a list of 10 questions. And my guess is that we’ll get through about four of them.

 [laughter]

 DR. KELLOGG: So we may want to -- we probably will want to prioritize. I think because we -- actually, I think a year ago he asked us whether we would consider having a virtual meeting, and so in some sense this is a response to that request; so I want to make sure that the telepresence participants get full chance to ask questions as well. So why don’t we -- if you don’t mind I’ll just run through the list [laughs] -- I’ll run through the list and then we can prioritize from there.

 So my thoughts were -- let’s see, the first -- the thing I heard most often -- I heard -- I collected your advance emails and also what I heard yesterday, and one of the main things I heard was a question of what the status of the search for a permanent AD is, and second was what the impact of these -- what the motivation was for the managerial changes including the merger of OPP and GEO and what the impact of that would be on GEO. So I’m seeing some nodding around the table. I have a feeling those are the questions that we absolutely want to get an answer to. Is that correct? I’m sort of looking at the screen, if you guys could --

 DR. RUDNICK: I like the question that Lee submitted via email. I don’t know if you’ve seen it. It came in this morning.

 DR. KELLOGG: It came in this morning?

 DR. RUDNICK: Workload versus the tension between, you know, workload and all these new initiatives --

 DR. KELLOGG: [affirmative], okay. So --

 DR. RUDNICK: I think that’s a really important one that hears.

 DR. KELLOGG: So workload and initiative -- is Lee on --

 FEMALE SPEAKER: Yes.

 DR. KELLOGG: -- the phone? Okay, yeah. And new --

 DR. TAYLOR: There’s also one that you didn’t capture and it’s timely because the director’s about to go west and, including the Sikuliaq launch, and that came up a lot in the ocean division meeting the other day which is that the facilities the divisions are being asked to support after they come out of MREFC accounts that are relevant to not only to all of GEO but actually all of NSF, and the budget structure at the moment is putting the O&M costs on divisions, but the facilities are responding to needs for the broader NSF. And that is not in one of your list of 10.

 DR. KELLOGG: Yeah, that’s a very good point. There were several questions -- would you like to ask that question, actually?

 DR. TAYLOR: Sure.

 DR. KELLOGG: There were several questions related to support for facilities, and one of them was a sort of general question about the sort of mid-scale facilities, and that, you know, the things between 4 million and MREFC and what happens with those. I had some people send me specific questions about specific things that are taking budget cuts, and I think there’s at least one of those from each of the [laughs] -- of the divisions, and with the concern for the major impact that these cuts will take on the science if the facilities are cut. And then there’s this question of transition of these major investments to long-term sustainability. Those were the main things I heard about facilities just in the general balance, and that will become -- somebody said yesterday, you know, basically we’re taking one of the most facility-heavy offices and merging it with one of the most facility-heavy directorates and so that will be even more of a problem. I think if you would like to pose that question -- that would be great.

 DR. TAYLOR: That consortium of questions, or -- I mean, it depends --

 [laughs]

 DR. KELLOGG: Well, so that’s -- let’s ask the group. What’s -- how do we want to see that posed?

 FEMALE SPEAKER: That’s a lot of questions.

 MS. ARROYO: I mean, here’s a question about that question. Is it that the facilities themselves being cut, or is the idea that even when the facilities are protected that perhaps other items that affect the research that you can conduct in that facility are affected, because obviously you need the people to do the research. And that, once the facilities are protected, there are other competing demands for them, and so it’s sort of a broader question about resource constraints and where do you put it in the question of the facilities versus the operating budget, I guess.

 DR. KELLOGG: Well, and the other third part of that is how do you balance the support for facilities versus the support for the science that’s done using those facilities, and if you -- if everything goes into the facilities, then doesn’t -- it hurts the science, ultimately.

 MS. ARROYO: So maybe it’s a broader question of how NSF is thinking about that, because, I mean, it’s a resource-constrained environment. It’s nobody’s fault, and that’s just the way it is. But how do you think about those kinds of tradeoffs?

 DR. KELLOGG: I’m looking up at the screen as if you guys can see that I’m looking up there --

 [laughter]

 Any of the telepresence people want to weigh in on that?

 DR. TAYLOR: I can try to capture some of that flavor and we’ll see where it goes in real time.

 DR. KELLOGG: I think it’s fine; I think it’s a good idea to use some of these specific examples, because these are really success stories in GEO and they are, you know, things that we’re concerned about in the long run.

 Okay, so the questions about the merger -- Harlan asked a very specific question about the -- this sort of change -- what the motivation was and also wanted to hear from the director regarding what he considers to be the strengths derived from the -- from this organization and the challenges, and asked how we, the AC GEO, might be able to assist him and the new GEO AD in managing the transition. Is Harlan up there?

 DR. SPENCE: I am, yeah. I guess my comment would be -- it’s maybe too polite a way of asking, I don’t know. I think there were other feelings from the folks --

 DR. KELLOGG: I’m not sure what you mean. I’m not sure it hurts to be polite in asking a question, but -- [laughs]. How else would we pose such a question?

 DR. SPENCE: Well, I guess there are [inaudible] dimensions to the question one could think about. One is -- to some extent it’s poking at what is the role of this advisory committee and could we/should we have been more involved in some of the major changes. To some extent, Marge commented on that yesterday --

 DR. KELLOGG: [affirmative]

 DR. SPENCE: -- and -- not too much work looking at that with question -- I guess I was trying to be more forward-looking about what we do going forward, you know, to help with the transition. Where does -- really, where does he think that -- where does he see this going?

 DR. KELLOGG: I think that’s the best -- our best strategy is to look forward and, you know, ask about that. I would be interested to hear him talk about -- a little bit about what motivated the reorganization. Not just this one that affects us directly, but all of them. Because I think that will give us an insight into what he’s thinking about the future directions for NSF.

 Okay, so we also have -- looking at the wall clock -- we also have questions about the education and diversity, the changes, the “Dear Colleague” letter that we got, and how the efforts in GEO relate to a broader agency-wide assessment of the topic of education and changes in sort of educational programs. So, I think that’s a very important question. That’s something that’s been of interest to us for a long time, and these new changes are really, you know, a big -- have potentially a big impact on us. GEO has made a big investment in this and wants to see that that investment is, you know, wisely handled with respect to the needs of the geosciences education. So -- and we also suffer from a lack of diversity even compared to other STEM fields. So I guess my question is who would like to ask that question? No volunteers? [laughs]

 DR. SCHIMEL: I’m not sure I understand what the question was.

 DR. KELLOGG: So I guess the question is what -- given these changes -- the investment in E Squared, the Expeditions in Education, what are his thoughts about the way that’s going? And how can we, you know, make sure our voice is -- you know, make sure the needs of GEO are met? I didn’t put that all that well.

 DR. SCHIMEL: Yeah, I’m not sure what the question in there is that he would answer.

 DR. KELLOGG: [affirmative]

 DR. SCHIMEL: Because he’d say oh what -- the advisory committees are very important and we’re looking forward to [inaudible].

 DR. KELLOGG: Right:

 DR. SCHIMEL: So it seems like -- if there’s something that we actually really -- if there’s something there that we really substantively want to address, we need to figure out what it is. I mean, I’m willing to ask, but I don’t want to ask him something that’s going to generate a platitude.

 DR. KELLOGG: That is an excellent point. Okay, so let’s throw this open for --

 DR. SCHIMEL: But I didn’t exactly understand what that nub was yesterday either.

 DR. HORNBERGER: So it strikes me, Dave -- at least what I heard was that -- E Squared or E2, what are we calling it -- was expedition-oriented, and therefore when it was that we were the -- an obvious -- there was an obvious link, and if the expedition part is no longer so front and center, I guess the question relates to how GEO plays. But I think you’re right; he would be seeking advice from us on that.

 DR. KELLOGG: So one way to handle that is not to ask that question at all but just have me mention that we’re following it with great interest.

 DR. SCHIMEL: Actually, it occurred to me that, after what George just said, that maybe we should skip the question step and simply provide him with advice. We’ve been following the Expeditions in Education. We think it’s a very important, exciting project, and we think that this as the premiere directorate for expeditionary science should continue to play a major role in it.

 DR. KELLOGG: Yes, let’s say that.

 [laughter]

 That’s great. That summarizes everything we’ve been talking about.

 DR. SCHIMEL: Rather than asking him a question --

 DR. KELLOGG: Yeah.

 DR. SCHIMEL: -- where we want him to deduce -- that’s what we’re thinking.

 DR. KELLOGG: Yeah, that’s a good idea. Okay.

 DR. TAYLOR: But which -- if it focuses mainly on undergraduate education, we don’t necessarily see as the -- playing to our strengths.

 DR. KELLOGG: Well, so I -- yeah, that’s right. I’ve got three things. There’s one -- one was that the -- if the emphasis on Expeditions gets eliminated or reduced, well that’s what -- one of our strengths. And another thing is that we have a lot of these very large facilities that actually represent an opportunity for Expeditions in Education. And the third is this thing that if it focuses on undergraduate education, that’s not where we can really play in a --

 DR. RUDNICK: I don’t agree with that last point. Why doesn’t undergraduate education factor into what we do? We teach undergraduates. I’m going to log off here in an hour to go teach undergraduates [laughs].

 DR. KELLOGG: We do, but we don’t -- I mean, I think that one of the things is that, you know, our courses generally, that all of us teach, are never required. They’re optional courses. We do teach undergraduates, but we don’t teach, for example, every pre-med the way physics and --

 DR. RUDNICK: I think the fundamental problem is that earth sciences should be required in high schools as well.

 DR. KELLOGG: Yeah. That’s right. I don’t think you’ll get any disagreement here [laughs]. I --

 DR. DONEY: I guess for -- well, for some of the fields that we’re dealing with, a lot of the first exposure that people are getting are at the graduate level. So I think the undergraduate is very important, but we need to emphasize that, you know, it’s not just undergraduate teaching.

 DR. FISCHER: Well, perhaps a positive way of making that point would be to talk about the synergy between graduate and undergraduate education -- that we can build on the strengths of our facilities and, you know, sort of, you know, the outstanding work we do at the graduate level, but also combine that with teaching even in very introductory undergraduate courses. And I think, you know, that the pitch about how pressing the world’s problems are related to our research areas is a natural draw to undergraduates -- is always a helpful thing. And, you know, rather than saying that we have any sort of specific advice now, this might be a very good topic for one of our future advisory committees, you know, just -- you know, we’ve talked about having questions posed in advance. This might be one where, you know, we do some brainstorming and come back to the director the next time with, you know, some sort of more specific recommendations.

 DR. KELLOGG: We’ve actually had a subcommittee that developed a whole strategic plan for -- related to education and diversity, so we could draw on that work as well.

 DR. FISCHER: Absolutely.

 DR. DELANEY: I’m still not sure if that captured this in a question or even in observation for him. But certainly the “Dear Colleague” letter was an abrupt and significant change in the EHR programs in GEO, and the relationship of our programmatic interest in education and diversity to E Squared is not yet clear. Reading between the lines of the Dear Colleague letter, I look at someone saying these efforts should be in EHR, not in geosciences, and geosciences should focus more narrowly. I’m not sure if that’s what it’s saying, but -- and so there’s a big change in what we’re doing and I don’t completely understand the big change.

 DR. CAVANAUGH: That might be the question -- I don’t -- you know, you can ask -- put it however you want, but you might -- we all might learn something, I think, from questions geared towards what kinds of changes are they seeing at sort of a, you know, at a bigger scale related to NSF’s role in education. And because I think a lot of this -- a lot of -- there are a lot of things happening. There’s a CoSTEM report that’s -- that Jill mentioned yesterday, and there’s some rethinking of how the various agencies would work together on education. And I think that a lot of that kind of -- a lot of that is driving changes not only, you know, in EHR, as well as the thinking about what -- how the directorates would be involved in education. So I think that that -- a question that sort of probes on that could be really helpful since we already have some strategic plans; we already know we’d like to be able to play and we could have a role, you know, maybe that would be helpful. And Cora probably knows quite a bit about that, and I think she’s coming -- she’s -- yeah.

 DR. SCHIMEL: I just wanted to respond to that one thing. I agree with everything we’ve said about the importance of a balanced approach to education across the different levels, but I thought what I heard at the last briefing that we had from EHR was a pretty high level concern about the failure to increase recruitment at the undergraduate level into the STEM disciplines, and, you know, I believe the slides show that the total absolute number of students entering STEM had really improved over the -- or increased over the last 20 years despite a fairly large increase in the total undergraduate population. If I understood that correctly, I could not imagine not prioritizing recruitment at the undergraduate level into the STEM fields above almost everything else. And if we were to try and push against that, we might not be very successful.

 Now, you know, using the integration of graduate and undergraduate education as a recruiting technique is a great one. It’s one of many strategies that’s, you know, certainly worked well in many institutions. But instead of pushing back against that, I think we actually ought to be really seriously thinking about how we can use the enormous appeal of the geosciences to be recruiting students at the undergraduate level and increasing the flow into the graduate pipeline in so doing. You know, I would hate to do anything to suggest that we think that that problem over all STEM undergraduate recruitment is just someone else’s problem, and --

 DR. KELLOGG: Right.

 DR. SCHIMEL: -- and we’re not going to deal. I don’t think any of us mean that, but I would hate to come across that way because this is, you know -- this is a national, strategic problem that we can’t shirk partial responsibility for addressing. And again, I think -- going back to this expeditionary concept, we have in our disciplines the exciting, hands-on, engaged, intellectually challenging opportunities that ought to be a really powerful tool. Yeah, and that’s the positive of this --

 DR. KELLOGG: Right, so --

 DR. SCHIMEL: -- unless they step away from that in the program.

 DR. KELLOGG: I understand.

 DR. SCHIMEL: Yeah.

 DR. KELLOGG: So we now have like two minutes --

 DR. SCHIMEL: Right.

 DR. KELLOGG: -- so I’m trying to keep us on track. I don’t have -- who’s going to ask the Polar Programs merger question? Is there someone who would particularly like to ask that question? Someone online?

 DR. SPENCE: I’d be happy to do that.

 DR. KELLOGG: Who is that? I didn’t catch that --

 DR. SPENCE: This is Harlan. I’m sorry.

 DR. KELLOGG: Okay, thank you. And the workload question. Now, we had a few other questions related to the fiscal cliff -- [laughs] -- in particular. Do we want to ask that question?

 DR. HORNBERGER: I think that would be reasonable -- a reasonable question. I mean, it may be, again, a very short answer.

 DR. KELLOGG: Yeah. Roberta, are you -- oh. She may be gone to teach. Roberta, are you there? Are you able to ask that?

 DR. RUDNICK: Sure, I can ask it.

 DR. KELLOGG: Thank you.

 DR. RUDNICK: Do we know what order we’re asking things in?

 DR. KELLOGG: I’m going to start by -- with the AD search question, then I think we’ll do the merger, then facilities, then fiscal cliff. And then if we’re lucky, we’ll get to the workload. Now, of the other questions, unless anybody objects, is there anything anybody sees as being higher than that? If we had additional time what would your top priority be?

 All right, well, we’ll just play it by ear. I doubt will have time for more than that. So -- so Lee, can you ask the workload question? You posed it.

 DR. ALLISON: Sure, I’d be happy to.

 DR. KELLOGG: Okay. We’re going to have most of the questions from the telepresence people. Yeah, that’s good. Yeah, [laughs]. All right, so are there any other kind of thoughts or concerns right now? Somebody’s typing in a way that we can hear you. I don’t know who.

 DR. SCHIMEL: Since we still have one minute, do we want to provide this brief bullet of advice to him? Yeah.

 DR. KELLOGG: About the education?

 DR. SCHIMEL: Since it doesn’t really require a lengthy response --

 DR. KELLOGG: Yeah.

 DR. SCHIMEL: -- from him, maybe you could include it in your preamble?

 DR. KELLOGG: Yeah. So help me formulate it. The Expeditions -- there are many changes going on --

 DR. SCHIMEL: Yeah.

 DR. KELLOGG: -- we feel that we have an important -- extremely important role to play.

 DR. SCHIMEL: And I would, you know, say something about being the premiere directorate for actually conducting Expeditions.

 DR. KELLOGG: [affirmative] We might want to go around and introduce the AC members, although -- [unintelligible] he knows who we are -- just so we know who’s here. So I think we’ll probably do that. Actually, on second thought, I think we probably won’t do that, because we have very limited time and it’ll be hard to coordinate -- it’ll be hard to coordinate all the introductions of the people online. So if you don’t mind, we’ll just sort of generally say -- assume he can see the name tags and when people talk he can see who they are.

 DR. SCHIMEL: Maybe you could just introduce the online presences when you ask him to [inaudible].

 DR. RUDNICK: So Louise, would you mind just very briefly going over the order again?

 DR. KELLOGG: Yes. So I will, you know, introduce a couple of topics. I’m going to ask -- you know, mention our concern about the AD search, which will -- is a question there. I think he’ll probably want to make some remarks. Then Harlan is going to ask about the OPP merger. Brian is going to ask about facilities. Lee is going to ask about workload, and you’re going to ask about the fiscal cliff.

 DR. RUDNICK: In that order, right?

 DR. KELLOGG: That’s the order.

 DR. RUDNICK: Okay, thank you.

 DR. KELLOGG: I’m just taking a minute here to make a note or two of my own.

Meeting with the Director

 DR. KELLOGG: Hello, and welcome. Nice to see you.

 DR. SURESH: It’s good to see you.

 DR. KELLOGG: Yeah, good to see you again. Thank you for coming.

 DR. SURESH: How are you?

 DR. KELLOGG: Hello, Dr. Marrett.

 Yes. So welcome, Dr. Marrett and Dr. Suresh to our meeting. I really appreciate -- we all really appreciate you taking the time to meet with us. As you’ll see, we have a kind of interesting format. I think a year ago you asked us about the possibility of doing tele-meetings, and so we decided to undertake the experiment and have a mixed-format meeting, and we will assess the experiment at the end of the meeting and -- [laughs] -- and decide whether to, you know -- what changes to make to it. We have --

 DR. SURESH: As long as you don’t say it’s mixed results.

 [laughter]

 DR. KELLOGG: We’ll see. It might be. So we have 12 people online. Some of them you can see are video presences and they can see you and they can hear us, and the others are on the phone and so their voice will come through the ceiling as I’m sure you’re familiar with [laughs]. And then the rest of the committee is in attendance, so we have the chairs of our subcommittees and people who are local and people who were in -- available to be in town come to the meeting. So if -- again, welcome.

 If I just may say a couple of things about where we are. We’ve had a very productive meeting and we recognize there’s a lot of changes happening here, many of which affect GEO, in particular the merger of the Polar Programs with GEO, so we’ve been discussing that a great deal. I want to thank Dr. Cavanaugh for her leadership and for being willing to act as acting assistant director of GEO. We really appreciate her stepping up and we appreciate her entire staff, everybody else who has also stepped up and, you know, provided steady leadership during this sort of transition time. That said, we are anxious to see a permanent person in the AD position, and so we’ll be interested in your comments on where that stands.

 And another thing that we’ve been talking about generally is the various changes in -- evolution of the Education program, the Expeditions in Education. And I did want to note that we, the GEO directorates, see ourselves as leaders and the premiere of directorate for expeditions, and especially with the addition of Polar Programs, that becomes even more true, and so that Expeditions theme is very important and we see ourselves as having, you know, a leadership role and hope that the Expeditions part of that theme remains an important part of the program as it evolves into the Polar Programs.

So anyways, let me let you just --

 DR. SURESH: Well, let me start by welcoming you back, and those who are joining online for taking the time to join here. I, you know, want to appreciate -- I want to express my and Cora’s appreciation for your engagement with GEO and with the Foundation. I can talk about a lot of things, but I thought maybe since our time was limited, why don’t you ask questions? And I think -- and tell us what you have in mind and I can respond to it. And if there are -- if you don’t cover some of the topics that are on my mind, maybe at the end I can fill it in. This way will be a productive use of our time rather than my giving a speech.

 DR. KELLOGG: Okay.

 DR. SURESH: So with that, we can start.

 DR. KELLOGG: Okay, could we get an update on the search for a permanent AD?

 DR. SURESH: So we have -- we’ve interviewed a number of candidates and we hope that there are a few more names in the hopper, but we hope that we will converge on a candidate before too long. We paused for a few months in between because of the realignment but -- because either we do it well before the realignment or do it after the realignment but not during -- [laughs] -- and that made a little bit of a pause. But the -- we’ve been continuously working through this. I want to make one other statement related to this and I’ve been to AAU and talked to the university presidents about this. NSF is, given the rotator system and so forth, is very much an integral part of the extended university system, and leadership opportunities at NSF come and succeed in partnership with the tones that universities set. That means supporting, nurturing, and encouraging colleagues from universities to go to a place like NSF. And the universities have to be willing to make a certain level of sacrifice. And I know that fully well how -- doing what I'm doing currently from my previous job. And I think it's a partnership when especially at a time when there is significant concern about, you know, going to Washington for any number of reasons. It's all the more important that universities double their efforts in encouraging because there's a lot to be gained. There are some universities that are enormously proactive in this role. And you can see it from the participation of those universities in NSF's decision-making process.

 There are many universities that are not so proactive, and the reason I mention this to this group is perhaps you can help with the community. This is also sets up a community expectation. A lot of university colleagues have very strong ideas on what NSF should do and should not do. But when the rubber hits the road and you ask them, "Are you willing to come and spend a few years, implementing your own ideas?" They say, "No, I have so many limitations. I cannot do this." So I think it's a partnership where we have to work together. And it cannot all be left to NSF to say, "You go fix the problem. This is where we are." And so I really have a plea for help from this distinguished group.

 So, to get directly to the -- it's sort of a concluding statement on your question. We have a number of -- several, not a number, but just a few very good candidates will come for interview. And we'll wait and see where it goes. Sometimes there are -- a search of this nature, there are so many things one needs to take into account, including family and other commitments and so forth. So we'll see where this goes, but we do have a plea for [inaudible] for interview and we'll take it from there. And I also very much appreciate the input that I've received from many of you and also from the search committee.

 DR. KELLOGG: Okay, thank you. I expect we’ll continue to provide input as this goes forward.

 The realignment is a major topic of discussion on our minds, and I'm going to ask Harlan Spence, who's actually going to be a voice in the ceiling. He's from the University of New Hampshire. He’s participating remotely -- to ask a question about that.

 DR. SPENCE: Thanks, Louise. Hello, Dr. Suresh.

 DR. SURESH: Hi, good morning.

 DR. SPENCE: Hope you can hear me. We have a two-part question, I would say. One, more generally, what were the motivations for the realignment that resulted in the mergers of OPP and GEO and OCI and CISE? And maybe coming more GEO perspective -- the reintegration of OPP into GEO. There is a significant change by many measures. And probably many great reasons for this realignment, and if they're managed well could strongly be beneficial for GEO and the agency at large. So I guess we'd like to hear what you consider to be the strength to rise from this realignment as well as the challenges. And really in the spirit of us being an advisory committee, how can we assist you and the new GEO AD in managing the transition?

 DR. SURESH: Great. Those are all very good questions and I'm happy to address them. Actually take a few minutes to address them as thoroughly as I can. And please feel free to ask me more questions about this.

 So there are many reasons why this realignment was contemplated at this time. And it was not done without significant thought and deliberation. So let me articulate a few reasons. GEO, by its very intellectual flavor, is a highly multidisciplinary field which cuts through a variety of topics. The Office of Polar Programs engages not only different corners of NSF and different intellectual fields but also other agencies and many international partners. Historically we've had entities evolve at NSF.

 So the first thing I want to say is the cutting edge of science and engineering today is moving at a much faster pace than the organizational infrastructure of most institutions, universities, and NSF. So we have organizational structures that exist for a particular reason that may have been created, decades ago in some cases, which, for a particular reason -- the reason for which they were created at that time, several years ago or many decades ago, may not be totally relevant in today's context. So that's the first point I want to make.

 The second point is everything we do at NSF is not only highly interdisciplinary and increasingly so, it is also highly international. That's one of the reasons why we look at not just GEO, not just OPP, but all of the programmatic offices at NSF that operate independently as entities other than directorates. So that's -- so we -- the realignment affects all of the program offices, not just OPP or GEO. The second point I want to make.

 The third point, which only I can -- I have a much better flavor for this than you're likely to, and I have much better flavor for it now than I did two years ago. And that is in any organization of this size, you want to worry about how the internal organization’s done. There are 16 offices and directorates that report directly to the National Science Foundation. And you talk to any organizational expert, it's like a dean having 16 direct department head reports or center reports and this like this. Some universities have that. But there is a question of organizational efficiency that's involved.

 Some programs are created because it's infrastructure-heavy, and some programs are created because they are interdisciplinary. But if you want to align science with practice, you normally want to be very careful about infrastructural needs. There are different ways to divide the organizational structure. And so we have many organizational structures at NSF which are infrastructure-heavy, whose budgets are not that much lower than OPP that are impractical program, but they are not standalone units. So there's no consistency internally at this point on what should be an office, what should be a part of a directorate as a division. I can give you an example. The -- one of the other units that was involved in the realignment, was Office of Cyberinfrastructure, whose annual budget is $180 million. We have entities that are nearly twice the size of that that are not separate offices; they are divisions. So what is the rationale for one being -- both are multidisciplinary. One that’s double the size is much more international. So there is no particular logic. Then there is -- historically OPP was part of GEO. So we went back and looked at why the split took place. I spoke to all the living directors of NSF, including the directors who made the decision. And we went through documents, internal memos that led to this decision. And what is the best way to synergize science at this point in time?

 So with this realignment, we go from 16 offices and directorates to 13, and some would argue even 13 is too many. And why now? Because there are a lot of leadership changes taking place at this time. And it’s as good a time to look at organizational efficiency, internal operation efficiency. And I want to emphasize none of these changes took place because we were unhappy with an entity. So the change was very carefully made so that there'll be no change in FTE, not a single person has to move out of their offices. Just two or three reporting structures have changed, and the infrastructure budget, or large infrastructure operations will be firewalled to the extent we can forecast for the future. We don't know that 2013 budget yet to the extent we can do this. And all of this has gotten to the intention of strengthening the program, [inaudible] programs. So these are all the rationale that we went through. We've had multiple conversations with multiple entities.

 So I think to the last part of your question about how can this committee help. There are a number of ways in which you can help us. One is seeing this as an opportunity. As, you know, we have set up a tiger team. We’ve had a number of other things that are going on in parallel. For example, the National Research Council produced a report on intellectual drivers for the Antarctica program. We had a blue-ribbon panel that just released a report on infrastructure issues for the Antarctica program. And we have a tiger team that I have set up internally that's working through a point-by-point response to the blue-ribbon panel report. And in fact, going beyond what the blue-ribbon panel report says, we're using this as an opportunity to strengthen. We have a change of contractor for the Antarctica program from Raytheon to Lockheed-Martin. And so there are opportunities that my colleagues here have identified that we can look at.

 Are there other opportunities to integrate the science? I think on levels, within NSF, by having these alignments. Big Data is everywhere and GEO and OPP are big partners in the Big Data enterprise. And how can we better integrate the activities of GEO and OPP with the NSF significant new investments in Big Data? We just -- two weeks ago we announced new programs. How do we do this?

 So these are all opportunities, and I think we would welcome your comments on what you see going forward. And even more proactively, as the forefront of science moves so fast, what can NSF do to keep up? And I think your ideas are welcome, and this is -- this realignment -- areas that you see where there are opportunities and areas where you see issues and problems, let us know. We'll try to address them. And I think that the whole leadership team is engaged in this process, and we have set up a working group or task force or a tiger team for all of these activities, and we will also have a three-year review of all the realignments that have taken place to see how well they've gone, what the issues have been, and how to fix it.

I hope that answers your multipart question.

 DR. SPENCE: Thank you very much.

 DR. KELLOGG: Would anybody like to ask a follow-up question and follow-up comments? I think we've been discussing this a lot. I will, actually.

 [laughter]

 DR. MARRETT: No, I guess I had a question of the group. As the director said, this is all designed to always strengthen the sciences taking place. And the fact that the question was coming up in this context. I suppose we'd like to know is it that we haven't conveyed appropriately enough? Is it a communication issue? And if so, we really would like to know how to convey to the larger communities and how what we say to you is going to be important for the feedback you will give to others.

 DR. SURESH: On the issue of communication, I think what Cora was referring. On the issue of communication, let me say a few things about this. And as I mentioned before, this involved -- this has to happen with a lot of conversation, a lot of people. And, for example, the blue-ribbon panel. The four units that are involved within NSF, Office of Management and Budget, Congressional staff, Office of Science and Technology Policy; many advisory groups, but we have to do it in a certain sequence. And this is an executive position which involves proprietary information that's not available to you and some of which cannot be available. I cannot share the [unintelligible] discussions. There are no budgetary implications here at this point. But discussions with congressional staff. So we have to do it in a particular sequence. Plus, we have to inform the NSF staff before they read about it -- read about a half-page story in the front page of a newspaper.

 Just to give you an idea, from the time we had a town hall meeting, the NSF to announce this with the NSF staff, to the time it appeared in a blog was about 12 minutes. That's what we have to deal with. And just to give you another idea, the Merit Review Task Force that we set up last year, we got input from 195 advisory groups. And some of them were completely orthogonal. That's what we have to balance. This is the communication challenge that we have to go through.

 DR. KELLOGG: Yeah, we certainly understand that [laughs] and understand about laws and things. So I think a lot of us see this as an opportunity, a really positive opportunity because there are these natural crossovers between Antarctic sciences and geosciences. So, you know, we’re -- want to be helpful in making this work for both GEO and Antarctic -- and, I'm sorry, Polar Programs. These are both very facility-rich entities and so, you know, there's always a challenge -- there's always been a challenge in GEO to support the facilities and so, you know, this would make that intention more challenging.

 I also am interested in the impact on the merger of OCI and CISE on GEO because GEO has made a very long-term effort to develop partnerships, very successful partnerships, with OCI and with CISE and -- but they're different. They're different kinds of partnerships, and so we want to make sure that those continue and are successful as well. The Polar Programs is, in some sense, moving towards GEO on the org chart, which is great, and the OCI on the org chart at least is moving away. We want to make sure that doesn't move away in terms of the intellectual engagement.

 DR. SURESH: So those are very good points. In fact, the other thing -- and not with the Polar Programs -- one of the other alignments, I went and spoke to the community recently about the realignment. And one of the questions that came up was that -- there's a multitude of communities involved, and two of those communities in an open meeting, they stood up and said, “You know, we have difficulty. There's a trust issue between these two communities. What can NSF do to help?” My response to that is NSF is the community. NSF is not some ivory tower. We are made up of thousands of scientists from community. And, you know, there are -- there's a lack of resonance within two communities that needs to be addressed. At the community level, the director of NSF or the AD for GEO cannot go to the community and talk about this. And this is an area where I think setting community expectations in highly interdisciplinary areas would be very helpful for us to engage.

 DR. MARRETT: I know that there is part of a question that's there. And again it's very helpful to get things really out on the table because I heard this as well. Is this going to mean that to support infrastructure needs, especially in Antarctica, funding will be moved from the infrastructures that GEO traditionally has been supporting? That's not -- that’s not the intent whatsoever. We've got problems across all the Foundation and trying to ensure that there is the kind of infrastructure needed for advancing science and engineering, and we want to work with all the advisory committees in every other group, all the groups, on how to address those kinds of problems that are there. This is not at all something that said, "Oh, we see some problems there. Let's try to figure out how to move some things to address those problems."

 DR. SURESH: So, one of the -- just to amplify that point a little bit more, if the success of an entity that handles a huge infrastructure depends solely on who the entity reports to -- and I think we need to reexamine how we do this. So let me give you some examples.

 Astronomy has facilities. More than 60 percent of the budget of Astronomy is facilities. And most of the astronomy facilities are not in the U.S. Bulk of it is in Chile and Hawaii and Puerto Rico and Arizona. And that operates as a division in MPS. The ocean sciences, that’s used -- that’s going to be in in GEO. Division of Materials Research has huge facilities. That's about $280 million division within MPS, with a lot of facilities scattered all across the country. So that's one point I want to make.

 The second point with respect to OCI. OCI has an annual budget of $180 million in cyberinfrastructure. NSF's annual budget in cyberinfrastructure is $700 million. There's a lot more in cyberinfrastructure outside of OCI than inside OCI, that OCI has no part in. So these are all the considerations that one needs to take into account.

 DR. DE PAOLO: Can I make a comment?

 DR. KELLOGG: Yes.

 DR. DE PAOLO: I enjoyed listening to your description of, you know, what you had to do to get prepared to make a change and I think it's really -- I believe in change. I think organizational change is good just as an exercise. Certainly every 20 years, that often. But I think with regard to communication, it's not so much that anyone would have expected, you know, to know about all what's happening in any detail ahead of time. But I think it's probably also kind of naive to think that if you're making a change at this scale that you wouldn't have some ideas about what was going to be the result of this and that where, perhaps, there might be efficiencies of improvements or synergies. And I think with regard -- my view of the communication issue is that I would have liked to hear a little bit more about what the expectations are, now that this is a, you know, I believe in cleaning up org charts and I think that you’re right; 16 people reporting to you is too many, probably by about two. But on the other hand, there's clearly -- there will be some opportunities, and I think setting out some expectations about where there might be improvements and synergies wouldn't be a bad thing.

 DR. SURESH: Great. And so this is why we have set up the task forces. So again, what I did not want to do is to set up -- so there were compelling organizational and executive reasons to make this change. But I did not want the changes that evolved to be top down. It would have to community driven. So how do we facilitate that? This is why we set up the task force -- the tiger team to look specifically at the polar programs. In this case Antarctica, because it's -- and there it's not only a response for what the blue-ribbon panel asked for, but going for beyond what the blue ribbon panel has asked for. In fact, our colleagues have some great ideas. We met a couple of weeks ago on things -- if you looked at the blue ribbon panel report, there are specific recommendations for infrastructure support and specific recommendations on science. And in fact what the tiger team is working on is looking at strengthening the infrastructure segment significantly without -- not only not weakening the science but significantly strengthening the science by very strategic leveraging. And that some of the leveraging could have happened without the realignment, but the realignment provides new opportunities for strategic leveraging. So that's one part of it.

 The second part, it's asking a fundamental intellectual question. How do you -- and this is a great opportunity to do this. If you artificially segregate infrastructure from science, is that the right way to organize an organization? How do you seamlessly integrate infrastructure and science in an organization of this complexity and scale? And there are opportunities. There are a lot of ideas within the building, and that's why we set up a team to look at this. In the case of OCI, there are additional potential benefits that the task force is looking at. For example, there are policy issues, and I've specifically told them, “I'm willing to take the heat. Tell me what policy steps need to be taken that we don't have yet.” I can already identify a number of policy steps, very simple steps, that we can take that will enable the community that uses cyber infrastructure to work much more efficiently than they do now in many different disciplines -- in pretty much every discipline. So this is something that they are looking at. I could go on; so there are many, many opportunities.

 Another opportunity that we are tapping into, using realignment as a vehicle, is that the whole issue of evaluation, evidence-based decision making, an infrastructure at NSF to do this; we don't have that yet. So one of the things we are planning to do, in fact we are initiating, is how to take the -- hitherto disparate activities scattered all across the Foundation in evaluation in different offices and directorates -- call us then into a coherent entity that will not only have the resources, both financial and human, but also the infrastructure to do longitudinal studies that will inform NSF policy making. We don't have that at the present time. So that's a tremendous opportunity for us. So with respect to this community, I think if you can advise us on things that we could do, things that I could do, that you see NSF -- I may not be able to do all of them. At least it would be good for me to know how do we use this as an opportunity to do this. And the last point I want to make is, we merged Integrative Activities and International, and the new office is called the Office of International Integrative Activities. And that provides new intellectual possibilities for us to do pilot programs in the spirit of Integrative Activities that we have not always done in the International Program. And so, this is something we're looking at. And I just came from a meeting to hear on something that we are working on, hopefully we'll be able to announce in the next few months -- several of my colleagues are working on in the building, on new possibilities for large numbers of young American scientists on the international scale. And so, realignment of this kind provides new opportunities, new energy, and new perspectives to do that.

 DR. MARRETT: But I think it only fair to say that you really did have a number of intellectual and scientific issues that probably had not been -- they hadn't all been spelled out, but it's not as if this was a purely from an administrative angle that the whole idea that were scientific synergies to be achieved. Some of those had come to the attention through some things already taking place. Some had come through the kinds of discussions that you've had with the Arctic community, for example. Some come about because, if we think about NSF having this overarching concern as the former all-geosciences director that said "for Earth systems." And if we're talking about Earth systems, how could we possibly leave out certain parts of the Earth if we wanted to understand the kinds of connections. It was also, as we were working a few -- about last year, with NOAA, one of the big questions was what were the things that really NSF might undertake, and we talked a lot about coastal systems. Well, if you do that, those again are not things that are limited to -- so, these kinds of organizational issues sometimes did not seem to be the best ways for making the advances on the scientific front. So I think it only fair to say that it's not just a matter of asking a community; give us all of the ideas. There are ideas that really undergirded much of the kind of deliberation, and those are the things that I'm very pleased about -- the kinds of conversations taking place in the realigned organization. Because I think those are the matters that people are already pursuing.

 DR. SURESH: You also have SEES as a $200 million-a-year activity. CIF21 is $120 million activity. You have other activities that cut through all of NSF. There are no barriers, there are no office barriers, flow barriers to any of these. There should not be. If there are we should remove them. And I think this is the kind of intellectual driver that we face. And it doesn't' mean that core funding is not important. So whenever I mention SEES the immediate question is "is it at the expense of core?" If a lot of SEES funding comes from the core, and CIF21 and others, so I think those are other intellectual drivers.

 DR. KELLOGG: We're actually very aware of SEES, obviously, and we've heard a number of announcements of new calls, and I think people here are pretty excited about some of those; the natural hazards plan and some of the others that are coming online too. Brian, did you want to ask a question about facilities?

 DR. TAYLOR: Sure. Brian Taylor from Hawaii. Another area of great excitement is what is happening in facilities. And we've heard at this meeting of many new things coming online, major refreshments, and upgrades. And of course, you have the joy of going to two new openings. Going backwards on Monday, the Wyoming supercomputer, and on Saturday, the launch of the Sikuliaq. And I think you can still toast the Sikuliaq as being on time, on budget, or under budget, and a major successful MREFC. So in that arena the -- in the theory of talking about facilities, there's a couple of things that have come up, and one of the big ones is the pressure on division level programs that are hosting major facilities that actually, as you just said, activities in core facilities that actually serve across the Foundation. Not only within the directorate, but across directorates. And one of the choices of your predecessor, Arden Bement, was to change the rules related to how MREFC infrastructure transitioned to support in the out years in terms of operations and maintenance in that it now largely resides within the lines of particular directorates and particular divisions for that support. And the Sikuliaq is a great example. It's a new facility, it didn't replace any previous facility. It's going to be a, you know, an additional cost, but that cost is going to be borne within the directorate and within a division.

 So the issue -- couple of issues. One is the balance of support for facilities and the science that they support and how the divisions get that support in terms of budget. And another issue that was raised is where between MRIs and MREFCs, the so-called midscale infrastructure and facilities mechanisms to support that. Thank you.

 DR. SURESH: So, you know, the Sikuliaq is a one-time shot because it came from stimulus funding. So that's more of an exception than the rule. We're not going to have very many stimulus packages of several billion dollars that come NSF's way in the foreseeable future; so that's a special case, a funding mechanism that's going to happen.

 So as you know, the MREFC mechanism in different parts of NSF is mainly driven by community priorities. Take the decadal survey of the Astronomy community. So their most recent decadal survey, they had three priorities. They had LSST as the number one priority, then they had mid-scale as the second priority. And then they had the GSMT as a third priority. But that decadal survey was based on the assumptions of NSF budget doubling from 2007 to 2016, which we know -- so you have -- the community had to revisit that entire projection, to go back and see what is realistic and what is not. There are several differences from the time Arden made his decision to where we are today. The world has changed a little bit since that time. For example, the MREFC budget has been -- had been significantly reduced in 2011, cut by 50 percent. And we went back to Congress with some very compelling arguments on why that will put American science as a serious detriment. And partly as a result of that, most of that, if not all of that request had been restored. But that came at a price. Congress, rather than making the decision of MREFC, they allowed me to make a decision, and if you want the money for this you can take up to $50 million from R&RA and put it into MREFC, and I did not exercise the full -- because that flexibility comes with enormous responsibility. That is a zero-sum game. If GEO wants a new vessel or if astronomy wants a new telescope, it's fair enough to ask the question, "Why should mathematicians pay for it?" Right? It's a zero-sum game, so we had to be fair internally to different communities and their needs. And we definitely don't want to hurt mathematics in the country, especially at a time when STEM education is so critical.

 So these are all the, you know, multiple considerations that we have to take into account, so we made -- we're making decisions on the basis of a number of what I would call principles. So what are those principles? They would be that if a -- first of all, we have certain guidelines put in place. We leave out the MREFC process. Increasingly, with some of the solicitations that have gone out, we are demanding, and even in the initial stage, descriptions of sunset clauses which were not done previously. That's very important to do in certain fields. Then the question of how much money has already been spent, and what is the opportunity lost, and what is the cost that we will lose if we don't continue to fund? In the event of a budget downscale, downsizing, is there an opportunity to slightly de-scope without destroying the science? What is the international comparativeness of this particular facility? If we are number two in the world, and there are five other facilities where we are number one in the world, relatively speaking, which ones do we protect? And then also, a question of the -- protecting NSF's commitment, because the reputation of NSF is at stake in certain case, so we want to make sure that the brand name is not diluted when we engage on this. So these are all very complex considerations that we have to engage in. Regarding mid-scale, you may know that the National Science Board had a task force and they found that 20 to 25 percent of all of NSF funding across all of NSF is already mid-scale research funding, which they felt was a very healthy mix of mid-scale versus MREFC projects versus individual research clients. That may not apply uniformly from every field -- to every field, but at least broadly, at the NSF level from a high altitude, the National Science Board, with the input from the community, felt that was a correct mix and they wanted us to continue along that path.

 Having said that, we are putting in place a new mechanism for mid-scale funding. So let me describe a couple of new mechanisms. You know that just about three months ago we announced 40 new INSPIRE grants. Our first year budget was $30.6 million. The second year INSPIRE grants, the task force that's working on this, the program officer group that's been designing this program are planning a mid-scale component in the next solicitations which is about to come out. This is highly interdisciplinary within the design of the INSPIRE program, which provides new opportunities for mid-scale research beyond a single-investigator or two- or three-investigator research activity. So that's another mechanism that we are exploring for mid-scale projects.

 You know, they are deciding whether it's a mid-scale research or mid-scale instrumentation, and that's a distinction that we have to be careful about. But nothing has been taken off the table. And our studies state the INSPIRE program is expected to have at least $120 million a year. So there’s an opportunity to adjust mid-scale activities along those lines. And the last thing I want to mention with respect to major infrastructure is, given the changes that are taking place, not just in the U.S. but on a global scale, we need to have a new thinking on how the community addresses mid-scale. So in the past, for major funding projects, the expectation is that NSF will pay for this, in entirety or the bulk of it. And it's the NSF's responsibility to engage other agencies or any other entities. The community will give the proposal to NSF, and NSF will accommodate it. That was fine, it worked very well, but we live in a new world with new demands, and so we're -- going forward, what are going to be some of the considerations? And this -- we have already put in place with our MREFC discussion in the form of discussants who will raise these questions if I don’t raise the questions. Have you done due diligence with other agencies? Not just in terms of cursory conversations, but in terms of substantial commitments. A good example is we just signed off the LSST new project. NSF will fund several hundred million dollars, but the Department of Energy is putting in $180 million. That's part and parcel of the a priori discussion.

 Another project -- operation costs over the long period of time, there are many international partners involved, and who engages them and how do we engage them? Industry contributions, the same project; there are private contributions and philanthropic contributions that are in place. So these are the things we need to look at. Even when we talk about Big Data and open access to publications and open access to data, the conventional wisdom, and including the recent announcement by the British government and RCUK, is that this is what the British government would do: forgo the open access. But many of us believe that it's a global issue. The U.K. accounts for 6 percent of the science and engineering enterprise of the world, but why should the other 94 percent have free access to the investments of the British taxpayer? So who decides who pays for it? How do you elevate it to the global scale? So that's why we've set up in this room, four months ago, the Global Research Council. And they will take it up in the next annual meeting on how major science funding agencies of this world will engage in this. So week after next week on Monday and Tuesday, there is a first meeting of this in Brussels to address this. So these are all examples of infrastructure issues on a global scale.

 DR. RUDNICK: I wanted to follow up on that regarding, you know, cost sharing and the like, and take this discussion to the even smaller scale at the facilities -- the small scale facilities, below MRI. The National Science Board decision to eliminate any cost share by institutions has severely limited the number of facilities that can be funded now. And this is a big issue, and I'm wondering if there's any way that could be revisited.

 DR. SURESH: It can always be revisited. In fact, that NSB decision also comes with special waivers which we don't take very lightly, and these waivers have to be given very carefully. I think part of the rationale behind the NSB decision is that if cost sharing were the criterion, rich institutions, large institutions may have an unfair advantage over smaller institutions that are suffering, especially as state institutions or institutions located in places that don't have the opportunity to do this.

 But I think, you know, we do have in certain -- there are six programs at NSF that have cost-sharing capabilities. We have to provide special exception to those. I provided one exception for one of the programs since I became director, but these have to be done very carefully and we cannot open the floodgates. But if you have specific ideas on what the issues are, we'll be happy to take that up. And we'll happily take it up with the National Science Board.

 DR. RUDNICK: Seems like it should be a mechanism that could be put in place whereby institutions who can afford the cost share should be allowed to do that, but not given special advantages just because they can afford it.

 DR. SURESH: So if there is no special consideration for cost-sharing institutions that can very well afford it are not likely to voluntarily cost share, I think that we know from experience, including in my former home -- my current and former home institution.

 DR. TAYLOR: Just want to come back, director, one of the things that you mentioned in your response, which was great. But both in the time scale of decadal surveys and implementation and the community input that leads to MREFCs, and with respect specifically to GEO. GEO had never had an MREFC before HYPER [spelled phonetically], and over a decadal process it turned out that three big things were in the pipeline at the same time when rules were changed, and that was SODV, the conversion of the draw ship, the Earth Scope, and OI. Those communities entered into those bottom-up things with one set of rules of engagement that included, you know, the out year O&M costs being at least partly provided, not only on the directorate level, but at the whole NSF level. And that change, while those very big things were in process has led to some situations down at the division level that now house those facilities, particularly EAR and OCE, that on top of the flat budget scenarios and those that were also being proposed -- and as you said, a time of expectation of growth. That has led to some pressures at the division level in terms of balancing the science that those things facilitate and those facilities themselves that are pretty tough to manage.

 DR. SURESH: No, I hear you, but I think, you know, this is why we try to accommodate as much as possible. But we also have the balancing act of, you know, funding either prior commitments or new commitments to keep one intellectual field at the forefront. If it comes at the expense of distraction of another field that's equally important to the country then we have to make some very difficult choices, and that's what I was talking about earlier as a zero-sum game. And in fact, it's even worse than a zero-sum game in some cases, and that's why we have to manage it very carefully. I don't have a single response to this, but those are the considerations.

 DR. KELLOGG: So we do have a few more questions, but we also want to give you --

 DR. SURESH: We have another seven or eight minutes.

 DR. KELLOGG: Oh, okay. So in that case, I'm going to ask Roberta to ask her question. Sorry, maybe I went out of order, but that's all right.

 DR. RUDNICK: Yeah, okay. So this is a question about the looming cliff that we face. That, you know, the fiscal cliff next year. If we'd like to be -- hear your thoughts about what NSF’s strategies will be should we go over the cliff.

 DR. SURESH: I should ask Cliff Gabriel to answer that question. No, so the, you know, this is a big uncertainty. There is even a bigger uncertainty. Especially, you know, the question that Brian asked about long-term planning, long lead times for major facilities and commitments made, and the budget changes. We have a number of issues. We're the only developed country that doesn't do a multi-budget planning process at the authorization and approval level. In fact, we're even less than annual in the sense we operate on continuing resolutions; we don't have the budget for the year that started last week. I think this makes it very difficult and it also makes it very difficult for us to engage with our international partners who have multi-year budgets. The German National Science Foundation knows its budget for the next five years. They know it now.

 DR. CAVANAUGH: We do have a visitor from Germany with us, and he just affirmed that that was the case.

 DR. SURESH: Yes, I know. Your outgoing president and incoming president were here, I had dinner with them last week, and we know this very well. So this is an issue. This is a national issue that we face, and this is the parameter under -- within which we have to operate at this point. So regarding sequestration or fiscal cliff, as you know, the Office of Management and Budget has put out a scenario should sequestration happen come January. The implication for NSF will be that our budget -- I think it's the 2012 enacted level, will be affected by -- it will be reduced by 8.2 percent. So if you translate the numbers in to individual research grants, you are talking about 1,000 research grants out of 13,000 or 14,000. So that's where we are. Hopefully we won't go there. So, but on the other hand, in the back of our minds we always have to think about, should this happen, in the worst case scenario, what would we do? And this is why we want to go back to the issue of what are our principles? And if the worst case scenario materializes, what are the things that we will not cut under any circumstances, and what are the principles? And I can tell you what some of the principles are. We don't want to cut opportunities for young scientists, graduate students, post-docs, and CAREER awards and so forth. We want to honor existing commitments that are well underway as much as possible, because abruptly terminating them will in the cost -- in the long run cost a lot more than not funding it, both in terms of opportunity and scientific leadership, and also in terms of money that's already spent, taxpayer money that's already spent. So those are all the considerations. So we have a long list of what these principles are, principles of leveraging and a variety of other things.

 DR. MARRETT: I think the only thing I would add to that is that the way the legislation is written, there is no flexibility. So the -- it's a cross -- it indicates what things would have to be cut out of the discretionary non-defense budget. That's why the Office of Management and Budget, as the director noted, a few -- not that long ago had this national teleconference in which they said this is not a good move and that people ought to be bringing that to the attention of their congress people, and we're sitting there saying, “We don't lobby.” But it turns out that the conversation was with a number of other people who were on that teleconference to -- so these are corporate leaders and others who are being asked to think about how the enactment of this legislation would have completely unintended consequences for any number of things, including for a number of agencies, the jobs. Or the Defense Department that's worrying about what contracts would have to be actually not acted on. So those are the kinds of things where we don't -- we would not have some flexibility for deciding how we would actually put it in place. It's in the legislation, and to the extent that any kind of decisions would be made, they'd have to come from OMB.

 DR. KELLOGG: Well, on that note -- I think we had one more question for you. Okay, so Lee -- so I didn't introduce Roberta Rudnick who was speaking from the University of Maryland, and the next question is from Lee Allison. It's in the upper right-hand corner there, it's from the Arizona State Geological Survey. So Lee, are you still there?

 DR. ALLISON: Yup, I am, I just had to unmute there. So good morning from Tucson. One of the issues that seems to come up at each of the meeting in one form or another is this question of workload on the program officers and the resulting impacts. Yesterday we heard that the proliferation of some of the special solicitations, especially those that are multidisciplinary or multi-office, is really adding greatly to the workload. And it seems like every time we hear from one of the Committees of Visitors, they raise similar concerns within the different programs. So we as a committee have brainstormed at each of our sessions about various solutions, but it seems like a real viable solution is going to have to require either a more intense or a more comprehensive consideration. So the question we have is, how are you dealing with this at the directors level, and have you come up with any ideas on how we ought to move forward to try to resolve these concerns?

 DR. SURESH: Okay, so the answer is yes. About a year ago, maybe a little more than a year ago we set up a task force of program officers, about a dozen program officers, asking them to come up with mechanisms that will help with the merit review process -- the mechanics of merit review, not the criteria for merit review, and especially as it impacts workload. And what would -- one size is not going to fit all, because SPEE directorate is not the same as GEO or MPS, and each -- we have so many different flavors. Different directorates on their own have come up with different models. So as you may know, Biological Sciences Directorate has two of the divisions within BIO have a pretty interesting model that they've come up with, and a significant fraction of the community likes very much, a significant fraction of a community doesn't like it. So it's sort of evenly split at this point, and this is part of the issue. So it takes a village to do anything, but in the case of NSF, it takes a country to do anything. So the question is -- so there are a number of ideas that -- the task force of the program officers has come up with a report which is in the final stages of review. There's a lot of external input. In fact, they even got external panels to come and advise on how to do the merit review process. Now, workload is one component of that. The second major component of the task force recommendations are not one-size-fits-all. There are different pilots that different directorates will engage in. In fact, even this week, there were three different entities within NSF that talked about three different ways of doing merit review. And I think we have to do something.

 Part of the problem is also community expectations. And community expectations, if they rise above immediate self-interest, I think that'll help the community at large, and that's one of the problems that we have. And how do we address this? The second thing that we are looking at is the issue of technologies that can help reduce or eliminate unnecessary work. I can give you one success story. One of the program officers actually came up with a compliance check that used to take several weeks if done manually. It's now automated, and can be done in less than a day. It's a GEO person, so.

 [laughs]

 Good, thank you.

 DR. CAVANAUGH: No. Thank you.

 DR. SURESH: And so those are examples of this. Virtual panels. Initially the cost to implement virtual panels is higher, but eventually, if done correctly, that can save time and resources and can engage the community in different ways. There are other things that one can do. For example, you know, again, this depends on community expectations. If everybody demands that every proposal has to be reviewed the same way multiple times with minor revisions, then we are continuing to have the workload. And this is where advisory committees can be of enormous help in the community expectations, because the NSF is just a reflection of the community. It's not that we make the policies that benefit the community and the ideas come from the community. If community doesn't want something -- it goes back to my earlier point. You know, we -- if we want to address an issue, we have to be willing to give up something. And I think if we do that we can address this issue.

 So those are mechanisms that we are trying. There are many pilot projects in addressing the workload issue. We launched a program on career-life balance for NSF staff. And there’s a working group doing that, and that's coming up with some interesting ideas. How do we engage that community -- internal community and external community? So these are some of the mechanisms. If you have other ideas we would be very interested in knowing about it, and how we research.

 DR. RUDNICK: The, you know, trying to find efficiencies in merit reviews, in a sense, almost trying to treat the symptom but not the cause -- and what we heard yesterday is that some of the biggest workload issues come from these cross-directorate, cross-disciplinary initiatives that take an inordinate amount of program officers time in terms of merit review and all sorts of other things. So the question is, you know, maybe there should be some introspection about how many of these there should be. Should there be some limit put on them? Should they come up from the grassroots versus top-down? So I'd like to hear your thoughts about that. That seems to be a significant issue in this topic.

 DR. SURESH: So let’s take some of the cross-directorate initiatives. SEES, CIF21, National Robotics Initiative, et cetera, Materials Genome. So here is again, a question of tradeoff. So do you want NSF to be at the cutting edge of the intellectual evolution of different fields at a time when young faculty members are increasingly interfacing and interacting with the outside community with many different fields? Should we not do that because we have such entrenched organizational silos inside NSF that we are not able to respond to the cutting edge of science? This is why we asked the program officers to come up with mechanisms because they are in the front lines of this issue. Take the INSPIRE program -- the INSPIRE program, the program officers were given a pot of money, and said the only requirement is that we design a mechanism to do interdisciplinary research. You go and design it. You are the program officer, you know what your workload is, you come up with any recommendation that you want. The only thing is that -- or the only recommendation that I will not accept is that let's not do interdisciplinary work because it's going to add more workload to us. That will be a suicide for NSF. So that's how the INSPIRE program came about, as an example. SEES, so many advisory committees were involved in this.

 So the question is, how do we do this and what are the ideas? And coming from the program officers because they are designing this program. INSPIRE was designed by program officers. I-Corp was designed by program officers. SEES came up from our advisory committees. So if we cannot collectively address this, then I think we need to reexamine how to do this. Eventually, I think if everything is top-down, it will not work. If everything is bottoms-up also, in a federal government bureaucracy with 300,000 individuals engaged, we cannot have 300,000 people running NSF at the same time. That will not work either. I think there has to be a balance between top-down and bottoms-up, and you need to advise us on what the right balance is.

 DR. CORA MARRETDR. TAYLOR: Actually there are some things that we are doing. I'm looking back in the audience at Fae Korsmo, who while she was in the Office of the Director said, “We've got to take a look at the number of solicitations, because there are lots of solicitations, some of which are for very small amounts of money.” So that's a lot of work for very low success rates that you're going to have, and she said that we do have to try to examine those kinds of circumstances. And what happened, I'll go back to the director's point, is that these were coming up always from the bottom. By the time it would get to the director's office, well can we sit there and say, “Oh no, that's not what you should do.” But we are trying to promote the kinds of conversations. Because it's workload on the community and it’s workload inside the Foundation.

 We've all, as a few people around the table know, looked at our creation of committees and groups and panels. There's bit of you around that anytime you did anything it had to have representation from across the Foundation. Well, just imagine what that means, that some people were being asked to serve on one thing after another. So there's this question of when -- what kind of participation is essential for what sorts of purposes. And we've also been asked -- and don’t -- out of the office with the director -- “Don't go creating some new groups if it's not even clear what that group is going to be able to do, and to foster what needs to go on.” So there's no question but that we know we've got to get a handle on the matters of the kind of workload; at the same time never undermining the creativity of our own staff. We want to give the staff the opportunity to be able to engage in both operations for the foundations but the ideas as well. So I would just echo, we need help. We're certainly trying as much as possible to get it from within the Foundation, but so much of this depends on interactions with the community.

 DR. SURESH: One other important point related to the workload issue, both for NSF staff and for the community, a lot of the requirements, especially reporting requirements and compliance requirements are not initiated at NSF. They are initiated in congress. And just look at the America COMPETES Reauthorization Act, which was signed into law in December of -- which was approved by congress in December of 2010. There are dozens and dozens of reporting requirements for NSF. The language says the NSF director “shall,” “should,” “make,” “will,” and things like this. It reports by certain dates. We were not consulted. And so we do not always have the flexibility to say we cannot do it, because this is the first question that often comes up in my congressional testimony. So there are -- the president's stimulus funding, it was wonderful to have a lot of resources, but it comes at a price, and the reporting requirement shot up. So there is a lot of these factors that are not in our control, and this is something that we have to address. And the community doesn't often fully recognize this. They think that NSF is creating these new bureaucracies that hurt the community when a lot of these requirements don't come from NSF. They come from outside, and we have very little control over this.

 DR. KELLOGG: Okay, yes, thank you. So I think you've gotten a sense of the scope and variety of discussion, and I really appreciate you coming and answering questions and --

 DR. SURESH: Well, I want to thank you again. You know, this is enormous service on your part and I want to thank you for taking the time. And again, I cannot emphasize enough, the talks that you have, the ideas that you have -- we may not be able to do all of them, but on several of the items that we talked about, whether it's a workload related issue, or realignment presenting an opportunity for the GEO and OPP communities to do things in ways perhaps we may not have done in the past, interfacing with the cyber infrastructure all across the Foundation. Any thoughts that you have, and I also have a request that community expectations are something that -- the potential doubling of NSF budget set up a community expectation, but there is a significant time lag between where the expectations are and where the reality is. And I think a distinguished group like yourself can help us in that regard.

 I want to close with going back to Brian's point about infrastructure. So, a week from today, Nature Magazine is going to come out with an issue on global science, and I have some thoughts on how infrastructure efforts among science funding agencies can come together in ways in which they have not, that can collectively help science flourish in new and interesting ways. So any thoughts or feedback you have on that, please let me know. Thank you very much.

 DR. KELLOGG: Thank you. So now we have a 20-minute break, I guess. And then we're going to have a working lunch, and I believe lunch has been set up out there. So you can pick up your lunch and come back so that --

 DR. ROBERTA RUDNICDR. KELLOGG: I've got to say goodbye, got to go teach.

 DR. KELLOGG: Teach well.

 DR. RUDNICK: Bye. Thanks, I'll try.

 DR. KELLOGG: We'll see the rest of you --

 [break]

Working Lunch: MREFC Project Overview: Earth Scope

 DR. KELLOGG: So let’s get started again. We're going to -- we traditionally hear about one of the MREFCs, or one of the major facilities at each one of these meetings, and so today we're going to hear from Greg Anderson about EarthScope, the MREFC project overview for EarthScope. And so welcome back, everybody who's online. We'll get started now.

 MS. LANE: Do you want to turn the lights off?

 DR. ANDERSON: I think that'd be helpful, yeah, if we can. Hi everybody and everyone on the line. I'm Greg Anderson from the EarthScope program in Earth Sciences division. I'm going to kind of try to give you an overview of the program. Both the facility side and some of the activities that are going on in the science side to give you a sense of what's on and what's going on and what's new and what's different.

 I figured I should probably start, for those who are kind of new or not as familiar with this as others are, with a little bit of background about the program. And I want to emphasize that, anywhere in here, if you have questions, just chime in and ask. I do have one slide toward the end that's got one movie, but everything else is just regular slides, and when we get to that movie I think the idea is we're going to zoom in on the screen and hopefully that will work. And so if you have questions, just chime in.

 So EarthScope started as a program in 2003, and continues today. Its overall mission is to understand the structure, the dynamics, and the evolution of North America over a wide range of spatial and temporal scales. Lots of different types of science that that involves, and some of them are listed up here; everything from looking at active deformation using GPS and other techniques, looking at the behavior of earthquakes and faults, and lithospheric geology and looking at, even at the scale of individual mineral grains through samples collected by SAFOD. And in recent years, looking more and more across some of the traditional boundaries and looking more into the hydrosphere and the cryosphere and how EarthScope can be used to help with atmospheric studies. So we do a wide range of different kinds of science here. And we use a lot of different types of techniques from most domains of geophysics that you could name, a lot of geology, a lot of geodynamics, geochronology, and so on.

 The structure of the program overall, there's basically three main sections to it. The two program officers, myself and Chuck Estabrook, and we're responsible for the overall structure of things. I spend most of my time on the facility, which has three main components: PBO, SAFOD, and USArray. And we'll talk about that in a bit more detail. And then we have a national office which acts as a scientific coordination body for the project and for the community that EarthScope serves. And then we have the science program, and that's where Chuck spends most of his time, and I spend whatever time I don't spend on the rest of what I'm doing. We've split that one, and it works kind of in a good way.

 So we have these segments, and this is sort of -- kind of gives you the overall structure for the rest of the talk. I'm going to spend a chunk of time at the beginning on the facility, talk then about the science program and about some of the recent highlights and the research literature that's come out in the sciences program and out of the facility, and then I'll end with a little bit on the national office. Overall program budget, as we said, this is an MREFC construction project for the facility. Total budget of just under $200 million over the five years of construction. That's the blue bars here on this chart. You'll also see that we've got these green bars which ramp up starting in 2004, 2005 and continue today, and that's the operations and maintenance budget for the facility itself. And then the yellow bar there is the funding that's dedicated to the science program. The bump in 2009 in the science program is a stimulus-act ERA funding that we were able to make use of for the science program.

 One thing that you can see from this is that basically the budget for both the facility and the science program have been more or less flat since 2010. But 2010 was a good year to be flat from. We got a good level of funding there. In recent time, and this, of course, a 2013 request, this is the presidential budget request. We don't know, of course, know what the final number will be. And it looks like a healthy bump there in the facility, but in practice, we got a $1.12 million increase in the line for the facility, but $3 million of that has been targeted by the Office of Management and Budget for a specific activity to enhance the seismic network on the Eastern U.S., and I'll talk a little bit about that coming up. So overall, facility went up by 1.12 million in the request, but if you take out that $3 million, the rest of the facility is down $1.88 million. So it's actually a decrease there.

 As I said before, the facility has three main components and a fourth as well. The three main components are PBO, which is the geodetic and seismic components; SAFOD, which is actually the -- SAFOD, which is a deep-bore hole drilled through the San Andreas Fault down near Parkfield in central California; USArray, big seismic network that started -- it spans the U.S. It started in southern California, and one component of it is marching slowly eastward across the U.S. and is now here on the East Coast. And then finally, there's also another component called Geo EarthScope, which is geochronology, dating, and that sort of things as well as a lot of imagery from both LIDAR and from INSAR. So we've got both satellite and airborne imagery data there.

 This map here shows, basically, as of yesterday, where the dots are for the facility as things stand. And some of the lighter colors in the Western U.S. in particular are stations that have -- were covered by part of the USArray, and that's now moved on. So you can see we have stations from coast-to-coast, all of Alaska, and those of you that are sharp-eyed will notice a few dots in Canada as well. And I'll talk a little bit about that in just a minute.

 It's nice to build a big facility, but it's also very helpful if it's actually used, and so the question is, is the facility being used, and how strongly? Overall, the facility is operating very well. Uptime on a typical day is well over 96 percent. Data return over all time it exceeds 95 percent, and over the last six months, exceeds 99 percent on a given day. So we're way up there. We've got over 90 terabytes of data that have been collected to date. That's the yellowish curve here on the graph. We've delivered over 200 terabytes of data to the community as a whole. That's the blue curve. So, if you -- it depends on which type of data you look at. We collect a lot of different types of data. But some of the different types of data we have delivered essentially every byte that's been collected once. Other types of data, we've delivered every byte of data that's been collected 18 times, if you do the division by data type. So there's quite a bit of use. The users are the ones shown in the purple bar, the purple graph here, and on the left -- sorry, on the right Y-axis scale, that's actually the number of unique computers that have pulled data down. It's actually really hard to track users because our user community has given us the feedback that they don't want to have to register to get data. And of course, we want to make the data as open as possible. So we don't actually track individual people; we track computers. And just over the past few years, just over 3,000 computers have pulled data down. That's a nice set of numbers. I think that's pretty impressive.

 That growth curve is continuing to go very rapidly on the data going out the door. It mirrors the users quite nicely, as one would hope. I will say there is one user at the University of Miami that periodically pulls down the entire archive, Faulk Amalung [spelled phonetically] is one of our top users. He's a great guy to grab data terabytes at a time. A more interesting result is what's been done with those data, and over the past three years we've had over 200 papers written using our scope data. Twenty of those have been in Science or Nature in just the past three years. And in just the past year and a half we've had about six of those Science and Nature papers and over 100 of those other papers. So we're getting quite a bit of use from this facility.

 So talking then a little bit more about the different components of the facility. We're going to start with USArray. This is a map of where USArray is today, and I want to give credit to Sarah Robinson at the EarthScope national office for sending me this map yesterday. She made a very nice version, and I decided I wanted to use it right away. What you see on this figure, and it's one of these things where I wish I had a green laser pointer because I know the red one here just absorbs the light on the screen. But the triangles that you see here are different types of stations that make up USArray. It has a few main components. The big blackish triangles are what we call the reference network. These are stations that were installed with either USGS support or NSF support -- there are 39 of them that were NSF support -- as part of what we now call the Advance National Seismic System, ANSS backbone. Those stations are there running, you can see, from coast-to-coast. The red triangles in the eastern U.S. are where the transportable array component of USArray is right now. The transportable array stations are seismic stations that are installed in one location, they operate for 18 to 24 months in a given spot, and then they're picked up from the west side of the array and installed in a new location on the east side of the array, and they operate for again, another 18 to 24 months, and then they move again east. And so the image in your mind should be sort of a large tank track rolling slowly across the U.S. from west to east. The dots that are in the pink are the stations that are under construction right now on the east side of the USArray footprint. And the blue dot -- the blue triangles are the ones that will be installed in the coming year. And that'll be the end of installations for the TA. We'll have reached the east coast at that point.

 You'll notice we have stations in Canada, and you'll notice the grid's a little bit different form the grid in the U.S., and that's because it's actually build in a collaborative fashion with the Canadians that are operating the Polaris stations. Assuming that everything goes according to plan and that everything continues to operate well, we expect to install up to 35 TA stations in Southern Canada around 25 Polaris stations; and so there's actually about a 60 station network that would be running in southern Canada. And what that does is it enhances the network in the Northeastern United States and allows us to do better imaging of things like the St. Lawrence Seaway and the seismic zone through there, as well as the edge of the craton in looking at Hudson's Bay and things like that. So it does a lot of good there.

 The stations that are on the West Coast in Washington, Oregon, and Northern California are 27 TA stations that were installed using ERA funding as part of the first installation for a joint ocean sciences, earth sciences amphibious array. There's offshore instruments and onshore instruments, and these 27 stations are onshore seismic instruments. The ones in Southern California have been adopted by the Southern California Seismic Network, and they operate continuously. And those are basically those main triangles. You see some areas that have dense stations. Minnesota, looking just on the north side of Lake Superior, Washington and -- sorry, Oregon and Idaho here, and down in Georgia. These are dense seismic networks that are part of the flexible array. These are PI-driven science experiments. PI's come to the EarthScope program with a proposal to do some targeted, focused experiment. Using seismic techniques, they pull these instruments in and they operate them for, typically anywhere between one and two years for some of these passive seismic experiments. Collect a lot of focused data and look at the fine-grain structure. A lot of these are embedded in the transportable array, so you get both the regional scale structure and then a much tighter structure that you get from the close-in focused arrays.

 And then finally, the diamonds that you see there are the magnetotelluric backbone stations. There are seven of those that are part of the facility, collecting data continuously; the closest one in Blacksburg, Virginia. It's been an interesting time for MT data, because as you know, we were in a solar minimum. It was a relatively quiet time, and it's actually really hard to get good long-period magnetotelluric signals under those circumstances. But as the activities picked up, we're seeing a lot more, and we're regularly sounding data out to beyond 100,000 seconds now, with these magnetotelluric data. So they're operating pretty well. That's operated out of Oregon State. USArray overall is managed for NSF by IRIS.

 So some things that are happening with USArray that I wanted to let you know about. If you have looked at the presidential budget request for Fiscal 13, there is language in there that is specifically targeting $3 million for the first year of up to a five-year, $15 million project, basically to convert TA stations from their current mode of operation into, I won't call them permanent, so let's just call them long-term, stations that would operate longer than the current design plan for TA in the Eastern and Central U.S. And basically what I've been asked repeatedly, what's the line, what's the far west edge of that? It's basically been defined at about 100 degrees latitude, but that's -- sorry longitude. That's just kind of the way it was set up in the language.

 We had been working -- since this request language was in there, we've been working now with a variety of agencies -- USGS is our primary partner on this, but also the Department of Energy, Nuclear Regulatory Commission, FEMA, Department of Homeland Security, and a variety of others -- to develop a plan for which stations should be chosen. And USGS constituted a working group that involved a bunch of feds. It also involved a whole bunch of folks that run seismic networks or do research with seismic networks all over the Eastern U.S. And after a long series of meetings and discussions, this is the map that results. I should explain. The colors in the background are the national seismic hazard map from USGS. Obviously, brighter colors, higher hazard; lighter colors, lower hazard. The dots there, the squares, red, blue, green, are stations that are the nominal TA footprint. The stations that are shown as triangles or circles on the map are the ones that have been targeted for adoption through his plan. And again, I emphasize this was a community-based as well as a regional seismic-network based activity to try to focus these stations on areas that would enhance the seismic network for basically three reasons. Number one, basically improving the seismic hazard maps in the Eastern U.S. for the USGS. Number two, assisting our sister agencies with monitoring of critical facilities, like dams, nuclear power plants, et cetera. And to enhance, or continue the ability to do enhanced research in the eastern U.S. with a broad distribution of seismic stations in the eastern U.S.

 So this is the plan. With basically all the numbers that go into it, with all the adjustments to schedules that go into it, with all this, about 160 to maybe 180 stations, the nominal plan is 163, can be converted and operated. The conversion cost for all of that is about $13 million and the annual operating cost would be about $1.5 million. And that's kind of where this thing -- where this sits at the moment. We're waiting to see what the final budget numbers are and where things go from here. So, I don't know if anybody has any questions on that, but we can talk about it more later.

 DR. TAYLOR: Greg, what does that mean for what goes to Alaska?

 DR. ANDERSON: These stations, the conversion process that I'm talking about would be two stages; the first being a recapitalization process. So there would actually be new equipment purchased. And that new equipment would be used in Alaska, if the plan goes forward to go to Alaska through the proposal process that we're under way with. That's actually a benefit to our community because the equipment that would be used for this is the current TA equipment. Buying new equipment means you're getting equipment that's got new capabilities in some situations, and also it's got -- you know, it's got a newer lifetime, so it's going to last longer. So there's a net positive for us on this one as well. Any other questions? Yeah, Michael.

 DR. MORGAN: What's the lifetime of these stations?

 DR. ANDERSON: Well, the lifetime of a nominal TA station is a couple years. That's basically the design. The equipment itself, it could easily last 15 years. It's not limited by anywhere near that same period of time. Any other comments or questions? Yeah, I'm looking at the screen, and also I know there's some folks on the phone. Any questions else on this one? Okay.

 So let's talk about PBO, Plate Boundary Observatory. This is the geodetic and seismic compound of the facility. All the dots here are the GPS stations locations and also the -- underneath those dots are a bunch of stations where the locations for borehole strainmeter stations are. The color coding reflex the -- really the scientific focus of a particular set of stations. Things in California, transform faulting in the basin range and in the Rocky Mountain front is looking at extension, and so on and so forth. There’s 1,100 GPS stations, 75 borehole strainmeter stations, 79 seismometers that are all in the borehole stations, 26 tiltmeters, mostly along the Aleutian front and on Mount St. Helens, and six laser strainmeter. This network, overall, is working quite well. Average up-time over the past four years has been 94 percent. Data return exceeds 99 percent on a routine basis. It's almost embarrassing. This is one of those things where you sort of -- PBO's working, and it's working. And you keep saying, "PBO's working very well."

 And then, let's talk about SAFOD. San Andreas Fault Observatory at Depth. And I wanted to put this figure up as a reminder for folks who may be looking at this, particularly with either new eyes or slightly new eyes. It is a 3.1 kilometer borehole drilled through the San Andreas Fault. It goes down about 1.7 kilometers and then turns and goes through the San Andreas Fault near Parkfield. The idea behind it was to actually collect physical samples from a place on a major active fault where earthquakes are known to occur. It was also designed to have, then, an observatory component that would operate near the bottom of the borehole for extended periods of time, a few years at a time, be brought up for refurbishing, and put back down, and repeat that cycle. We collected over 1.6 terabytes of digital data through the process of building SAFOD. We did collect 40 meters of core, including a section of the San Andreas Fault. If you go down to Houston -- I'm sorry, College Station. If you go down to College Station and you stand in the core repository, you can literally hold the fault in your hands. We have distributed that core to 20-plus groups around the world, and just in the past two years, more than 24 papers have resulted. In just the past year, there's been a big burst of papers that have come out. Just this 2012, there have been about 18 papers from different groups. So it's actually gone quite well there.

 It must be said that the down-hole observatory component of the program was not as successful. And we have been working, essentially since I came in the door in 2009, to resolve that issue. And we described our plans for what we intend to do for SAFOD in a "Dear Colleague" letter last November. And I want to just update you on where things stand with that, because there's been some action since then. In the "Dear Colleague" letter, we put out a three-part plan. The first part was that we would be opening the SAFOD borehole for PIs to send in proposals to do research in the borehole. Another part of the plan was that we would be searching for a new entity to manage the SAFOD as part of the facility for us, because UNAVCO has basically said, at the end of the current cooperative agreement -- UNAVCO currently manages SAFOD for us -- at the end of the current cooperative agreement, they want to stop that role and hand it to a new entity to manage it. And the third component being a longer term process to discuss the future of SAFOD and a possible future observatory and what that might look like.

 This comes out of a recommendation, you may remember, from a special engineering subcommittee of AC-GEO that was constituted to look into what happened with the 2008 observatory which Don De Paolo was involved with there. And we have that -- diagnosis came to us in -- came to us last year -- I'm sorry -- in April of 2011. And we've been working to get that going forward. And that's the basis for this plan.

 We have gone forward. And in the 2012 EarthScope science solicitation, we did, in fact, invite proposals to use the SAFOD main hole. And without divulging anything I shouldn't, I'll just say we did get some response. We also have been working to identify a new management entity for the facility. And we put out a SAFOD management office solicitation at the beginning of the summer, back in June. Sent a lot of emails out about it, contacted all the folks who had spoken with me at AGU and expressed possible interest in this. And what I have to tell you is we did not get any response for this one. So we're in the process of trying to decide what the proper course of action is. And that involves a lot of contact with the community. Right now I'm having lots of phone calls with people to understand what this tells us and what the appropriate course of action would be going forward. And that'll be a process that takes us a little bit of time to work out. But we remain focused on finding the best solution to this situation and understanding what we should do next.

 So I don't know if there are folks who want to ask questions about this one. This is one that has focused -- has occupied a fair bit of my time, over the past year in particular, so...

 DR. TAYLOR: I got one. So, Greg, I mean, you know, the report we got and you got, I mean, the observatory's potential is sort of compromised in a number of ways, in terms of how holes intersect with other holes and wires and various things and corrosion. Do you -- does the community, and do you as a program manager, you know, do you -- is it viable to get instruments to the fault zone in the hole? And what sort of -- what's possible?

 DR. ANDERSON: So there's a lot of possible answers to that question, and I'll try to make sure that I'm as clear as I can be. The hole itself is not compromised. It can be used for science experiments, even today. And, in fact, the USGS has been operating, for some time, a single three-component down-hole seismometer package at the bottom of the hole. That's been in there since December of 2008. It operates. And the reason we think that it has managed to continue to operate, whereas the other experiments did not, is it's a completely different design. It's a passive sensor. There's no down-hole active electronics. It's a simpler box, essentially. And that seems to be running successfully. But you could take that out, and someone could come in with a string of instrumentation on a standard wire line and operate it. We did that -- we've done that 23 times, and a lot of them have done exactly what they were designed to do. They were designed to be short-term experiments for various sorts of equipment testing or data collection, and that's been done. So we know it can be done, even now. That's why we opened the hole for people to put in proposals. There wouldn't be a point in doing that otherwise.

 In terms of what it would take to actually operate a facility for many years at a time in the conditions at the bottom of the borehole, the best engineering advice we have is that it can be done, but the amount of work necessary is very extensive. And at the moment, the resources available to the program don't make that a practical reality that we can do anytime soon. But that doesn't mean that there couldn't be a way of coming up with an observatory that could operate. In the meantime, to get science benefit out of this, I think the right thing to do is to allow the science community to come forward with these individual proposals. We need to have an entity in place that will then support the funded PIs, if there are any, to actually do their work, and that's what the management office is about. Don.

 DR. DE PAOLO: I'm sorry about the tone of this comment. Don't you have a problem in that the PIs who were the chief proponents of this part of EarthScope basically have abandoned the project? And so who can come in -- how can you come in and say, "Well, okay, this is still interesting and we should do it," when the people who thought it was so interesting and pushed for doing it in the first place have sort of detached themselves from the project totally? Isn't that a problem?

 Dr. Anderson: Well, there's, again, lots of possible answers to that question. I think you could take it on the face as evidence that you can manage SAFOD by the fact that UNAVCO's been doing that since 2008, and doing a fine job of it. So we know we can do that. What the future course for SAFOD is, on a science basis, is actually the topic of those discussions that I'm having with the community right now. And it's a fundamental question to ask, "How much emphasis does the community think that NSF should be placing on future science using SAFOD?”

 And that's really what we're going after with these discussions that I'm having, is to understand that. What I want to do -- and I've said this in lots of ways to people, but I'm trying to make sure that we address the right issue, not necessarily the obvious issue. You know, there may be something that -- there's something practical about the way the solicitation was crafted that turned people off, for example. That's a practical issue. It may be the obvious issue, but it may not be the right one to go after. And I'm trying to make sure we go after the right one. So that's why I'm having these conversations with people right now. Jim.

 DR. WHITCOMB: One possibility might be there wasn't enough money --

 DR. ANDERSON: Jim, can you -- Jim Whitcomb was making a comment, but he's coming to the mic.

 DR. WHITCOMB: One possibility, and it's sort of a partial answer to your question, is that there may not have been enough money available in the solicitation that people thought it would be doable at that level. And so if it turns out that people were saying, “Well, we'd be interested if there was like, 10 times the amount available,” then that would come back to us as a decision. Do we want to put that amount in? Is the science worth it? And we might want to go to the community and, you know, put those questions to them.

 DR. ANDERSON: And that’s what I was referring to, when I was talking about practical questions. It may be there isn't enough money, it may be that there's some aspect of the work that people didn't understand because I didn't write the solicitation clearly enough. Or something like that, when I say a practical issue.

 Any other questions on this point? Anybody online or on the screen? All right, so then we’ll move to the next topic. You know that we have had for some time a plan to integrate the management of the EarthScope facility with the management of the facilities that are -- the seismic facilities that IRIS currently manages and the geodetic facility that UNAVCO currently manages. That was approved by NSB back in 2010, and we've been operating on this plan since. I can tell you that we now have the proposals in hand to effect that integration, and we're in the middle of a review process for them. That review process ultimately has to culminate in a trip to National Science Board in May of 2013 with whatever recommendation that EAR and GEO leadership decides to make. It needs to go to NSB for final approval in 2013. So we're underway with a rather intense review process, and I'll just leave it that.

 Assuming, for the rest of this slide, that the decision and recommendation from us is to go forward with award, then what we would have at the -- coming up starting in October of 2013, would be two integrated facilities. One called GAGE, which is an integrated geodetic facility that would be managed by UNAVCO; one called SAGE, which is an integrated seismic facility that would be managed by IRIS. And the idea is that those, assuming that we went this way, and again as I said, assuming for the rest of this slide, those would operate for five years under a new cooperative agreement. One of each: one cooperative to UNAVCO and one and one to IRIS. And then in the 2017-2018 time frame there would be an open re-competition for whatever the next stage of the facility or facilities is. And people have asked me repeatedly, what does that mean? And I say, “We're working that out, because we need to have conversations with the community about what the form of that really ought to be.” So for now, we're focused on getting ourselves to May of 2013, with an eye down the road. But folks need to be aware that that is the plan, that is what we promised the National Science Board and that's what we're operating to. Already been asked about, and so I'll just say one big part of the SAGE facility -- yes? Let me move up to that. Go ahead.

 DR. TAYLOR: Does that mean the EarthScope office disappears after 2013?

 DR. ANDERSON: So there’s an EarthScope national office and there's the EarthScope facility, and those are two different awards and two different activities. And so the answer -- the short answer is no. the EarthScope national office is currently at Arizona State University under a cooperative agreement that would end in 2014. And that's just because the idea is, we do it every three or four years, it rotates to a new place. And that would be the time. It doesn't -- it's actually not directly tied with the facility. The national office doesn't have any direct oversight rule for the facility, so the awards are distinct from each other. It does mean that the PBO component of the facility is going to be -- the management of that is then going to be integrated with the management of the facilities that UNAVCO concurrently manages in this GAGE facility. But the -- and the same thing for the USArray and IRIS. But the national office is a separate case.

 Other questions? Sorry, I skipped only because I was going to tell you something about it, but I can always talk about this first. Anybody else? Okay.

 One part, it's been alluded to already for the SAGE proposal, and I'm not telling you anything you don't know, because this has already been said repeatedly, is to go to go to Alaska with the transportable array starting in 2014-2015 time frame. I want to say this sentence out loud because it is one of my favorite sentences to say. EarthScope is in Alaska. Please don't say EarthScope's going to Alaska. It's been there since 2004. Transportable array will go to Alaska, assuming we go there. So that's the -- that's the distinction. Each one of these dots is one of the stations that they've -- that they would be putting forward. This is just one version of the plan, I should say. This is not anything out on a proposal. And you can see, yes, there are dots on the Canadian side of the border in the nominal plan, and there are discussions with Canadian organizations about how that might actually come to pass. Their community feels very strongly that's something we ought to do. Particularly if you want to look down in southeastern Alaska. If you just try to put dots in southeastern Alaska you don't get a whole lot of dots. It's pretty narrow in the panhandle. So there's a lot of discussion there about what can be done. Two-hundred ninety-one nominal stations, a little bit broader grid, 85 kilometers instead of 70. The first thing everybody says is 291, it's 400 in the lower 48, it's 291 -- great, we've got 110 extra stations. It doesn't work that way. Each station is more expensive. So in the end, the cost kind of comes out in the wash if you look at it, and all the nominal plans that had been discussed out in public meetings.

 So, that's what I wanted to tell you about the facility, and before I go into the science program, let me just ask if there are other questions people would like to hear about. And then I'll tell you a little bit about what's going with science on the research side. Leonard?

 DR. FISCHER: May I ask a question?

 DR. ANDERSON: Sure, go ahead.

 DR. FISCHER: Okay, so I wanted to wait till the end so we saw the whole picture. So, I think it's great that these stations are being installed in the Eastern U.S., both from a research point of view and sort of, you know, all sorts of reasons related to seismic hazards. I guess the question I have going forward is the $1.5 million it will take for operations and maintenance; is that something that will be a cost borne solely by NSF, or because the USGS and other agencies are interested, presumably also in the seismic hazard aspect of these stations, is that a cost that will be shared somehow between these agencies?

 DR. ANDERSON: Hi, Karen. The answer is that that $1.5 million a year in a nominal plan is actually, it would be the responsibility of other agencies. NSF's interest is in the science and that does have a nominal end time; and so that time frame, if you look at that five hears, is compatible with the current EarthScope plan in terms of overall five years running through 2018. So after that, it would be something where we'd be looking to USGS and other agencies to take the leadership role in that funding. And we have made that very clear in discussions with our sister agencies.

 DR. FISCHER: Thank you.

 DR. NOONAN: May I ask a question?

 DR. ANDERSON: Sure.

 DR. NOONAN: Hi, Norine Noonan, USF-St. Petersburg. So I guess -- maybe I missed something, and maybe it's sort of because I'm not a geologist, but why is it that OMB targeted the Eastern U.S. and made this set aside? Would that have been something that you all would have done anyway? Or is that a politically incorrect question?

 DR. ANDERSON: So, I can just tell you, a lot of discussion have -- Norine, a lot of discussion happened in the earth science community about that one, and in the EarthScope community about that idea overall. Originally it had a fancy acronym, “one in four.” The idea was, let's leave behind one out of every four TA stations. That was discussed in the USArray advisory committee and the Transportable Array working group, it was discussed at a few AGU town halls involving EarthScope. There was a big open meeting of it that was held here in May of, oh, I guess that would have been 2011. No -- yes, 2011. So there was a lot of discussion about that. It originated in the community having discussions. Beyond that, I'm really not privy to how OMB does its business. I know it comes in the president's request in the end. Jim looks like he want to -- Jim wants to comment further.

 DR. NOONAN: I have some familiarity with that, but all I'll say is I just wonder how that got started.

 DR. WHITCOMB: I think also it was not coincidental that there was an earthquake in Virginia. There was some concern about the seismic hazard of nuclear facilities, and so I -- my guess is that may have had something to do with it.

 DR. NOONAN: Fair enough. Thanks.

 DR. ALLISON: And this is Lee Allison. Could I comment for -- throw in something?

 DR. ANDERSON: Go ahead, Lee. What was --

 DR. KELLOGG: You’re breaking up a little. We missed --

 DR. ANDERSON: Lee, you're breaking up.

 DR. KELLOGG: Yeah, we missed your question.

 DR. ALLISON: Oh okay, sorry. Let me get closer to the microphone here and see if that helps. One of the unintended consequences was that in the Western U.S., many of the states, including my state, came in with our own funds and bought a number of the stations before they were rolled out and moving eastward. And we'd gotten the money from a variety of different places, and so those were one-time purchases, and we're all scrambling now to find the operational funds to keep those stations running. And so for instance, in Arizona we've never had a statewide network. And now, for the first time, we have only eight of the stations that we could afford, but we can monitor probably any magnitude 3 or greater earthquake in Arizona for the first time in our history. So I concur with Jim's comment that it was probably the Virginia earthquake and the impact on the impact on the Washington Monument that got the OMB and others excited about putting these -- you know, converting the stations in the East. But longer term, I think we have a similar problem in the Midwest and to the West of places you know, like beyond like say, California, or a few other states where we haven't had the same level of monitoring networks. And so I think what we've seen happening here on the East Coast has gotten a number of us thinking in the western states that we need to go talk to congress and come back and see if we can make more of a national program out of this.

 DR. KELLOGG: And Leonard.

 DR. ANDERSON: And Leonard still -- thanks, Lee. Leonard, did you want to comment?

 MALE SPEAKER: Yeah, I wanted to return just for a moment to SAFOD and ask the question whether we have thought at all about trying to get an international consortium involved in, or interested in SAFOD, and carrying on perhaps the observatory program or whatever. And the reason I ask this question, while Guido is still here, is we have a visitor from the German DFG and also a member of the advisory board for ICDP. And I just wondered, Guido, if you had any comment on whether this would at all be of interest, or possible from your point of view in Europe. Not to put you on the spot at all.

 DR. LUNIGER: No, no.

 DR. ANDERSON: Leonard, turn off your mic or we'll get feedback.

 DR. LUNIGER: Actually, the science we fund is usually bottom-up. So if there is some interest from the community and if there is a proposal dealing with SAFOD and to sustain the observatory or the management behind it, we probably can find a solution to contribute to this problem. Yeah.

 MALE SPEAKER: Greg, do you have any comment?

 DR. ANDERSON: Well, I would just comment that I actually had a long conversation the other day with a member of the Science Advisory Group for ICDP about exactly this problem, and so, yeah. I'm certainly willing to not leave stones unturned on this one. The current solicitation that went out had the language that restricted the respondents to U.S. organizations, either in industry, or academia, or in a collaboration between the two, it may be that that's something we need to get rid of if we put out a revised solicitation. I don't know, it's certainly a model we could consider. I'm happy to talk with people about it. Anybody else?

 MALE SPEAKER: I just had another comment for Lee. You know, we always talk in Washington about a Washington Monument budget strategy, and this has got to be the most elaborate we've ever seen.

 DR. ANDERSON: All right, well unless there are any questions, we'll most onto the Science program. I'll show you some pretty pictures in just a minute here. Just some numbers to let you know where things stand with the Science program. In 2012's round of proposals, and remember EarthScope has one deadline in July. So these are the proposals that came in the July of 2011 deadline. We were able to fund 12, or recommend for funding 12 of the 63 projects, which is a success rate of only 19 percent. That's actually a fair bit lower than normal for EarthScope. Given the uncertainty in the federal budget at the moment, we felt that it was prudent to begin to make sure that our mortgage was kept under control and at a level that was going to give us flexibility to continue to do work in the future. We deliberately put extra money into that, and that led us to have to be able to fund fewer. We were able to fund a CAREER award with another -- two other programs. We had several RAPIDs, EAGERs, and workshop proposals that were able to go out. It was quite a bit of -- quite a bit of activity there. Without divulging I can't, 2013, 73 projects, including 11 that are shared from, to us, from other programs that are under review at the moment. And that's quite a bit of active collaboration across the programs.

 Just some issues that we always keep in mind in dealing with the Science program part of EarthScope is the community has its hopes for large science in particular, and that comes up against the budget realities, and we have to try to figure out the right balance. And we're constantly aware of that and constantly focusing on that. And we always want to make sure we're in good coordination with other programs in EAR, elsewhere in the directorate, and even, in some cases, we're going beyond the directorate. But we always want to make sure we keep those things going. I do think that we're doing a reasonable job at both of these, and in particular, the coordination. As I said, we're sharing 11 proposals this round. We've got a bunch that are being shared with other people from us to them. Lots of conversation happens, and lots of coordination takes place.

 I mentioned a little bit about the revised solicitation. I will just say, one of the things that we also did to try to manage the budget and help set that community expectation level, is in particular to put two items into the solicitation; the second and third bullets there. We put in language that said, if you're going to put a proposal at greater than $300,000 a year, please come and talk to us before you submit. That wasn't a threshold that said you can't go above that. It was a threshold that said if you're going to hit that level, come and talk to us so we can help understand what you have in mind, help set realistic budget expectations, and help us plan for the future. And we also put in a limit of two proposals per PI per year, and this is to ensure that the broadest group of people can participate in the program that we can. That's actually worked quite well. We have had, in the process of running this program since 2004, overall we've had 165 individual PIs get funding through the program. And that's -- that rate has continued basically steadily up until the last couple of years when I think, essentially, we're reaching saturation. There's only so many folks who can make use of our scope at this point.

 So, I wanted to talk about some research highlights. There's a lot going on and there's some very interesting results. I said there were over 200 papers. I'm not going to sit here and blast through a paper every three seconds to just try to fill the time up. I just want to pick some areas of highlights. A couple of areas of focus. One of them is structure. It's a big area of focus for the program. Seismic structure, geologic structure, lithospheric structure, looking at the upper mantle and looking even deeper through a variety of techniques. These are just two examples. One looking at the far northern part of California, this is a paper by Leono [spelled phonetically] that came out in Earth and Planetary Science Letters this year. Looking at the structure of the Gorda slab, which is this blue bulge that comes down, as it subducts under North America and looking at areas where you see high heat, temperatures in the Mano [spelled phonetically] wedge above the slab, looking at the cold slab. But then also looking at the flow in the asthenosphere underneath the slab. I picked this because I could broaden it to a much broader view of the Western U.S., and one of the things that you have seen in recent results is a sign that there is a very large signal of circular flow in the Western U.S. that may be basically, this -- triggered by slab rollback and the flow of the asthenosphere around this slab as it goes down. This is a close-in view of that from work out in Northern California. Looking at the Colorado Plateau, Alan Levander and folks at Rice and others, using receiver functions to look at, basically, what is the structure of the Moho in the area and what is the structure of the lithosphere. And the nice thing about this is that you can see this in the receiver functions, both P-receiver functions and S-receiver functions, but you can also see it in standard tomography, you can see it in a variety of other techniques. It appears that there is lithospheric delamination happening under the Colorado Plateau, and that's why it's plopping up. So it's a nice, focused, targeted study. The Colorado Plateau recently has been the subject of a lot of papers that have come out of EarthScope.

 Another big area of focus for EarthScope research is deformation at a variety of scales. These are what I'd call regional to large-scale, mostly geodetic studies. The one on the left here is a figure from Lucy Flesch and her colleagues, presented at the EarthScope National Meeting in 2011. The one on the right is from Corne Kreemer and his colleagues in Geology in 2010. And I almost came with it, but I couldn't figure out how I could show it to you folks who aren't in the room, but there's a new map that has resulted. Pretty full-scale wall map that you can get out of the Nevada Bureau of Mines and Geology from this update of Corne's work. But basically, what the one on the left is, is looking at Colorado Plateau, which is this sort of, oh, I don't know, potato shaped outline there in the middle. With various GPS stations marked in red, their velocities with -- there are uncertainty ellipses, but you can't see them from where you're sitting I'm sure. And then a model of deformation in the region overall based on those data and a variety of others. And I will actually come back to this, because it's also a good example of integrated science. And basically, what it's showing is that the plateau itself is not deforming much internally. It is rotating, but there's a lot more deformation on the west side than there is on the east side, even though the Rio Grande rift is just over to the east. So there's some interesting differences in the regional gradients of deformation there. The one on the right is showing a regional strain map, and what it's showing is, looking at southern Nevada up into the Wasatch Front and around the -- basically, the west side of the Colorado Plateau. And you can see this high rate of extension that's happening on the west side and across the basin range. And if you zoom out this map that they've now produced, there is also not a whole lot of deformation. Even with, as I said, the Rio Grande rift off to the east, there isn't a whole lot of deformation on the east side.

 Now looking at deformation, much finer scale, we're going to zoom down into SAFOD. These are results out of looking at SAFOD core. The one on the left comes from Dave Lockner and his colleagues. It was in Nature in 2011, and the one on the right comes from Brett Carpenter and Chris Moran and folks in Nature Geoscience. And what this essentially is looking at is, the friction coefficient along the fault. Right? A fundamental longstanding question about the San Andreas Fault and other large mature faults: Is it a strong fault or is it a weak fault? And the answer appears to be, based on SAFOD core, it's extremely weak. It's both the mineralogy and potentially the fluids that lead this fault to slip at a very low level of friction. And so no heat flow paradox, this makes all sense, this is good, but this is what you get when you can actually hold an active fault in your hand and run lab tests on it. What that's basically showing is coefficient of friction quite low in the fault zone there on the right. Coefficient of friction quite low here in the green and orange-ish curves on the left side figure. But both of them doing independent work on independent samples showing essentially the same thing.

 And of course, EarthScope's -- one of its big purposes is this integrative science. These are great disciplinary studies, but we want to bring together seismology, and geodesy, and geology, and geochronology all into one big set of studies. This is an example Lucy Flesch and her colleagues presented to us that uses GPS data, the ones I showed you there on the upper left. Uses lithospheric fitness estimates coming out of seismic data, both receiver function studies and tomography. Estimates of the gravitational potential energy and the deviatoric stress that results in the lithosphere, and that gravitational potential energy comes from studies of topography using LIDAR, ENSAR, and other methods. And I'm pulling this together with geodynamic modeling with both a temperature and a horizontally variable viscosity model. Pull all that together into a model that tries to explain the surface deformation pattern, and it actually does quite well. That's what's shown over here on the far right. And again, it shows that the Colorado Plateau is rotating clockwise with a much higher rate of deformation along its western boundary than along its eastern boundary, even though the -- temperatures on the two sides are actually fairly similar. So there's some interesting results coming out of this. I could have been here for hours doing this, so I'm going to not.

 Expect the unexpected. This has been noted by a lot of folks that some of the best science comes from the places you just didn't think of when you built the facility in the first place, and this has been thrilling. Quite honestly , this has been thrilling.

 This slide -- the title is an old joke. Right? Somebody loses their wallet on 1st Street, and somebody finds them over on 3rd, and the guys says, “Well, if you lost your wallet on first, why are you looking over on third?” “Well, the light's better here.” This is a case of, what do you see when the transportable array rolls through an area that is traditionally thought to have very low seismicity? This is Northern Texas. A paper by Cliff Frohlich just came out in the proceedings of the National Academy looking at the rate of seismicity in Northern Texas using TA data. “The light's better here.” He sees eight times more earthquakes than show up in the USGS catalog. This is just one example. When it rolled through Oklahoma, they saw 10 times as many earthquakes. When it went through Southwestern Colorado, the same thing. Everywhere the TA has gone, the rate of earthquakes has been considerably higher than originally believed, and the reason is, the light's better. You can see better. Higher density. What's interesting about this is, not just the red circles which are the earthquakes, it's also the fact that those yellow squares represent injection wells. And so this is a very interesting focused study of the correlation between injection wells and earthquakes in Northern Texas. I think this is an example of the sort of science we are going to see as TA rolls to the east, particularly when we get out to the Marcellus Shale and we're looking at things like this, we're going to see a lot of these sorts of studies coming out, and I think we're going to learn a lot about the role injection is taking in -- both in terms of its economic consequences as well as seismic consequences.

 A completely unexpected one, but this is one of those studies that you read this and you think, wow. And then that's really all you can say for about the first three minutes after you've read this paper. This is work from Ito and Simons at Caltech. They take GPS data from PBO, and they model the effect of ocean tidal loading on the GPS time series. And from that, they infer the constitutive relationship and they infer the bulk coefficient in the shear modulus down to depths of 300 kilometers in the Western U.S., and then they compare that to seismic models, and they match. So basically, you're inferring the seismic structure down to, you know, upper mantle depths, just basically discontinuity level depths, using GPS data at the surface. It just kind of blows my mind when I saw this one. And then this is the one -- for those of you that are on the remote side, this is the one that's got a movie in it. And I will just tell you, you can get this movie via IRIS, and I'll make sure that I'll get Melissa the URL so she can send it to you. But what you're going to see here, one of the interesting side effects of adding equipment to the transportable array. There was an LOI proposal that was funded that put atmospheric pressure sensors at all of the TA stations. All of them have it now, and one of the things that you can do with this now is, well, you can see tornadoes. Which is fun, kind of scary, but good. You can also see large scale atmospheric circulation patterns from the sort of level of detail that hasn't been something we've been able to do with seismic stations before. But the power comes when you combine the two of them. You can actually see when a tornado is on the ground, which is something the atmospheric scientists tell us is very important for now-casting and weather casting these sort of things in the short term. So what you see on the left side here is a map of the TA in April of 2011, and what you're going to see when I play this movie is -- colors changing, and those colors correspond to the air pressure. Blue colors, low; red colors, higher pressure. And you're going to see a bunch of red squares that pop up periodically. This is a very strong burst of tornadoes that happened in April of 2011, and what you're going to see is a variety of things. You're going to see one station down below; this is the time series of pressure. It's 10 days of pressure data. You're going to see that fluctuation as the storms come through, but you're also -- keep an eye as this tornado's happening. Watch, there are mesoscale structures that propagate to the north and the south across the footprint of this. And so you can see that kind of atmospheric circulation. On the right is a figure that shows you the detailed look at one of those tornadoes going by a station, here, in Northern Mississippi. The three traces at the bottom are the seismic model -- the seismic data itself. The two traces on top are the atmospheric data. And the two traces -- so the bottom traces -- the second to the bottom and third to the bottom are the two horizontal components. What you can actually see in that is the ground tilting to the northwest as the tornado goes down and goes across the surface, because the tornado is northwest of the station. So this is something unexpected. It's pretty cool.

 Let's show this movie here. Lots of fluctuation, mesoscale circulation, pretty soon you're going to start seeing those squares pop off with the tornadoes. There'll be one that's kind of in the join of the L there that'll pop a whole sequence up, and then you can see this propagation of the north and the south. And it's essentially the thunderstorms exploding up into the atmosphere and the gravity waves propagating across. There you go. So this is an unexpected -- there you go, there's the propagation. This is an unexpected benefit of using the EarthScope facility framework as a platform for which people can bolt on other equipment in a way that doesn't interfere with its core science but allows NSF to support a community that wouldn't otherwise have had this set of information. There's a lot of discussions going on with the atmospheric sciences community to see what other information they would like to glean from this and how it can be made available to them in a usable fashion. So that's the science program highlights that I wanted to talk about, except for one more that I just can't resist. Proof, what we already knew, Terry Plank was named a MacArthur Award winner, a MacArthur Fellowship Award winner in 2012, and I have to point out she's a multi-NSF awardee, but she's also had a long connection with EarthScope. She's been on the EarthScope's steering committee and is currently an EarthScope distinguished speaker for the current year, so congratulations to Terry.

 So switching to the national office, and we'll just talk about his very briefly. These are the -- this is the staff of the national office. The head of the national office is Ramón Arrowsmith, bottom left in the big picture there. Ramón is also the chair of the EarthScope steering committee, which is the top-level science advisory committee for EarthScope. It doesn't, as I said before, doesn't have a facility advisory role; it advises us on the science side of things. The EarthScope steering committee is actually going to be here next Monday -- not next Monday, the week after. So the 22nd and 23rd for their face-to-face meeting in the fall. We'll have lots of wide-ranging discussions, but this is the staff. Their main role is to act as the community nexus for folks to come together to plan workshops, to -- they lead the EarthScope education and outreach effort across all of the various branches of EarthScope that are going on. They maintain the EarthScope website, they maintain a very vigorous social media outreach effort that has really taken off quite a bit in the past year, since Wendy Bohon has been able to focus a lot of effort onto it.

 I should tell you the next national meeting, May of 2013 in Raleigh, North Carolina. Please come, there will be a lot of good science, and that meeting's being planned right now. And if you want more info, all of the usual places that one can go: you can talk to me, you can talk to Chuck Estabrook, you can go to the EarthScope website. Both the one that NSF has, nsf.gov/EarthScope as well as EarthScope.org. follow us on Twitter, you can like us on Facebook, you can go after Google Plus if you really want to hang out with the three other people who use Google Plus. Anyway, lots of things that are going on there. And I'm happy to take any questions that anybody has at this point.

 DR. KELLOGG: Thank you, thank you, that was very interesting. Okay, we covered a lot, so are there questions? Let’s open the floor.

 DR. SCHIMEL: I had kind of an ignorant question, Greg. You referred to one or two of the projects as integrated science. That, to my you know, carbon science perspective, seem to be just as -- didn't seem to be distinct from the other examples that you gave. And I wonder if you could just elaborate a little bit on what distinguished those research activities. In your view, on what dimension were they integrative?

 DR. ANDERSON: Sure, yeah. Actually one of the things that we have to focus on in the program is sort of the balance between what I think of as disciplinary science and what I think of as interdisciplinary, or integrative science. I define that in a certain way. Other people -- this is one of those things that, you know, it's the folks with the elephant. You can choose --

 DR. SCHIMEL: Right, yeah. I mean I'm looking at it and going, well, it's all geology to me [laughs].

 DR. ANDERSON: Okay, right. My definition of it is, if it's a project that uses seismic techniques, and there's a whole bunch, as you know, of various sorts of seismic techniques. I think of that as a disciplinary project. It's using seismic techniques. If we get a project that's going to use seismic techniques or results of seismic modeling with geodetic modeling, particularly with geochronological modeling or some kind of large-scale geodynamic modeling, I think of that as an integrative project because it's pulling together lots of different subfields of solid earth science together into a bigger package. One of the -- and again, that's one of those things that you can decide how you want to slice it. One of the things we had to do recently for a review, was I wanted to figured out how we're doing on that. Are we funding enough of the big integrative stuff versus the disciplinary stuff? Roughly -- and how do you determine that? Well, if you're me, you read the project summary for every proposal that's ever been submitted to EarthScope, all 794 of them. That takes three days. And you would basically say, is it disciplinary or not? And then you add it up. The short version is, 50 percent of the proposals we get over the history of the program are either one. We make 60 percent of our awards to the multidisciplinary science over all time. So I think of it as an integrative, as a multidisciplinary activity because it spans different areas of solid-earth science. That doesn't mean that we couldn't have one that say, was looking at glacial earthquakes, and that was using seismic data to look at glacial earthquakes, it was using geodetic data to do that, but it was also doing something about the physics of ice using stuff from the Polar Programs, I would think of that as an interdisciplinary activity and definitely integrative. I can also think of ones where you're looking at hydrologic cycle or biosphere, and I'll give you a prime example of that. Kristine Larson at the University of Colorado has an award from EarthScope to use GPS data to help look at the snow depth, at the water content of snow, but also, now, looking at how green is the vegetation in the area around the station, and correlate that against the indices that are already out there for vegetation greenness and see -- can you use this geophysical data set to help with biological science? So I would think of that as a prime example.

 DR. SCHIMEL: That one actually looks to me like disciplinary biology, but we can set aside. Thanks. That really helps me to understand the strategy that you're using in looking at this, and what the term is in reference to.

 DR. ANDERSON: Okay. Anyone else?

 DR. FISCHER: I have a question, and I think one of the really positive things that's happened in the last couple of years is coordination between EarthScope and GeoPrisms, and in fact, some other programs as well, in relation to the shared science goals the programs have both in the Eastern U.S. and Cascadia, and also elsewhere; though the Eastern U.S. and Cascadia are perhaps the primary two. I think what has happened, however, is because of a lot of these shared goals, sometimes PIs are really unclear about where their project belongs, and I know that you and Chuck and other program officers have tried hard to communicate that, and have gone to meetings and spoken at meetings. But I will say this last spring, particularly among many junior scientists I know that were submitting awards, there was real confusion about should they be submitting to EarthScope, or GeoPrisms, or Geophysics, you know, just sort of where their proposals belong. And I know the usual advice is that people should get on the phone and talk to their program officers, but I think very often for younger PIs that's a somewhat scary proposition. So I guess I just wanted to raise that as an issue, you know, perhaps for coming years. You know, to consider some kind of coordinated information sharing that just makes that easier nest time around.

 DR. ANDERSON: Well, let me comment on what we’re doing right now, Karen. And then, I don't know if others from NSF would want to pick up on it. But you're right, that is a common thing that we see as concern as well. What we're doing to address that right now -- at GSA and at AGU, there are specific workshops that are being called -- I think the latest title is Navigating the NSF System, and its designed both for new and young investigators, but also for sort of mid-career folks, or even the older career folks to come and talk with program officers from a bunch of programs inside both EAR and also elsewhere through GEO. So across GEO, about what is the program about, about how do you write a proposal that is going to be competitive in a given program, which the best program is, how do you find out what the best program is? Basically, as I say, navigating the system. And it's designed to try to get that kind of feedback. At the EarthScope National Meeting, we're going to do the same thing. We did this at the 2011 meeting and we had a great turnout. Out of 300 attendees, we had over 50 people that showed up just for that one, and it was organized in the morning at breakfast, and people still showed up. And we weren't serving the breakfast, so that was in another room and people showed up. So we're doing to be doing the same thing in 2013 at the National Meeting for EarthScope as well. And certainly we had the AGU town halls where we talk about this and try to help encourage people along the way along this path. And you're right, we always say call us, and yes, it's always intimidating for the younger folks especially. I don't know how else to say it, but guys, we don't bite. I swear we won't, and I'd much rather have somebody call me and ask what they think is a really silly question. Because it's not going to be a silly question, and if we can answer it and save you three weeks of worry, do it. And we're done in five minutes, it's great. And we like talking to PIs, so give us a call. But yeah, we actually do recognize that as an issue, and we're having these outreach efforts that we're putting on at the major meetings. We also have the “EAR on the Ground Newsletter” that we can use as a venue for encouraging people to get in touch with their PIs, their POs and talk about how to do that. And Chuck and I have discussed on the EarthScope website having a set of resources that we can make available for the community to look at this as well, and that might be something that we could look at more broadly than just for the EarthScope community. So we recognize it, and we're trying to deal with it.

 DR. FISCHER: Thank you.

 DR. KELLOGG: Additional questions, comments? Okay. Thank you Greg, that was very informative.

 DR. ANDERSON: Thanks for the opportunity.

 DR. SCHIMEL: Love the movie.

 DR. KELLOGG: Sorry?

 DR. SCHIMEL: Loved the movie.

 DR. KELLOGG: Yeah, the movie’s great. You guys should definitely download the movie, those of you who are online and want to look at it. It's really --

 DR. NOONAN: Yeah, I can’t -- I couldn't see it, so can we get it from IRIS? Is that right?

 DR. ANDERSON: Yes, I will make sure that Melissa has the URL and she can send it to you all.

 DR. NOONAN: Thank you so much.

 DR. KELLOGG: So I suggest that we take a brief break, a 10-minute break, and then we'll come back for our wrap-up session. So we'll reconvene at 20 after the hour.

 [break]

Meeting Wrap Up: Action Items, Meeting Evaluation

 DR. KELLOGG: So we’re sort of informally starting again, and we just realized starting -- that we started talking about assessing the technological use and it would be a good idea to bring in the telepresence people onto that conversation. So, I know there were some glitches and we have heard some ideas about how to fix those, or how to, you know, have meetings that work. So some -- I think, there was a little bit of conversation before I got in the room. So --

 DR. TAYLOR: I think it started, I'm not sure, the end of yesterday, certainly for those on the phone and on video, last night at dinner, several discussions about how to run this advisory committee differently in the future, given the constraints of budgets and other things. Some comments during the meeting yesterday that this hybrid approach was sort of the worst of both worlds. But thinking about the future, including things like getting the materials ahead of time, having one meeting, a true face-to-face everybody meeting maybe only once a year. Maybe even, we just heard, once every 18 months. But supplementing that within -- to be determined, but maybe three or four other meetings a year, which were only, say, two or three hours each, and on particular topics; so that there was a sense of continuity, the one face-to-face would give the personal engagement. But we actually could move on getting things done in a fairly efficient way. So that's where the discussion’s been revolving around some of us who have been here. And I guess Louise is interested in hearing, for some of you who weren't here.

 DR. KELLOGG: That’s right. So for those of you who were not here, that's kind of where people's -- what seems to be percolating up. Is the idea of having one face-to-face meeting, probably the first meeting of the year. The spring meeting, for various reasons, that's when new members rotate on and when there are a variety of kind of important things that need to be discussed here. And then follow that by a series of conference calls that would be shorter. Each one would be on one topic, so for example, the MREFC review might be one, or the topical -- sorry, the divisional subcommittees might be one of those meetings --

 DR. TAYLOR: Or a COV meeting.

 DR. KELLOGG: Or a COV meeting. There might be one for COV reports, that kind of thing. so that we wouldn't have lots of, you wouldn't be sitting on the phone or in front of your computer for two days. You'd be sit -- we'd all, all of us would be sitting in front of our computer for two hours more often. What do you think?

 DR. NOONAN: Louise, this is Norine Noonan. I'm rotating off, so I don't really have a dog in this fight, but I will say it's really hard if I'm in my office for people not to come in and say, or expect me to attend my regular meetings. So a two-hour meeting every so often is going to be a whole lot easier to take than a two-day meeting.

 DR. KELLOGG: Yeah, I understand that.

 DR. BARTH: Yeah, this is Mary and I like that idea as well. It's, you know, having, you know, a couple, a number of two-hour meetings by telecom or video conference is much more efficient. And then, I would suggest having the once a year, you know, everyone get together. That way we know -- we learn about each other face-to-face a lot better.

 DR. LOZIER: I’ll just add my comments as well. This is Susan. I agree that the format should definitely be changed, and I think what you're talking about sounds good. But actually, even more important I think that the content of these meetings needs to be changed because even when we're all there, I have actually been very dissatisfied and feel as though the meetings aren't using my time or everybody else's time wisely. It seems to me really imperative that we have materials up front and we understand what the goals of the meeting are. So it would be nice for, you know, NSF to say, this is what we want your advice on, maybe it's a series of questions or something. But you know, I think this is my fourth meeting, but at each meeting I feel as though I leave not really knowing at all, you know, what we have contributed concretely. So I think there's a lack of continuity between meetings, and so if we could just, into addition change the format, think more carefully about the content. I think that it would be much more satisfying.

 dr. baker: This is Dan, if I could say I agree with what’s been said before. Then I would also say that I think even if we do have an annual face-to-face meeting, I'd like to have a telephone conversation beforehand to stage that and to ensure that we have enough preparatory material well in advance, and then we would talk over, in advance, of the face-to-face meeting what we're going to try to accomplish. I agree fully with what's been said.

 DR. KELLOGG: So one of the strongest things I’m hearing is the need for the materials to be further in advance of the meeting. I think having some telecons like, and discussing would actually be a good way of conveying information which would allow us to, well, I say us although I'm rotating off to -- and so I don't have a dog in this fight either, but it would allow discussing and advising.

 DR. TAYLOR: It’s not unlike --

 DR. FISCHER: I think that’s part of it, but I also think, you know, something that has come up a number of times during this meeting is to have a more concrete idea of what input is wanted from us. So the notion of giving us, “Okay, in this presentation, here are the things we want you to think about, or over the course of this meeting, these are the things we want you to think and comment on.” And that's true, I think, in the plenary sessions, but it's also true when we break down into our three subcommittees. I mean, we're given a lot of information at those meetings, and it feels like it's incumbent on us to respond to that in some way. But then clearly there are some things where we can have more impact, and there's some parts of the information that we're being given where we can't have impact or our feedback really, you know, is not desired. And just having some clarity on that I think would make it at least feel more useful to this process.

 DR. TAYLOR: One other thing, too, is at the moment we, you know, get invited to serve on the advisory committee. We then get put into one of three divisions, and maybe in the future it'll be four divisions. But some of us really do actually span multiple divisions of GEO, and in the future, again with these dedicated smaller meetings, we may be able to participate in more than one division subgroup for example. What I think would help the whole cross-directorate thing in getting the positions of a larger interdisciplinary community discussing issues with program managers and with the directorate.

 DR. KELLOGG: That’s a very appealing aspect of having short -- the divisional meetings, and the subcommittee meetings in particular, be separate telecoms because they wouldn't have to be at the same time. So people could participate in more than one. I think that would be very appealing.

 DR. SPENCE: Louise, this is Harlan. I agree with what others have said about the [unintelligible] and the formats and such. I guess one thing about coming back to some of the technology, especially -- for me, I happen to be at hotel, and I basically have to give up on the jabber even though they had a pretty high speed, and then it really was not sufficient. Today I pretty much resorted to the phone. I guess I would say that my point about these more regular, shorter focused telecoms, that maybe we really don't [inaudible], you know, conferencing, which in my experience has been pretty cumbersome. And it may go with the Webex or something we can show up, share presentations, and have the ability to do some chatting and so forth. Adding people's faces is a plus. There's a strong desire for that, and I think it often distracts from the efficiency of the meeting, just because of technical problems.

 DR. TAYLOR: One thing there is if, you know, PDFs of presentations or position papers are shared ahead of time, I mean you can do a lot just with audio conferencing without having to do video conferencing. And that's a hell of a lot simpler and more reliable. So again, I think it plays to what the, you know, the state of technology and what we’re good at in -- I mean, people can you know, dial in on cellphones and so forth no matter where they are. So that's really very functional. Again, if there's -- if the material is a little bit ahead of time, people are not having to do everything in real time.

 DR. KELLOGG: Yes, I agree with all of that. There are multiple types of these technologies, and they serve -- they each work well for their own purpose I guess I would say, and so, but for the kind of thing we're talking about, this sort of telecom and simple voice where we all already introduced ourselves to each other. And so one that's probably going to -- voice supplemented by materials that we receive in advance, and that's going to work.

 DR. TAYLOR: I serve on several boards that have gone for the phone call of an hour or two, depending on, you know, it works very well because people get used to each other on, you know, by voice on the phone. They know -- and if meet once a year or whatever, you know who you're talking to and where they're coming from, and it's very functional and it's a whole lot less trouble.

 DR. DE PAOLO: Well, you know, there’s a lot of ways to actually function. But I thought one of the purposes of advisory committee meetings of this sort was to get together in a public meeting and to demonstrate not only to one another and to the agency, but to the public, that external advice was being given and taken in by the agency. I think that you defeat the whole purpose of having the advisory committee by doing it over the phone. I'm not going to be on the advisory committee, so you don't have to worry about me in the future.

 DR. TAYLOR: Although I think if you only did it over the phone -- if you only did it over the phone that would be true. But I think if you have an annual meeting where there is -- I mean, one of the important parts of this whole thing is communication, including communication of program managers and administration to us, and us to them. And part of that is, you know, I think once annually is going to require a face-to-face meeting. But if you get -- if you maintain continuity between those occasions and you seem to be providing two-way communication, I think you still fulfill that external perception role, which is real. So I take that.

 DR. LOZIER: Yeah if I could, if I could --

 DR. CAVANAUGH: Beyond perception --

 DR. LOZIER: Sorry, if I could step in here. Because to me it's not really whether we meet face to face or whether we, you know, meet remotely. The format of this really as nothing to do -- has very little to do with whether it [unintelligible] advisory board. To me, it's whether we are asked, you know, questions of which we can give advice on. So to me, things are presented to us, but it's not clear what we are to advise on. So to me the whole problem with the advisory board is that the meeting is not set up for us to be effective in our roles. So regardless of the format, I think we need to really rethink -- or NSF needs to rethink having the geosciences directorate -- how they use our expertise. Because honestly, at each meeting I come away not really knowing what advice we've given or what advice they'll take away from the meetings. And I don’t think that should happen. I know with NSF panel reviews meetings, I come away knowing exactly what my input as a community member has been, but after these advisory board meetings, I think we really walk away -- we are a little more informed about what's going on at NSF, but it's not clear to me that we really acted collectively as an advisory body to NSF.

 DR. KELLOGG: Well, I guess I would -- I can think of a number of counter-examples to that in which, you know, topics that we have brought up that have, you know, ideas that have come from the advisory board have been implemented. And you know, those range from essentially encouraging and advising on the development of new programs like some of the SEES programs we've heard about to things like implementing a parental leave policy for postdocs, for NSF postdocs in GEO which was then adopted first in GEO, and then by the rest of NSF. So there's a whole --

 DR. LOZIER: Those were probably before I came on then.

 DR. KELLOGG: They were, I know, but they sort of -- sometimes it's sort of funny, you know, you might thinking well, we just had a conversation and then a year later something comes back and you realize, oh, that's what happened as a result of our discussion. It's a little less -- it's a little different role than, for example, a panel where they're advising on a specific program or a specific set of proposals. It's a little, slightly different role. But that said, so we have developed a strategic plan and then some topical strategic plans, and I think there will be some more strategic planning going forward. So I know Marge has been trying to say something for a while, and so I'm going to turn the microphone over to her.

 DR. CAVANAUGH: Okay, well. Oh, well I’ll go back to some other things. But for now, I think that this, it's -- we generally put together some kind of vision document about every five years or so, and it usually takes us about two years to put those together. And it's a lot of work, a lot of it by the NSF staff frankly, but -- to put those together. But it's -- the one that we have has been on the streets now for three years or so. And so it's not too early to start thinking about what might be in the next strategic plan. And frankly, those plans do give us a lot of advice. It's out of those plans that you saw a lot of impetus for us to do interdisciplinary work and to emphasize sustainability and societal needs, and to go in that direction more than we have in the past. And so that's the kind of you know, with an impetus to be involved in SEES and to feel that we had the support of the community to do that. So there -- it -- I understand that sometimes the -- sometimes it's sort of diffuse, but I think the advice is often given and received. And so one thing that I think should start to happen next year is some -- at least some early planning for a new strategic plan which would give us -- and that we should be very, what shall I say? As focused about it as we can be. In other words, if we can decide on some major issues that -- questions that we think need to be answered or that -- a reflection on, let's say, that would be helpful to the community, we can start already building those -- the materials and the input et cetera that we might need in order to be able to say something about those questions in a strategic plan.

 And that would give a lot of focus to the meetings, too. You could imagine a planning process in which -- at the plenaries. Because that’s the other thing I heard, was that there was a difference between what folks thought they were being asked about or not asked about at the plenary sessions versus the subcommittee meetings. But say that, you know there could be a topic or two identified for each plenary sessions that would -- with the idea that the opinion that the committee had at the end of those discussions would end up being a section, or in the strategic plan, and contribute to the strategic plan.

 You can think about who you might want to invite to speak at the meetings, to join you to talk about particular subjects and that kind of thing as well. And one of the things I was noticing about this meeting is that we didn't really have people that we had identified to come and talk to the, you know, with the advisory committee about a particular topic; and it was because we were doing the virtual meeting, which is another way to think about these virtual meetings, by the way, I think, is doing the meeting -- is the format of the meeting conducive or limiting what we need to get done? And I think this time one of the things we're really trying to do was to try the experiment and the virtual meetings. And we actually -- when we did the schedule, we put fewer things on it and allowed more time for sessions, and it was a good thing, I think. Because we needed it in order for the flow of the meeting to go the way it did. We needed that time. But it has consequences too. So anyway, enough on that.

 DR. TAYLOR: One thing to make you feel good, Susan, about advice. I mean, two specific things, one in OCE and one more broadly. We got asked, well I guess about two meetings ago, about the potential re-org of the OCE division. And we changed what happened, and in fact they didn't do what they were thinking to do. Likewise, I think this committee brought up issues related to program officer content, or lack of same [spelled phonetically], as well as diversity issues. And now we see people like Debbie Bronk and Wendy Harrison, and others. I mean, I think we've actually changed the face of NSF. So I do believe, you know, there's been some issues where we've had very specific and particular input that's been effective.

 DR. BAKER: I just wanted to say, Marge, about the, something about the input from the community. And I know you were there a couple of weeks ago when we briefed the decadal survey in solar and space physics. And those kinds of activities represent a lot of work on the part of the community. A lot of distillation of ideas, and I believe that they can be very good starting point for a lot of the strategic planning we're thinking about. So I hope there's a very effective way to take that work and match impedances and get it integrated into your strategic plan.

 DR. CAVANAUGH: Yeah, I agree, I don’t think we want to repeat things or duplicate work that's already been done. We certainly want to take advantage of it. But that's one -- as an example of the kind of thing that this committee might -- could do. I'm not saying, you know, but you could have a -- make a point of inviting the chairs of each of a number of reports that have come out in the last couple of years, to come and talk about what they thought was the most important, or lasting, shall we say, advice that they gave in the report was and some of the issues that they saw that may or may not have been included in the text of the report, that would give us, you know, some insight into some of the issues that might even be broader than any one report.

 DR. SCHIMEL: I just wanted to comment. I cumulatively have seven years of tenure on this committee in two bursts, and it's really clear to me that the directorate does listen to the committee. I don't really think that's the question. I think that there's a question about how the meeting is organized to get the advice most distinctly and efficiently and to memorialize it in a way so that we actually know what advice was given, and you could report back on it. And I think that that could be tightened up. But I don't think anyone should be in any doubt about how seriously the directorate takes the advice; it doesn't mean that they always follow it, but you know, I've seen, you know, I think every one of us has examples that we could bring forward where we were asked a question and where the directorate took the answer very, very seriously. So I think that, you know, I wouldn't be on the committee for a second time if it hadn't felt that way the first time. And I don't think that's really the issue that we're trying to raise with you.

 It's more one of how to effectively use our time, particularly as we move from, you know, this traditional format to some new format. If we do -- and so getting back to technology and procedure -- if we do go to three to some number of virtual meetings a year, which I actually think is a good idea and I think all of us agree that those can be very effective, it's important to have clear goals going into those meetings. It's important to have clear decisions recorded. And I think it's probably important to the extent possible for the minutes of those virtual meetings to be available to the community so that the transparency is preserved. And that might actually be a FACA requirement; I'm not sure. But the -- but maintaining that transparency so that virtual meetings don't become offline meetings is a good thing to do, and it's not that hard. It does mean that there needs to be somebody who's the kind of recording secretary from the committee who shapes those minutes. And I think, you know, in this group there's a lot of experience and, you know, everybody must participate now in some activity that's managed that way. Certainly all of the PIs do who have more than one location. But for this purpose, the record and the transparency of those calls is also very, very critical.

 DR. DE PAOLO: Can I make one other comment? This is just as I’m leaving. The -- so I just was thinking about the comparison of this advisory committee meeting to something like the basic energy sciences advisory committee at DoE, which is sort of a roughly similar sized organization. So that's done in a very public place. It's done at a hotel, so if people don't have to have ID cards to get in. And people from the community send representatives, so virtually every place that gets funding from BES has somebody there because they want to know what's going on. And that would be a kind of different -- it's a different kind of thing, but you know, it's more than an advisory committee meeting. I think any advice that happens is sort of incidental. But the advice happens sort of in a continuing mode, sort of in the evenings and what have you, but it's very important to have that public meeting I think, at least for -- the DoE feels that way. And here it’s different. You know, have to have ID to get in the door, so not everybody would even think to come. And the only people you tend to have I guess are other agency folks who know about it, and most of the people are from inside the building. So I'm -- I don't know, you might think about that at some point.

 DR. KELLOGG: That is a very interesting idea. I'd like to -- since we only have a few minutes left, I want to wrap up a little bit. One of the things that will be on the plate for the next -- for the coming year, I guess, is the merger with Polar Programs. And I'll be attending virtually, the OPP advisory committee, or part of it, next month. So I'll ask you all -- I think I can summarize what I think are the concerns, but as you have a change to think about over the next few days and weeks to, you know, send me things you'd like me to pay special attention to on that committee.

 And then finally, we have a number of people rotating off of this committee, and so I wanted to thank each of them for their service, and in fact, I also want you to think about who should be asked to serve on this committee. But first, let's thank the people who are rotating off.

 DR. CAVANAUGH: We want very much to thank the people who are rotating off.

 Female Speaker: Oh, we get certificates?

 DR. KELLOGG: You get certificates, yes.

 [talking simultaneously]

 DR. KELLOGG: Peggy’s saying she'll do anything for a certificate. All right, so we’re going to hand certificates out. To those of you who are online, we're going to hand some certificates out. I think Brian is giving up because he has a plane to catch.

 DR. CAVANAUGH: Does he get one?

 FEMALE SPEAKER: No.

 DR. CAVANAUGH: So the first one is for Don De Paolo.

 DR. DE PAOLO: Oh, okay, thank you very much.

 DR. CAVANAUGH: You've been a wonderful member.

 [applause]

 DR. KELLOGG: Yes, including doing the SAFOD report, which was a --

 DR. CAVANAUGH: The SAFOD report was a very big deal.

 DR. KELLOGG: And a difficult thing, yes. Norine, we have your certificate an we're admiring it now.

 DR. CAVANAUGH: Yes, it's lovely, Noreen.

 DR. KELLOGG: Thank you very much for being on this committee, I really missed having you here in person.

 DR. CAVANAUGH: We’ll send it to you, though.

 DR. KELLOGG: Not sure she’s online anymore. She might not be online anymore.

 DR. CAVANAUGH: We'll put it in the mail to you. Oh, Walt left.

 DR. KELLOGG: Walt left. Oh --

 [talking simultaneously]

 DR. DELANEY: They didn't know we were doing certificates.

 DR. CAVANAUGH: No, they didn't. They didn't know they were getting certificates. Do you want to give it to him?

 MALE SPEAKER: Sure.

 DR. CAVANAUGH: Okay, thank you, because you'll see him for sure. Let's see who else we have here. Dave Schimel.

 DR. KELLOGG: David, thank you for your efforts on behalf of the committee.

 DR. CAVANAUGH: That's seven years, I hear. Have you gotten a certificate before?

 DR. SCHIMEL: I don't think so, I was just doing it for love.

 [laughter]

 DR. CAVANAUGH: Thank you very much. John Snow --

 DR. KELLOGG: John Snow, who's not here.

 DR. CAVANAUGH: And I don’t think he’s online.

 MS. LANE: He was never on today.

 DR. KELLOGG: He wasn’t on today; he was on yesterday.

 DR. CAVANAUGH: And he wasn’t feeling well. And Orlando was on yesterday.

 DR. KELLOGG: Orlando was on yesterday. All these people will get these surprise certificates in the mail.

 DR. CAVANAUGH: They will, and it will be great. And we have one for Peggy Delaney.

 DR. KELLOGG: For Peggy, yes, you have the certificate.

 DR. DELANEY: You kept it till last, just for suspense.

 [talking simultaneously]

 DR. CAVANAUGH: We have one more, and this is for our chair. Louise Kellogg, you've done a fabulous job.

 [applause]

 Big round of applause actually for all of the folks.

 DR. KELLOGG: Yes, thank you everybody, thank you for serving on this committee.

 DR. SCHIMEL: It looks like almost everybody.

 DR. KELLOGG: Almost everybody. So actually, that -- David raises an important point. A very large number of people are rotating off, and there's somehow been -- it's not a third of the people. Somehow there's been -- it's exactly a third. Okay, this time it's exactly a third. But --

 DR. CAVANAUGH: But one of the reasons that a lot of you are here, is the fact that we've made a point of -- or this virtual meeting of inviting the chairs of the subcommittees.

 DR. KELLOGG: You need to have your microphone.

 DR. CAVANAUGH: And so some of the more senior folks are here because they're chairs of the subcommittee, so it's not surprising that perhaps a lot of our certificate folks are in the room.

 DR. KELLOGG: so I would like people to think about who -- and we don't get to choose who's on this committee, but we can recommend names. And I'd like you to think about names and in particular considering what we've heard about the changes in programs and about the merger, and about the reorganization and also, considering that the advisory committee will be advising an unknown new AD who we hope will be here for the next meeting as a permanent AD. So I think we don't really have time to do much of that now, but my suggestion is that you think things over and send your names to me or to Marge or to Melissa. You know, possibly with a word or two about why, who they are. We like to get -- this committee works very hard to get a balance of people, a balance of disciplines, balance of perspectives on science and science implications. A balance of age, a balance of demographics, a balance of, you know, different kinds of -- sorry, geographic diversity. So we really try and have a wider representation of the community, and I think that's been quite successful over the last number of years. And so, keep that in mind as you recommend names as well. Sorry?

 MS. LANE: Polar.

 DR. KELLOGG: And Polar, and especially, if the two ACs are going to be merging, then having people who are knowledgeable about Polar Programs will be very important. And so last but not least, I want to thank Marge so much for her work as an acting assistant director and everything she's done. And thank Melissa and her amazing staff. And Melissa and her tireless work on behalf of NSF. And all of the IT guys.

 DR. CAVANAUGH: I just wanted to be sure that you all came to the town hall at AGU, which is on Monday at 6:15 in Moscone West at --

 MS. LANE: I’ll send an email out.

 DR. CAVANAUGH: You'll send an email out, but it would be really helpful, if you are at the meeting, to be able to come to the town hall. And one of the things that wasn't mentioned, when we were talking about the role of the committee before, is that one of the main roles of the committee actually is to communicate what's happening, but also to communicate what's happening here out, and so that provides a venue for that. So, we hope you'll be able to be there.

 DR. KELLOGG: So I think we are adjourned. Thanks, everybody. I want to use my gavel.

 [Whereupon, at 1:56 p.m., Day Two of the Advisory Committee for Geosciences meeting was adjourned.]

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