NATIONAL SCIENCE FOUNDATION

Advisory Committee for Geosciences Directorate

(AC/GEO)

April 2 – 3, 2014

National Science Foundation Headquarters

4201 Wilson Boulevard

Arlington, VA

MINUTES

Attendance and Membership

Members present:

Dr. Louise H. Kellogg, Geology Department, UC-Davis, Chair, AC-GEO

Ms. Vicki Arroyo, Executive Director, Georgetown Climate Center, Georgetown Law, Washington, D.C.

Dr. Mary Barth, NCAR Earth System Laboratory, University Corporation of Atmospheric Research

Dr. Paul Bierman, Department of Geology, University of Vermont Trinity Campus

Dr. Mary Ellen Carr, Columbia Climate Center at the Earth Institute

Dr. Chihing Christina Cheng, School of Integrative Biology, University of Illinois, Urbana-Champaign

Dr. Scott C. Doney, Marine Chemstry and Geochemistry, Woods Hole Oceanographic Institute, Woods Hole, MA

Dr. Karen M. Fischer, Department of Geological Sciences, Brown University, Providence, RI

Dr. Linda Green, School of Anthropology, University of Arizona

Dr. Linda Hayden, Center of Excellence in Remote Sensing Education & Research, Elizabeth City State University, Elizabeth City, NC

Dr. George M. Hornberger, Director, Vanderbilt Institute for Energy and Environment, Vanderbilt University

Orville Huntington, City of Huslia, AK

Ms. Jeanne Kosch, Occupational, Safety, Health and Environment, Crofton, MD

Dr. Dennis McGillicuddy, Woods Hole Oceanographic Institution, Woods Hole, MA

Dr. Jordan G. Powers, NCAR Earth System Laboratory, National Center for Atmospheric Research

Dr. Harlan Spence, Director, Institute for the Study of Earth, Oceans and Space, University of New Hampshire

Dr. Brian Taylor, Dean, School of Ocean and Earth Science and Technology, University of Hawai’i at Manoa

Dr. Joseph Whittaker, School of Computer, Mathematical and Natural Sciences, Morgan State University, Baltimore, MD.

Members not present:

Dr. Cecilia Bitz, Atmospheric Science, University of Washington, Seattle, WA

Dr. John Isbell, Department of Geosciences, University of Wisconsin-Milwaukee (connected by telephone on April 2)

GEO staff present:

Dr. Roger Wakimoto, assistant director, NSF Directorate for Geosciences (GEO)

Dr. Deborah Bronk, acting director, Division of Ocean Sciences

Dr. Margaret Cavanaugh, Deputy Director, GEO

Dr. Paul Cutler, acting division director for Earth Science (EAR)

Dr. Kelly Falkner, deputy director, Office of Polar Programs

Ms. Melissa Lane, executive secretary, AC GEO

Dr. Michael Morgan, director, Division of Atmospheric and Geospace Sciences (GEO/AGS)

**Wednesday, April 2**

Welcome and Introductory Remarks

Dr. Louise Kellogg

Dr. Kellogg welcomed the Committee members. This meeting would be important because the Committee had not met for a year; a meeting planned for the fall had been canceled because of the government shutdown. This meeting would be the first since National Science Foundation’s (NSF) Polar and Geosciences programs had merged, and thus the first in which the Polar and Geosciences committees would work together as one committee. The meeting’s goal was to review the topical strategic plans, on which NSF staff had been working for about a year and wanted the Committee’s input.

Members and other attendees introduced themselves.

Presentation: Update on NSF Geosciences Program

Dr. Roger Wakimoto

The meeting’s focus would be the GEO Vision, in which NSF wanted Committee members actively involved.

Later that day, Dr. France Córdova would be ceremonially sworn in as NSF’s Director. Dr. Cora Marrett, who had been Acting Director and was becoming Deputy Director, would come to the Committee meeting.

Dr. Wakimoto discussed NSF’s budget, research highlights, infrastructure highlights, education programs, Division Director searches, and the GEO Vision plan.

In FY13, with sequestration, NSF’s budget had been decreased about 2% from the year before; the budget of the Directorate of Geosciences (GEO) decreased about 4%. The FY14 budget was still in flux, not yet allocated officially. For FY15, NSF’s budget, including the budgets of NSF’s big directorates, would go up just slightly.

Research highlights:

* The program portfolio for Science, Engineering and Education for Sustainability (SEES), a cross-directorate initiative, was at its peak and would begin plans for sunsetting. The initiative’s closure could be a true sunsetting, with everything getting shut down, or there could be follow-on programs. One “SEESlet” would be the Water, Sustainability, and Climate (WSC) program, which will evolve into a new program. Because GEO was the only directorate planning for the sunset of a major initiative, GEO would set the pace for how to wrap up an initiative.
* The EarthCube program was moving toward implementation.

In infrastructure, the National Research Council has begun a Decadal Survey for the Division of Ocean Sciences.

A search was planned for people to replace three of the four division directors in the Directorate. The ideal choice for any of these positions would be both a good scientist and a good manager. The positions could be temporary (done under the Intergovernmental Personnel Act [IPA]) or permanent.

Dr. Wakimoto discussed the 5-year GEO Vision, the main reason for the meeting and especially important in this time of flat and declining budgets. He appreciated the Committee’s help in defining the current draft. NSF's greatest strength is responding to what the community wants, but the plan also needed input from leaders, nudging rather than command decisions. Especially helpful would be the Committee’s comments on Dr. Tom Torgersen's presentation on the water-food-energy network.

*Discussion*

Ms. Vicki Arroyo raised the issue of climate data, saying people at the state and local levels might not know how to translate the data they get into something actionable. Dr. Wakimoto replied that all agencies had been tasked with public access, including access to data, but had not always succeeded in getting data to “have-nots” in a format that they could understand and use. He cited hurricane and earthquake information as examples of success in getting information into the public domain. Dr. Cheng said the [National Center for Biotechnology Information](http://www.ncbi.nlm.nih.gov/) (NCBI) had set up GenBank, providing and annotating data in a way that is useful for the community.

Dr. Wakimoto noted that there had not been closure about what was meant by *data*: whether it meant, for example, raw data, quality-controlled data, or model results. Also to be considered was dark data. NSF did not save all model results, or even save code as platforms changed. NSF could not archive everything; agreement was needed on where to draw the lines.

Dr. Wakimoto explained that the SEES sunsetting was being watched very carefully by others in NSF. GEO, represented by Dr. Cavanaugh, had had extensive discussions with other directorates about the effects of SEES sunsetting on other programs. Some SEESlets, including, for example, the Prediction and Resilience against Extreme Events (PREEVENTS) program and the Water Program would continue, but some SEESlets had to end; if not, there would never be anything new. Dr. Wakimoto said the community needed to be assured and involved in the sunsetting discussion.

Preparation for Meeting with the Acting Director

The meeting with Dr. Cora Marrett, then in her last hours as Acting Director before the new Director would be sworn in later that day, was scheduled for 10 am. Dr. Kellogg asked Committee members what questions they would like to ask Dr. Marrett.

Dr. Cheng commented that in one of the last meetings of the Polar Advisory Committee, Dr. Subra Suresh, then NSF Director, had assured the Committee that the programs in Polar would not change with the merger. Shortly after that, Dr. Suresh departed. With a new Director, people in polar science again wondered what would happen. Dr. Cheng agreed to ask about it.

Dr. Taylor suggested that Dr. Marrett might reflect on her second round of service as Acting Director, especially her positive experiences.

Dr. Carr suggested asking Dr. Marrett for feedback to the Committee.

Dr. Doney suggested asking how facilities and a basic research program could be maintained with budgets close to flat.

Dr. Taylor suggested asking about the Major Research Equipment and Facilities Construction (MREFC) program going forward in the current budgetary environment.

Dr. Fischer suggested asking how Dr. Marrett envisioned the Strategic Plan being used.

Dr. Spence suggested asking about portfolio reviews and differences in readiness or input of the community, as well as about titles and abstracts and the question of who owns them.

Dr. Hayden wanted to express appreciation for NSF’s effort to improve science, technology, engineering, and math (STEM) education. She suggested asking about the prospect of a program for the development of young scientists. Dr. Hornberger suggested asking generally about the reorganization of the education program.

Dr. Kellogg summarized the plan for questions:

* The Committee would thank Dr. Marrett for serving as Acting Director and ask her to reflect on her experience and what she would like to see from the Committee as an advisory committee.
* Dr. Cheng would ask about the future of Polar Programs.
* Dr. Doney would ask about the balance of priorities between facilities and research.
* Dr. Taylor would ask about MREFCs going forward.
* Dr. Spence would ask about the role of strategic planning at the Foundation level.
* Dr. Hayden would ask about undergraduate STEM education related to field programs.
* Dr. Hornberger would ask about the organization of education programs.

Dr. Kellogg suggested giving top priority to questions about the merger of Polar Programs and its impact, and second priority to questions about STEM education, diversity, and field perspectives on undergraduate education.

Meeting with the Director and Deputy Director

Dr. France Córdova and Dr. Cora Marrett

Unexpectedly, Dr. Córdova joined Dr. Marrett to respond to the Advisory Committee’s (AC) questions. Dr. Kellogg expressed appreciation to Dr. Córdova and Dr. Marrett for attending the session. She thanked Dr. Marrett for her leadership at NSF during challenging times.

Dr. Marrett expressed pleasure and surprise at Dr. Córdova’s attendance at the session. She noted that the times were challenging, citing the example of the cancellation of the Committee’s fall meeting. The Geosciences Directorate, she said, had recovered incredibly well from sequestration.

NSF had released its FY15 budget request of $7.4 B, following a reasonable increase in FY14. Released with the budget was a strategic plan for FY14 and FY15. Dr. Marrett thanked the Committee for their input.

The budget contained performance goals as well as requirements for transparency and accountability. The people at NSF are stewards of public funds. Dr. Marrett highlighted that Dr. David Verardo was on a working group on transparency and accountability and that Dr. Michael Morgan had been facilitating conversations among Division Directors on the topic.

Dr. Córdova thanked Committee members for their service. She said there is nothing like the first-hand interactions that happen at meetings like these for the progress of this field. Having been to Antarctica twice, she said, she appreciated what NSF was doing there, doing research and being a steward. NSF’s goal was to keep scientists and the work they do foremost in the country's mind.

Dr. Cheng explained that when the merger between Polar and GEO had been announced 2 years ago earlier, Dr. Suresh met with the AC and assured them that the program’s substance would not change. Dr. Suresh had said he would revisit the issue in 3 years. Not long after that, Dr. Suresh's departure was announced; his assurances departed with him. Now the community wondered anew what would happen.

Dr. Marrett responded, saying that historically Polar Programs had been part of Geosciences. What led to the merger was the expectation of a great deal of emphasis on the Polar regions. Dr. Marrett assured Dr. Cheng that there would continue to be interactions between Polar and other parts of NSF; the presence of a given division in a part of the organization does not imply boundaries reducing connections. The plan had been to revisit the changes within 3 years, but that review was being done sooner. She asked the AC to consider what NSF should be examining as they considered the consequences of the GEO-Polar merger as well as two other mergers at NSF.

Dr. Córdova agreed with Dr. Marrett that all the directorates had overlaps. This added to NSF’s strength. Other countries, she said, especially China, were building bases in the Antarctic; NSF had to be prepared to step up. NSF leadership, she said, held the Polar Program in high regard and hoped the move would benefit that program.

Dr. Hayden thanked Dr. Córdova for coming to speak to the AC on her first day. She expressed concern about work to mentor young future scientists, especially in the Antarctic. There had been impressive changes to improving undergraduate STEM education; working in the field can take their experience to the next level.

Dr. Marrett replied that programs for interdirectorate undergraduate science and engineering programs (IUs) were in the FY15 budget. She said Dr. Cavanaugh had been researching the distinct needs of science education programs. NSF’s role is to advance models and understanding of education to build and disseminate a knowledge base of best practices. Dr. Córdova agreed that a student's experiential learning is transformative, and there is no more important thing than to nurture and raise the next generation. The challenge was to bring more resources to the table. NSF leadership had some ideas as well as some authority they might not have fully explored.

Dr. Marrett said broader representation and participation was a fundamental concern of the Foundation. She asked the AC what NSF should be paying attention to and what topics should be on the agenda.

Dr. Whittaker asked how NSF could be more creative in the context of less money, noting that NSF had not done nearly enough to reach underrepresented groups. In minority-serving institutions (MSI), there are limitations in curriculum, infrastructure, and leadership. How could that be changed? One suggestion was partnerships, using existing resources to make strides. Dr. Marrett noted that Dr. Whittaker was to speak about education and diversity at the meeting the next day; she said that the results of that conversation would be advice to the whole Foundation.

Dr. Paul Bierman commented that on that day’s news was mention of a successful NSF program in astronomy with one-on-one mentoring for minority students. He asked how that could scale. Dr. Marrett agreed that how things scale was the question. Partnerships are important. NSF had partnerships with the Department of Education, the Smithsonian Institution, and the National Oceanic and Atmospheric Administration.

Ms. Arroyo said that reaching out to potential future scientists when they are in high school can change their lives. Mentoring does not have to be one-on-one; a little can go a long way.

Dr. Karen Fischer asked for the NSF leaders’ perspectives on what the AC might consider as they crafted the Vision document, and how the document would be used within the Foundation. Dr. Marrett replied that in the Strategic Plan submitted with the FY15 budget request there were three broad goals: transform frontiers of science and engineering, stimulate innovation and address societal needs through research and education, and excel as a Federal science agency. She said NSF looked to the AC’s creativity in translating that vision into activities to be undertaken.

Dr. Córdova said the budget, more than the strategic plan, is the planning document. She suggested that the AC consider carefully whether the geosciences budget was aligned with the plan. She said she wanted to make a real difference in broadening participation, but if the plan did not reflect that, it could mean the Agency had not made enough room for that goal to be realized.

Dr. Taylor asked Dr. Córdova her thinking about new Major Research Equipment and Facilities Construction (MREFC) projects given budgets that were flat relative to inflation. Dr. Córdova replied that the National Science Board (NSB) was working with NSF to get the priorities right. Some scientists, for example astronomers, cannot do without a big facility, while others can do prize-winning science from a garage. The toughest issue is each project’s role in proportion to the entire NSF budget. Great science comes from the whole panoply of what NSF does. It is up to the Directorates, with the leadership of the Assistant Directors (AD), to guide the Agency to the appropriate balance, to achieve the best possible science.

Dr. Marrett explained that NSB decides what part of the budget should be for infrastructure and NSF has been following its guidance. The Board had been instrumental in linking MREFC accounts and the rest of the budget. Operation and maintenance costs can drive things. The MREFC account is not a fixed amount; it depends on the needs of approved projects. The White House Office of Management and Budget was looking at NSF’s budget overall. NSF would have to make justifications for MREFC and operations.

Dr. Taylor pointed out that with the post-sequestration ceiling, operation and maintenance accounted for a higher proportion of costs. Dr. Marrett replied that the Board had asked whether operation and maintenance costs could be included in MREFC accounts; to do this NSF would need authorization from Congress. One purpose for the flat budgets was to force agencies to look closely at the costs and benefits of projects.

Dr. Córdova emphasized the importance of merit peer review. Good merit peer review allows NSF to leverage its small workforce with insight about what constitutes good science and what will advance the frontiers. When merit reviews have not been followed it has been to the detriment of science. Peer review needs to be as honest as possible.

On behalf of committee, Dr. Kellogg thanked Dr. Córdova and Dr. Marrett, promising to continue to consult with them.

Discussion of Follow-up Issues after Meeting with the Director

Dr. Kellogg and Committee

Dr. Kellogg suggested a memo to follow up on any questions the director and deputy director had asked the Committee[[1]](#endnote-1). She asked for thoughts that AC members wanted to contribute.

Dr. Taylor noted that Dr. Marrett had hinted that things in the MREFC futures account might be coming from GEO Directorate. Dr. Wakimoto said he had not heard that in what Dr. Córdova and Dr. Marrett had said.

Dr. Bierman asked if there was a political reason for the decision to move up the review for Polar Programs. Dr. Wakimoto said he thought not; when he had joined the program a year earlier, it was clear that these programs would be reviewed.

Dr. Falkner asked about the breakout sessions scheduled for the next morning. Did Committee members have a choice of which meetings to attend? Dr. Kellogg replied that each member was encouraged to go to the meeting of most interest, and where he or should could contribute the most. (Chairs, of course, would have to go to the meetings they were chairing.)

Integrative and Collaborative Education and Research (ICER): History, Present, and Future

Dr. Michael Morgan

ICER was created around 2007 to simplify the implementation of cross-NSF and cross-GEO activities. The four categories of ICER programs are international partnerships, education and diversity, NSF priority areas, and

cross-GEO and cross-NSF activities.

Dr. McGillicuddy asked whether the Frontiers in Earth System Dynamics (FESD) program would come back. Dr. Morgan replied that the FESD program had been widely viewed as successful, and it might have a similar successor. It had been cut because of budget realities. Dr. Wakimoto said one reason for the GEO Vision document was to find out the community’s priorities, specifically whether mid-scale research should be a priority.

Dr. Doney commented that the coming Decadal Survey report would not be available in time to plan the budget. He asked how this might play out. Dr. Wakimoto replied that once NSF handed the prioritization of ocean science projects to the National Academies, NSF had to honor the Academies’ recommendations, even if that meant moving things around in the budget. Dr. Kellogg expressed concern that the Academies might not do what NSF asked them to do.

Dr. Spence said his experience as an FESD awardee had been transformative. He said the Decadal Survey was likely going to point to this kind of mid-scale activity.

Dr. Kellogg thanked Dr. Morgan for his presentation and stated her appreciation for program's transparency.

Briefing on Transparency and Accountability

Dr. David Verardo, Section Head, AC/GEO

Dr. Verardo gave his perspective from inside the Transparency and Accountability Working Group (TAWG).

Issues of transparency and accountability apply to NSF funding decisions, both awards and declines. The TAWG had been established in December 2014 for the purpose of aligning NSF’s funding practices with its policies. There was one representative from each directorate; Dr. Verardo represented GEO. The TAWG was to complete its work by the end of April 2014. The TAWG had received input from GEO via a town hall meeting, a listening session with staff, and e-mail.

Abstracts articulate why a decision is made; that informs public about what NSF does. According to NSF’s Proposal Award Manual, which guides policy, each abstract should contain a general paragraph, which talks about the project and how it fits into the program's goals and advances science in this field, as well as a technical section. The program director (PD), not the principal investigator (PI), is to write the abstract.

The second part of the TAWG’s charge has to do with portfolios. A portfolio can mean a collection of awards..

The TAWG reports to NSF’s Director. Her decision becomes NSF policy.

Briefing on StatSNSF Report

Dr. Mary Barth

Dr. Barth updated the AC on the work of the Support for the Statistical Sciences at NSF (StatSNSF) Subcommittee. The Subcommittee, led by Iain Johnstone and Fred Roberts, had written a draft report written and was seeking feedback.

The StatSNSF Subcommittee had 17 members, including one representative from each AC; Dr. Barth was the GEO representative. It was charged to examine structures of statistical support and to make recommendations. This was important because data is central to NSF research and NSF faces challenges in handling big data as well as new and complex data types.

The draft report contained recommendations about NSF organization, NSF research initiatives, workforce development, and the proposal and review cycle. One recommendation was to create a data science backbone, a network of experienced program officers to assist with the changing role of data science. Another was that when appropriate, proposals should require data management plans and disclosure management plans.

Dr. Barth asked the Committee for feedback on the recommendations, especially on the backbone idea.

*Discussion*

Dr. Kellogg asked how requiring a data science plan and disclosure management plan would be different from the present requirement for a data analysis plan. Dr. Barth replied that the difference was in transparency and in the policy that data would be made available to the public.

Dr. Hornberger asked how staffing limitations would affect the ability to create the backbone. Dr. Barth said the idea was new and still being examined. She would welcome feedback on the issue from program officers.

Dr. Fischer suggested that EarthCube would be a good project to make part of the backbone. She wondered what other NSF projects like EarthCube could also become part of the backbone. Others suggested that the backbone idea would add more teams to what were already too many teams in science, putting too much burden on PIs.

Dr. Cheng said that in her field, biology, there are big data sets for DNA. The people who deal with data are computer scientists; biologists know only how to deal with biology. Dr. Taylor suggested the need for π (pi) people, who could stand on two separate sets of skills (each represented by one leg of the letter), with two strong legs and a bridge.

Dr. Barth said providing comments was the most helpful thing the AC could do for the Subcommittee.

Proposed Water Initiative for FY16

Dr. Tom Torgersen, Water, Sustainability, and Climate / Water, Food, and Energy (WSC/WFE) Working Group

Dr. Torgersen discussed a water-sustainability-climate initiative, whose goal was to study water as a system and to broadly integrate that information across the sciences. He said NSF could do fundamental, discovery-level research in water, food, and energy. The path from that to policy is short.

In response to questions, Dr. Torgersen said the model considered sea level rise as a boundary condition, and the model did take contamination into account.

The next step, Dr. Torgersen said, would be to sell the plan to the ADs. Dr. Morgan suggested that showing progress and skill at a short time scale could lead to greater confidence for the longer time scale called for in the initiative.

Discussion of Arctic Committee of Visitors (COV) and Response

Dr. Paul Bierman

The COV, of which Dr. Bierman was a member, had been convened to evaluate the way proposals were evaluated at NSF. The COV had been very much impressed by the evaluations for proposals both accepted and rejected. Dr. Bierman commended NSF for keeping to the core and getting through noise. The major issues were:

* Some proposal evaluation summaries were lists of considerations; more explanation of their reasoning would have been appreciated.
* There was a recommendation to strengthen or reconsider the Arctic Observing Network.
* Arctic program officers needed to get out into the community more and interact.

Some minor issues were:

* A post-doctoral program had been discontinued. That program had offered a great opportunity for hands-on mentoring and could be a way to break some glass ceilings.
* The program needed to be more proactive in bringing early-career scientists into the proposal review process.
* The COV had done its work remotely. That did not work as well as had been hoped, because it was hard to find out what people were thinking.

Dr. Spence suggested bringing in students to the proposal process. He said students he knew who had done that had become leaders in the field.

Dr. Carr moved to accept the report and response. The Committee voted unanimous agreement.

There was a break, during which the new Director was sworn in ceremonially.

Discussion of Strategic Planning Topics

Facilities

Dr. Scott Doney, AC GEO

Dr. Doney talked about the results of the last GEO Subcommittee meeting and the discussions that followed from it. In the GEO Vision document (attached), he showed a list of the imperatives that had come out of those discussions and asked what messages the Committee should be giving back to NSF on infrastructure and facilities. He asked whether there were topics that were not addressed in the report but should have been.

Dr. Wakimoto said the new GEO Vision report was expected to be completed in about 4 months, some time in the summer of 2014. The version with which the Committee was working was based on program officer retreats and input from the Committee. NSF would continue to get community input, making versions available.

Dr. Doney suggested whole-life-cycle cost accounting, an issue that feeds into balancing priorities. Dr. Wakimoto replied that he thought that was in the draft document. It was important, he said, and he suggested that if it was not in the document, the AC write it in.

Dr. McGillicuddy suggested that the topic of a balance between research and infrastructure, and how that balance might be sought, might be elevated to its own subsection. Dr. Wakimoto thought that was a great idea.

Dr. Fischer commented that the strategic planning document contained a mix of general things that could be done better as well as specific pieces of science that were cited, without much explanatory text. Dr. Wakimoto replied that the gray areas were places in which the AC could help with suggestions. Dr. Fischer asked whether infrastructure imperatives should be viewed as things that should happen to the exclusion of other things or as illustrative examples. Dr. Wakimoto replied that some important things were not on this list; included were only things that rose to the GEO Directorate level, like MREFC.

Dr. Cheng said expressed concern that not much about the Polar Program was in the document. Dr. Wakimoto replied that it is in the eye of the beholder: The Polar Program was already represented in the budget. Dr. Cheng said that that did not seem to come through in the core research imperatives. Dr. Wakimoto requested that the AC suggest anything missing from the research section that rises to the GEO level, but avoid the “kitchen sink” scenario.[[2]](#endnote-2)

Dr. Taylor suggested adding something about recent, large MREFC projects. This would illustrate projects that were ongoing, big, and important to GEO. Dr. Wakimoto replied that he liked that suggestion.

In the discussion of *Complete construction of Ocean Observatories Initiative and begin operations* (p. 4 of the draft GEO Vision document) under *GEO Community Resources and Infrastructure Imperatives*, Dr. Taylor suggested making a link between infrastructure imperatives and research imperatives. He said there were other ocean observatory-type things that were not specific to the Ocean Observatories Initiative (OOI) program. Dr. Wakimoto added that the grand challenge is how to integrate these critical zone observatories into a view of the Earth.

Dr. Cheng asked whether OOI included the Southern Ocean. Dr. Doney answered that it did include some observatories there. Dr. Cheng pointed out that that left most of the Southern Ocean out. Dr. Doney replied that replied that OOI was not a global observatory; it had just four nodes. Other assets being funded by NSF and others were more widely dispersed.

Dr. Taylor noted that NSF is appropriated annually. He asked Dr. Wakimoto how NSF dealt with a budget that spiked one year and not the next because there is an infrastructure project. Dr. Wakimoto replied that this issue was critical and had not garnered as much attention as it should have. He said that if a project was in the GEO Vision plan, the Directorate would find a way to invest in it.

Dr. Cheng stated her understanding that the blue ribbon panel recommendations (p. 4 of the GEO Vison document) had to do with Foundational improvement to how science is supported. She asked how polar science could be integrated into the other items there, which seemed to support science but were not directly connected to its execution. Dr. Falkner replied that NSF would not be doing the science it was doing without those facilities. The imperative was to rein in the cost to be able to support a wide range of science. This bullet was generic enough to include Arctic concerns.

Dr. Doney said he was seeking commonalities as well as differences among divisions. He said he wanted more input from the Division of Polar Programs (PLR). Dr. Falkner replied that PLR had produced its own strategic imperatives document. Commonalities, she said, included rising labor and fuel costs, bringing about a need to be more clever in how to observe, more innovative.

Dr. Fischer commented that the two projects listed under state-of-the art facilities, Sikuliaq and Regional Class Research Vessels, were great examples. She suggested listing Earthscope as well, because of the impact it had had on science as well as on young scientists, who gained a new concept of the kind of science they could do. Dr. Wakimoto requested that if Dr. Fischer had specific verbiage, she should pass it on[[3]](#endnote-3).

Looking at the next item, *Begin conceptualization and development of next-generation Sun-Earth-system community models* (p. 5 of the draft GEO Vision plan), Dr. Taylor commented that some system-level community models were common to the four divisions; he asked why this one was standing alone. Dr. Morgan replied that it was a challenge to bring individual pieces together in a way that made sense. It was doubtful that a full Sun-Moon-Earth system could be developed within the next 5 to 10 years, but if it could be done it would be a great achievement for the geosciences. In the broad community there was an interest in predictive models. A model of the Earth system should include ecosystem modeling, biogeochemistry, and society – all of these in a way that is dynamic, not prescribed. He said the conceptualization of such a model was just beginning.

About computational infrastructure, Dr. Doney said the connection must be made between infrastructure and facilities on the one hand, and cyberinfrastructure on the other. Dr. Taylor said this needed to be extended to an interagency and international scale. Dr. Doney said there should be a discussion about facilities crossing NSF, the National Oceanic and Atmospheric Administration (NOAA), the National Aeronautics and Space Administration, and other agencies.

Dr. Barth and Dr. Morgan both commented that the document’s language seemed to be focused on the Division of Atmospheric and Geospace Sciences (AGS) but should be broadened to include all geoscience.

Presentation: Cyber-infrastructure

Dr. Karen Fischer, Dr. Eva Zanzerkia

Like other components the GEO Vision plan, Dr. Fischer explained, this component developed from discussions at the last meeting and after. She encouraged AC members to look at the expanded outline, which it gave life to some of the ideas, while the short outline captured the main points. Missing were workforce development issues, which, Dr. Fischer suggested, should be added in a few places. Also discussed at the earlier meeting was the importance of one-on-one mentoring, to which virtual communication can contribute.

Dr. Fischer discussed dark data, which, she explained, are data that are hard to find or hard to render into digital format – for example, bits of data stored on PIs’ computers. Dark data can be powerful, an important target. Questions arise such as What is useful and worth saving? Standards need to be iterative, with input from people who develop the data.

Dr. McGillicuddy commented that in some cases data may be dark just because the project’s PI has not done anything to make them light. Dr. Taylor commented that it is often easier to get funded to get new data than to use existing data. Funding the *use* of data would help bring dark data into the light. Dr. Fischer suggested easy-to-use systems as well as workshops on the subject to make it easy for people to bring their data forward.

Dr. Zanzerkia gave an update on EarthCube. The idea behind EarthCube is to advance science on the Earth as a system developed through a community-driven process.

A solicitation was under review. A series of community-based activities led to roadmapping in 2012; in 2013, the program funded nine building block awards. These included some awards made under the Research Coordination Networks (RCN) program for communities that had no other way of organizing data.

Another award program was Test Enterprise Governance (TEG), established to facilitate the development of the community-driven process to build cyber-infrastructure. This program was very flexible to the community's needs. Industry representatives from, for example, Microsoft, had been at TEG meetings.

Dr. Zanzerkia said awardees had been helpful and collaborative.

Dr. Zanzerkia discussed challenges: how and where to engage communities, how to communicate outcomes. There was a language challenge, where for example her group interpreted “governance” to mean a facilitation body and the community interpreted it to mean control.

In response to a question from Dr. Hayden, Dr. Zanzerkia said that in geosciences workshops, a critical need for gateways had emerged, with people saying they did not have access to their colleagues' data. She said software institutes are meant to be community resources, citing CIG as an example.

The Earthcube program had tried to engage early-career PIs, post-doctoral fellows and older. Dr. Taylor suggested targeting graduate students before they became PIs. Dr. Kellogg cautioned against assuming that all young people are comfortable with computers. Some may be underserved and not have access. Others may know no more than do older people, or may know only how to use things like Facebook. Dr. Taylor agreed that young people have a different attitude about computers, an attitude that defines the future, and the AC had to embrace that.

Dr. Zanzerkia explained that the EarthCube program wanted to support data and high-performance computing on multiple levels. Challenges came with maintaining the mid-size cluster.

Dr. Kellogg explained that demands presently and going forward for high-performance computing exceeded what was available in the science community. One important question, she said, was whether software development was being funded adequately to take advantage of new architectures. The allocation process for access to computing resources was somehow decoupled from the science funding. They [? I think she’s referring to the people she was meeting with “upstairs,” but don’t know who that was.] were trying to encourage the people at that other community [?] to consider partnerships with other government entities that could provide large-scale computing such as DOE.

Dr. Whittaker asked how it is possible to secure data while making sure it is appropriately accessible. Often software is developed without consideration for security; afterward, someone has to work backwards to ensure security. Dr. Zanzerkia replied that cyber security had been a critical issue. The problem Dr. Whittaker had raised could serve as a pilot for GEO to begin to develop some cyber security solutions.

On the issue of models for software development, the Cyber-Infrastructure Subcommittee had discussed open access as well as shared software and the special needs for curating it, making it available over time. These questions arise when software is developed on one platform and used on another, creating uncertainty. The Subcommittee had decided that the acceptable level of uncertainty has to be decided by the user community.

Dr. Powers suggested that NSF recognize the importance of some practical matters about computing, such as support of code and of different platforms, making it simple to find out how to get access to NSF’s computing system, and allowing proposals to provide for a software engineer to dedicate time to helping a project work. Dr. Fischer agreed.

There was discussion an item on p. 7 of the draft GEO Vision document, *Invest in infrastructure for observing systems and sensor arrays*. Dr. Fischer commented that GEO had diverse sets of observations being developed. Dr. Zanzerkia said GEO also had a venue for developing new observational sensors. As those increased in diversity, GEO needed to address the challenge of being able to extract from them. GEO also need to be able to use data in real time.

For the future, Dr. Fischer said, the Cyber-infrastructure Subcommittee emphasized more virtual interaction with sensors in remote locations, potentially bringing about huge savings in field cost.

As an example of a generic investment that could benefit all, Dr. Fischer cited models for using a single interface that could handle multiple data streams. That model was already working in many places. Dr. Zanzerkia commented that for many problems there were solutions that had already been developed elsewhere. She said she hoped there were commonalities that GEO could take advantage of.

Dr. Morgan suggested that for any sensor that NSF developed, there should be a requirement that the technology to assimilate its data be developed as well. Dr. Cavanaugh said the AC for Environmental Research and Education had seen a number of disciplines dealing with the same issue. She suggested some communication between the two ACs. Dr. McGillicuddy suggested looking at internal experience within GEO; consideration of the cyber-infrastructure for the OOI might be valuable. Dr. Fischer said some type of consortium or formal networking would be hugely helpful.

Referring to the item *Use distributed instrumentation and facilities in support of research and education* on p. 7 of the draft GEO Vision document, Dr. Fischer noted the possible role of cyber-infrastructure in mentoring, with an eye to bringing in diverse groups. One-on-one mentoring cannot be replaced, but it is not always possible; virtual mentoring could play a role in keeping students connected. The goal was both to get young people into science and to work with people in science already.

Dr. Hayden discussed some limitations to using technology, noting that scientists want to get involved with students, but they have time pressures and may not be skilled at mentoring. They need an environment in which they can mentor without having to engage with undergraduates in other respects. Virtual communication works well for students with skilled mentors, and could be a way of scaling up the mentoring effort. A virtual connection can help keep a mentoring relationship going informally after the formal part of it ends.

Dr. Kellogg thanked Dr. Fischer. The meeting adjourned for the day.

**Thursday, April 3**

These notes begin at the agenda item *Discussion of Strategic Planning Topics*, at 10 am. Earlier in the morning were Division Subcommittee meetings.

Dr. Kellogg asked attendees sign in.

Dr. Cutler, Acting Director of the Division of Earth Sciences (EAR), gave a staffing update: Alex Isern would be the next Section Head for the Surface Earth Processes Section in EAR. Currently, she is a program officer in PLR.

Dr. Kellogg moved the meeting toward a continuation of strategic planning discussion begun the day before. The day’s topics would be research (one topic) and education and diversity (a second topic), with 1 hour on each topic. During lunch would be reports, 15 minutes each, from the Division Subcommittee meetings.

Research

Dr. Louise Kellogg

Dr. Kellogg asked for a discussion about core research and how it was addressed in the draft GEO Vision outline. (*Continue strong emphasis and support for core research,* p. 3*.*) Dr. Doney said connecting core research to the other parts of the report was what would benefit the Directorate.

Dr. Cheng asked for language that would polar issues into core research, or that would integrate address social sciences or native communities. Dr. Falkner said PLR had supported and would continue to support things that go beyond traditional geosciences, but the words in the text did not speak to that. She said interdisciplinary programs were part of the core. The core research element in the research imperatives page of the draft GEO Vision document contained a bullet point including interdisciplinary science as an element of core research. (*Maintain culture of excellence in GEO core research programs including disciplinary, inter-disciplinary, systems-level, and community-driven science*, second bullet under *GEO research imperatives*, p. 3, draft GEO Vision document.) But she cautioned that readers of the GEO Vision document may take “geoscience” to mean just traditional geosciences, and nothing beyond that. Dr. Kellogg replied that adding “polar” to bullet point before that one, *Advance science at the forefronts of geoscience disciplines and at intersections with related disciplines*, would clarify the second bullet’s meaning.

Other suggestions were made about the question of what is geoscience. One was to call out explicity all science not classically considered geoscience. Another was to include a statement that “geoscience,” for purposes of the GEO Vision document, encompasses polar science, and enumerate the aspects of polar science covered. How much “geoscience” should be spelled out would depend on who the audience would be: If external to GEO, the meaning should be spelled out. Dr. Wakimoto said the audience would be both internal and external. He said that if too much was included in the report, fewer people would read it. While he agreed with Dr. Cheng’s point that since the document would be available to the commuity it should include language reflecting Polar Programs, there was a need to balance. He asked Dr. Cheng to suggest language.[[4]](#endnote-4)

Dr. Bierman suggested adding a bullet point, in bold, for the poles, which are getting the worst of climate change and may drive climate change for the planet. Dr. Wakimoto said it might be assumed that that was covered under PREEVENTS. Dr. Bierman replied that that did not come through in the GEO Vision document. It is critical to understand the Arctic and Antarctic and how they tie to the rest of the planet.

[missed some because of mic issue. Didn’t get recorded.]

Dr. Kellogg suggested addressing the issue using language from an earlier report, available on the meeting website and called "GEO Vision." The 2009 document was the last full strategic plan done by the AC, perhaps the first done by a directorate at all. Dr. McGillicuddy suggested considering language found on p. 29 of that report.

Dr. Green asked for an explicit reference to the social sciences, something that recognized people as actors rather than just passive recipients.

Dr. Wakimoto said there was a sense, right or wrong, that cross-directorate initiatives had eroded the core. Dr. Kellogg said that was an important point, especially with funding flat. She concluded that the sentiment was for a broader definition core research.

About the next item, *Establish collaborative effort to improve understanding of and resilience to hazards and disaster,* Dr. Barth suggested including other agencies as well as something about air pollution and health. Dr. Bierman appreciated that the text addressed not only extreme or abrupt climate change, but also thresholds crossed by gradual climate change. For example, a higher water table may trigger mudslides. The social issue – the part people play – was also key. For example, the site of the recent mudslide in Washington State had been known to be unsafe, but houses were built there anyway. He suggested adding text to the effect that social scientists needed to be involved. Dr. Carr commented that vulnerability is as much a factor as resilience: A mudslide that happens where no one lives is not a disaster. Mr. Huntington commented that climate change was huge in his home state of Alaska, as was nuclear reactor fallout. Dr. Fischer said this item was a good opportunity to emphasize that understanding of the underlying systems at the basic science level is essential to preventing hazards.

Dr. Doney suggested more consideration for the longer-term perspective, which is important to geosciences. Dr. Falkner agreed, saying geoscientists provide context for some events. For example, the potential for a massive earthquake in the Northwest had been revealed by periodicities in sediment cores. The context that geoscience provides might be what informs geoscientists of the hazards under their responsibilities. Because many hazards occur at intervals greater than a lifetime, data need to be collected over long periods. Dr. Doney commented that time and space scales are uniquely important to geosciences. Dr. McGillicuddy said the 2009 report spoke directly to that issue in a sidebar on deep time. He suggested that that that box could be augmented or amplified. Dr. Kellogg suggested that it could be referred to.

In the final GEO research imperative, *Establish collaborative effort to improve understanding of the water cycle* (p. 3), was the water/food/energy nexus referred to in the second bullet too narrow to stimulate the community? Not many things entail all three elements. Dr. Taylor said that to qualify as a water/food/energy issue, an issue does not have to involve all three. Dr. Kellogg explained that water is the driver; a water/food/energy issue could involve water and food, water and energy, or all three.

Dr. Bierman asked how to interpret “cold spots”: Was “cold” meant literally, or was it metaphorical like “hot” in “hot spots”? Someone [?] said “cold spots” referred to important (metaphorically hot) things that are cold literally, including ice sheets and permafrost.

Presentation: Education & Diversity

Joe Whittaker

Dr. Whittaker asked what better way to set priorities, push frontiers, and work across disciplines than through education? He would focus on how to support education with inclusion, so that NSF would look like society. Partly because it is naturally interdisciplinary, GEO could serve a model for the rest of NSF. Dr. Whittaker articulated many ideas for programs to bring in underrepresented groups. He urged the AC to create a vision, to choose a few ideas and do them well.

To bring about real change, a public-private partnership needs to create a long-term connection between student and institution. Young people may not get involved in science because they may be unaware of opportunities. There needs to be outreach to those young people, even if it means partnering with facilities that are not well equipped.

A particular challenge for GEO is how to get people to work in extreme environments. Dr. Whittaker asked Mr. Huntington to talk about his community and the challenges there.

Speaking from his experience as a tribal chair in Alaska, Mr. Huntington explained that it is hard to keep Alaskan students interested in science. Young people want to be outside. Mr. Huntington’s village, Huslia, is small and so far from big cities that people there lean on their cultural teachings. People coming to Huslia from outside (non-tribal) cultures could not survive the environment on their own; native people have had to take care of them. Native Alaskans have many issues and have to speak up. The tribes are sovereign nations, with their own way of looking at life.

Many in rural Alaska do not even have a computer. Mr. Huntington devotes a lot of his time to helping people. He gives food to people who do not have any, and may buy a small computer for someone who has nothing. That is the way of his people. Mr Huntington learned from the elders where the world is going. The tribal people would see things first. Just 1/4 mile from his door are lands that have not changed much in hundreds or thousands of years. But the fish in the rivers have become contaminated.

The University of Alaska system needs to be made more accessible. One hundred fifty Alaskan villages are far from roads. The programs to reach them that have been tried do not work well.

Dr. Whittaker said Dr. Huntington had given a perspective on the challenges for underrepresented minorities.

Dr. Hayden noted that students may not self identify as being contributors; someone who can recognize core skill sets needs to identify them. She suggested working with a group that works with minority students on a daily basis in university classrooms, mentoring students and involving them, perhaps a minority professional organization. Some of these organizations are struggling and may welcome outreach by scientists.

Dr. Green said it was laudable that NSF and GEO wanted to address diversity at the undergraduate and graduate levels, but each underrepresented group has its own history, which cannot be ignored if one is to build on both strengths and challenges. There are class issues as well.

Dr. Cheng cited the Minority Access to Research Careers (MARC) program at National Institutes of Health (NIH) and Temple University, a program that provides full funding for students from underrepresented communities identified as high performing. The stipend provided by this program allows students to concentrate on academics. Dr. Whittaker cautioned that the MARC program has not always gotten students into doctoral programs, partly because it begins too late, in the junior year, when students are already focused on graduation and are therefore not fully engaged. NIH has developed a pre-MARC program, but it is not structured or funded.

Faculty are usually teaching full loads and when they participate in such programs it is usually only because of their passion and commitment to the students. A program can be made effective if the funded institution is required to provide release time and institutional support to faculty to work in the program.

Dr. Doney asked whether, in light of the importance of field work to geosciences, enough was being done enough for students with disabilities.

Dr. Karsten said NSF had funded such projects for students with disabilities. She referred to the International Association for Geoscience Diversity, at theiagd.org, which was compiling resources for students with disabilities and faculties who work with them.

There was discussion about how to stimulate elementary school children to like science. There is a new K-12 standard, which pushes earth science early. Dr. Kellogg commented that geoscience is not taught in high school as a serious science that will lead to college admissions. For example, geoscience does not count toward admission at the University of California. That discouragement of geoscience is a national problem; it may have contributed to geoscience having even less minority representation than the other STEM fields.

There was discussion of the Advancement of Women in Academic Science and Engineering Careers (ADVANCE) program to promote women in STEM fields. ADVANCE makes institutional grants, requiring the recipient to commit to changes that will outlast the grant. Such programs are important, because usually in a participating institution when the funding goes away, so does the program; there is very little institutionalization of these programs.

Dr. Fischer pointed out an opportunity to blend two kinds of strengths: Create a program that brings people with research resources together with institutions have been doing outreach to underrepresented groups well. Dr. Whittaker commented that not only would this approach have benefits for transformation and impact, it would also bring qualified students.

In order to work, a minority-outreach program must be a win-win, with something for the MSI in exchange for its effort to develop and train students to hit the ground running when they reach their next steps.

Dr. Whittaker challenged the AC to come up with a new vision to bring in students from underrepresented communities and engage them and get them to be better than the present generation of scientists. A lot of successes in this area were not scalable or transferable from where they were. To broaden the scope would require a different kind of thought. NSF needed to do something different from what had been done in the past. Dr. Whitaker advised Dr. Wakimoto to get a group together that would focus on this issue. Dr. Wakimoto said the point was well taken.

There was discussion about students coming into university unprepared to engage in fundamental STEM areas. Ms. Arroyo suggested a pilot project with local businesses, having employers donate employees’ time and creating a match for opportunities to take children to do field work and get out in nature. Someone has to show the initiative to start such a thing, but it can be matched. Dr. Karsten said individual projects that GEO had funded had succeeded in getting private funding to keep them going. Other sponsors may contribute after the NSF funding has run down. She said the Administration was supportive of public-private partnerships for STEM education. Dr. Whittaker talked about a 5-year BS-MS program with NASA and Johns Hopkins University. He said such things can be supported by interagency partnerships and public-private partnerships. Dr. Kellogg asked AC members to send any comments they had on this issue to Ms. Lane.[[5]](#endnote-5)

*Reports from Division Subcommittees*

Atmospheric and Geospace Sciences

Dr. Harlan Spence

At that morning’s meeting, Dr. Morgan had presented the process that drove the goals and objectives document from AGS, prompted by Dr. Wakimoto's call for a strategic plan. The process was informed by input from the program directors; there had also been opportunities in recent months for input from the community as well as from the Atmospheric and Geospace Sciences Subcommittee. There were issues about the context of these planning documents; concerns that a topic that is not called out explicitly it may never get funded; and calls for additional information. There would be opportunities for additional input. The intent was to have a final document at next AC meeting.

The Subcommittee had also discussed the GEO Vision document in parallel with the goals and objectives document, recognizing that the GEO Vision was a wrap-up at the directorate level. Some areas could be strengthened.

[Change to Geospace Portfolio review. Not all of AGS.]

There was a challenge in how to be responsive to the Decadal Survey when the budget was flat. The group suggested forming a subcommittee that would help AGS set priorities for the basic, curiosity-driven research that NSF likes to do along with activities the Decadal Survey has identified. Dr. Spence would chair the Subcommittee, with membership comprising the Atmospheric and Geospace Sciences Subcommittee as well as some the people involved in the Decadal Survey and, possibly, some members of the COV.

Dr. Spence moved to establish a subcommittee as described. Dr. Barth seconded the motion. The Committee voted unanimously to establish the Portfolio Review Committee.

Earth Sciences

Dr. George Hornberger

Dr. Hornberger said the Subcommittee had heard from the Division’s science leadership Committee. They had interviewed program officers for their view on elements for important topics for a strategic plan; the program officers’ list seemed consistent with what the Subcommittee saw in the outline for the GEO Vision document.

Ocean Sciences

Dr. Brian Taylor

The Subcommittee had discussed challenges, especially budgets. They had discussed changing modes of direct analysis and whether modes of funding had tracked those changes; how to make headway for new priorities; and what changes in it they might recommend to NSF for the structure of the GEO Vision document.

Polar Programs

Dr. Christine Cheng

The Subcommittee thanked the Arctic COV for an excellent job. Before the merger into the GEO program, the Polar AC had had a vision statement, renamed Polar Imperative and incorporated into the GEO Vision document. There were concerns that the integration of the Polar portfolio, especially parts that were not traditionally GEO, did not come through. The Subcommittee talked about adding wording that would reflect the Polar portfolio. They would get their suggestions to Ms Lane[[6]](#endnote-6).

There was also concern over the structure of the AC; it needed many representatives from Polar Programs because of the diversity of topics covered, but its size had to be reduced. How could those issues be covered? Dr. Doney suggested guest input. Also, there was much changeover in staff, raising issues of continuity.

Two major studies were to be released in about a month: the NRC study of the Arctic and the next 5-year plan. Also in the works was an NRC study of the Antarctic, meant to help Polar Programs prioritize questions.

Dr. Wakimoto thanked the Polar Subcommittee for their report. He assured Dr. Cheng that he did not want to hamper the Polar program in any way and said he needed to know if the Polar program was not running smoothly.

Meeting Wrap-Up

Dr. Wakimoto

Dr. Taylor expressed appreciation for the new agenda arrangement for the breakout groups, allowing each person to attend two groups. Dr. Kellogg noted that the 1 hour schedule for each breakout group might not have been enough time and suggested making it 1.5 hours the next time. She also noted that some subcommittees had had pre-meetings. Many members indicated that they felt the pre-meetings were a good idea. Dr. Spence asked that in future pre-meetings be announced to the whole AC, so that anyone who wanted to be part of one could do so. Dr. Wakimoto said the intent was to make these meetings known to the whole Committee. Dr. Kellogg agreed, pointing out that since subcommittee membership was self-identified, being able to listen to any combination of subcommittee meetings was a good idea.

This meeting’s format had been dictated by the circumstances: It was the first meeting of the combined group and there was extra business to cover because of the cancellation of the planned October 2013 meeting. Dr. Kellogg asked for suggestions for changes to the meeting’s format for the next time.

Dr. Wakimoto would be meeting with the NSB in May 2014. The discussions about the GEO Vision plan at the present meeting were an important step before the NSB meeting. Dr. Wakimoto asked for whatever input the AC could provide.[[7]](#endnote-7)

Dr. Wakimoto said NSB scientists believed their role was to give advice. He did not want to ask them for decisions; if he did that and NSB made a strong statement, that would send a message across the community about what NSF would do. So the meeting would be “just a discussion.”

Dr. Kellogg raised the issue of committee membership. Every Committee member’s term was to end at the end of 2014. In the normal course of things, one-third of the committee would leave at the end of any year. But this time, for continuity, some members would be asked to stay on. Dr. Kellogg asked for suggestions for the skills needed on the committee as well as suggestions for names. Dr. Wakimoto asked members who wanted to remain on the Committee to let Ms. Lane know.[[8]](#endnote-8)

With Transportable Array of Earthscope going to Alaska, Dr. Kellogg saw an opportunity to bring in one or more people strongly connected to the Division of Earth Science as well as people from Polar programs. That would help with crosscutting aspects. Some names were suggested, including Dr. Matt Huber at the University of New Hampshire, who does paleoclimate modeling, and Dr. Catherine Constable. Dr. Kellogg asked members to suggest more names and to send suggestions to Ms. Lane or to herself.[[9]](#endnote-9)

Dr. Wakimoto thanked members for their attendance and participation. He apologized that it had taken a year to bring the Committee to a meeting. He thanked Dr. Kellogg for her tenure on the Committee, noting that she had been scheduled to leave the Committee in the fall but had agreed to stay to chair the present meeting. Dr. Wakimoto announced that Dr. Hornberger had agreed to chair the fall meeting.

Dr. Kellogg noted that the NSF staff, particularly Ms. Lane, had been amazing in coping with changes. Dr. Wakimoto also thanked Ms. Lane for the support she continually provided to the committee and Directorate for Geosciences. He also thanked Rasheda Spratley saying she had been incredibly helpful.

Dr. Taylor moved to adjourn. Dr. Spence seconded the motion. The meeting adjourned at 1:40 pm.

Action Items

1. AC to send memo to follow up on questions the Director and Deputy Director had asked the Committee. [↑](#endnote-ref-1)
2. AC members to suggest to Dr. Wakimoto issues to add to GEO Vision document. Issues must rise to the GEO Directorate level. [↑](#endnote-ref-2)
3. Dr. Fischer to send Dr. Wakimoto suggested wording for Earthscope as an example of a state-of-the-art facility. [↑](#endnote-ref-3)
4. Dr. Cheng to send Dr. Wakimoto suggested wording for the inclusion of Polar Programs in core research. [↑](#endnote-ref-4)
5. AC to send comments on 5-year BS-MS program with NASA and Johns Hopkins University to Ms. Lane. [↑](#endnote-ref-5)
6. Polar Subcommittee to send Ms. Lane suggested text about Polar portfolio in GEO Vision document. [↑](#endnote-ref-6)
7. Dr. Wakimoto requested AC input into the GEO Vision plan before his May 2014 meeting with the NSB. [↑](#endnote-ref-7)
8. Members who want to remain on the AC are to let Ms. Lane know. [↑](#endnote-ref-8)
9. Suggestions for new Committee members to be sent to Dr. Kellogg or Ms. Lane. [↑](#endnote-ref-9)