

NATIONAL SCIENCE FOUNDATION (NSF)

Advisory Committee for Polar Programs (AC-OPP)
Fall Meeting, September 10-11, 2020
Meeting Held Online

MINUTES

Action Items Arising out of the Fall 2020 AC-OPP Meeting

1. Items arose for possible inclusion in the agenda of the next AC-OPP meeting (spring 2021)
 - a) further discussion of the impact of interruptions in research due to COVID-19 presentation regarding minority-serving institutions:
 - b) a briefing on the current status of the polar fleet.
 - c) a presentation on developments and opportunities in computing and cyber infrastructure. Dr. Stiglitz and Dr. Heimbach will participate.
 - d) updates on vessels including ones of the Coast Guard, the current Antarctic ship situation and any further progress with respect to the Antarctic research vessel.
 - e) an overview from Dr. Rebecca Keiser on the issue of security
2. The AC will form a diversity subcommittee. Ms. Walker will organize the effort and Dr. Weingartner will keep the AC informed of progress. It is intended that relevant “learning activities” will be developed in consultation with subcommittee members and made available to OPP Staff and the full committee.
3. It was proposed that material based on Committee of Visitors reports be developed for an Eos article, contingent upon current Eos publications policy. Dr. Kump, Dr. Sfraga, Dr. Quinn and Dr. Mack will assist.

Attendance and Membership

AC-OPP Members Present:

Dr. Thomas J. Weingartner, College of Fisheries and Ocean Sciences, Institute of Marine Science (Ret), Chair, AC-OPP

Mr. Raymond V. Arnaudo, Department of State (Ret), member, Advisory Committee, Environmental Research & Education

Dr. Douglas H. Bartlett, Scripps Institution of Oceanography, University of California, San Diego

Dr. Aron L. Crowell, University of Alaska, Anchorage

Dr. Michael D. DeGrandpre, Department of Chemistry and Biochemistry, University of Montana, Missoula

Dr. Ryan E. Emanuel, Department of Forestry and Environmental Resources, North Carolina State University

Dr. Mark Flanner, Department of Climate and Space Sciences, University of Michigan, Ann Arbor

Dr. Patrick Heimbach, Institute for Computational Engineering and Sciences, The University of Texas at Austin

Dr. Allyson Hindle, University of Nevada, Las Vegas, School of Life Sciences

Mr. Steve Iselin, U.S. Navy (Ret), Iselin Consulting Enterprise, LLC

Dr. Vera Kuklina, Department of Geography, George Washington University
Dr. Brice Loose, University of Rhode Island, Graduate School of Oceanography
Dr. Amanda Lynch, Institute at Brown for Environment and Society, Brown University, Providence, RI
Dr. Michelle Mack, Center for Ecosystem Science and Society and the Department of Biological Sciences, Northern Arizona University
Dr. Meredith Nettles, Lamont-Doherty Earth Observatory, Columbia University
Dr. Patricia Quinn, Pacific Marine Environmental Laboratory, National Oceanic and Atmospheric Administration (NOAA)
Dr. Sharon Stammerjohn, Institute of Arctic and Alpine Research, University of Colorado
Dr. Eric Steig, Earth and Space Sciences, College of the Environment, University of Washington
Dr. Abigail Vieregg, Kavli Institute of Cosmological Physics, Eckhardt Research Centers, University of Chicago, IL

AC-OPP Members absent:

Dr. Adam Marsh, School of Marine Science, University of Delaware

Office of Polar Programs, other NSF staff present and presenters:

Dr. Kelly K. Falkner, Director, OPP
Dr. Scott Arnold, Senior Advisor, OPP
Dr. Greg Anderson, Program Director, Arctic System Sciences, OPP
Dr. Linnea Avallone, Senior Advisor for Facilities, Directorate for Geosciences (GEO)
Dr. Andrew Backe, Management and Program Analyst, OPP
Dr. Anjali S. Bamzai, Division Director, the Division of Atmospheric and Geospace Sciences (AGS)
Dr. Scott Borg, Deputy Assistant Director, GEO
Dr. Lisa Clough, Program Director, Division of Ocean Sciences (OCE)
Ms. Jessie Crain, Antarctic Research Support Manager, Antarctic Infrastructure and Logistics Section (AIL), OPP
Ms. Renée Crain, Research Support & Logistics Manager, OPP
Dr. F. Fleming Crim, NSF Chief Operating Officer
Dr. Paul Cutler, Program Director, Antarctic Glaciology, Antarctic Sciences Section (ANT), OPP
Dr. William Easterling, Assistant Director, GEO
Ms. Terri A. Edillon, Communications Specialist, OPP
Mr. Jon M. Fentress, Safety & Health Officer, OPP
Ms. Carlena Fooks, Program Coordination Specialist, OPP
Dr. Colene Haffke, Program Director, Arctic Natural Sciences, OPP
Dr. Patrick Haggerty, Research Support & Logistics Program Manager, OPP
Dr. Karla Heidelberg, Program Director, Organisms & Ecosystems, Polar Education, OPP
Dr. Audrey Huerta, Program Director, Earth Sciences (EAR)
Dr. Alexandra Isern, Program Director, Research & Logistics Integration, Antarctic Sciences, OPP
Dr. Michael Jackson, Program Director, Research Facilities and Special Projects, ANT, OPP
Dr. Brandon Jones, GEO Front Office, Program Director
Dr. Yekaterina (Katia) Kontar, American Association for the Advancement of Science (AAAS) Science and Technology Policy Fellow, Office of Polar Programs

Dr. Lee Kump, ANT Committee of Visitors (COV) Chair, Pennsylvania State University
Ms. Melissa Lane, Staff Associate for Information Management, GEO
Maj. Rachel Leimbach, Antarctic Infrastructure & Logistics Section; Air National Guard Liaison
Mr. Brian MacDonald, Antarctic Research Vessel (ARV) Project Controls Lead
Ms. Pawnee Maiden, Administrative Officer, OPP
Dr. Nature McGinn, Environmental Policy Specialist, Section for Polar Environment, Safety and Health, OPP
Mr. Timothy McGovern, Ocean Projects Manager, OPP
Dr. Jennifer Mercer, Arctic Research Support and Logistics Manager, OPP
Ms. Rennie Meyers, Science Assistant, OCE
Dr. Peter Milne, Program Director, Ocean & Atmospheric, OPP
Dr. Robert Moore, Program Director, Aeronomy and Astrophysics, OPP
Dr. Sethuraman “Panch” Panchanathan, NSF Director
Dr. Vladimir Papitashvili, Acting Section Head, Antarctic Sciences, OPP
Dr. Lina Patino, Senior Program Director, GEO Opportunities for Leadership in Diversity (GOLD)
Ms. Karen H. Pearce, Senior Legislative Affairs Specialist, Congressional, Office of Legislative & Public Affairs (OLPA)
Dr. Polly Penhale, Polar Environment, Safety & Health Section; Acting Section Head
Dr. Frank R. Rack, Arctic Research Support and Logistics Manager, OPP
Ms. Jennifer Rhemann, Antarctic Sciences Section; Science Assistant
Dr. Jessica Robin, Section Head, EAR
Mr. Ben Roth, Facilities Engineering Project, Manager, AIL, OPP
Ms. Kate Ruck, Contractor, Section for Arctic Sciences, OPP
Dr. Dana Savidge, Program Director, OCE
Dr. Nigel Sharp, Program Director, Division of Astronomical Sciences (AST)
Mr. Paul Sheppard, Deputy Section Head, Antarctic Infrastructure and Logistics, OPP
Ms. Stephanie Short, Section Head, AIL, OPP
Mr. Simon Stephenson, Section Head, Arctic Sciences Section (ARC), OPP
Dr. Marc Stieglitz, Program Director, Arctic Natural Sciences, OPP
Dr. Colleen Strawhacker, Program Director, Arctic Sciences, OPP
Dr. Nancy Sung, Science Policy Advisor, OPP
Dr. James Swift, Chair, AC-OPP Ad Hoc Subcommittee on the U.S. Antarctic Program’s Research Vessel Procurement
Dr. James Ulvestad, Chief Officer, Research Facilities, Office of the Director (OD)
Dr. Jennifer Wade, Acting Section Head, EAR
Ms. Beverly J. Walker, Science Assistant, OPP
Ms. Elizabeth A. Zelenski, Staff Associate, GEO

Thursday, September 10

Opening Remarks, Introductions, and Conflict of Interest (COI) Review

Dr. Weingartner; Dr. Falkner; Dr. Isern

The meeting began with Dr. Falkner thanking everyone for attending. She noted the special circumstances brought on by the COVID-19 pandemic and the fact that the committee did not meet in the Spring but said she looked forward to continuing with the committee’s important business.

Dr. Weingartner thanked the NSF staff for putting together this virtual meeting and welcomed the committee's new member, Dr. Emanuel. He then asked all those attending to introduce themselves.

Following introductions, the committee turned to the COI review. Dr. Isern noted the advisory committee is subject to the Federal Advisory Committee Act (FACA) and highlighted relevant elements. Dr. Falkner added that subcommittees of FACA committees may conduct business offline, if they report out to the full committee and their recommendations are public. She noted that AC-OPP has had such subcommittees, which will report to the full committee later in the meeting. There will also be discussion later in the meeting about setting up another subcommittee.

Office of Polar Program Updates

Dr. Falkner; OPP Staff

Dr. Falkner said there have been a large number of OPP staff changes since the last AC-OPP meeting in the fall of 2019. She listed the changes:

New Hires:

- Nancy Sung, Office of Polar Programs; Science Policy Advisor
- Marc Stieglitz, Arctic Sciences Section; Program Director, Arctic Natural Science
- Maj. Rachel Leimbach, Antarctic Infrastructure & Logistics Section; Air National Guard Liaison
- Andrew Rowell, Antarctic Infrastructure & Logistics Section; Program Manager, Logistics
- Stuart Gregory, Antarctic Infrastructure & Logistics Section; Program Manager, Transportation
- Erica Hill, Arctic Sciences Section; IPA Program Director, Arctic Social Sciences
- Robert Moore, Antarctic Sciences Section; IPA Program Director, Astrophysics & Geospace
- Christian Nelson, Polar Environment, Safety & Health Section; Safety & Occupational Health Manager
- Anthony German, Antarctic Infrastructure & Logistics Section; Director of Christchurch Operations
- Jennifer Rhemann, Antarctic Sciences Section; Science Assistant
- Joyce Johnson M.D., Polar Environment, Safety & Health Section; Chief Medical Officer
- Maria Vernet, Antarctic Sciences Section; VSEE Program Director, Antarctic Organisms & Ecosystems
- David Sutherland, Antarctic Sciences Section; IPA Program Director, Antarctic Ocean & Atmospheric Sciences
- Allen Pope, Antarctic Sciences Section; Program Director, Polar Cyberinfrastructure

Promotion

- Beverly Walker, Office of Polar Programs; Science Analyst

Acting

- Polly Penhale, Polar Environment, Safety & Health Section; Acting Section Head

Departures

- Xujing Davis, Arctic Sciences Section; IPA Program Director, Arctic Natural Sciences. IPA Appointment Ended
- Jennifer Burns, Antarctic Sciences Section; IPA Program Director, Integrated System Sciences. IPA Appointment Ended
- Cynthia Suchman, Arctic Sciences Section; Program Director, Arctic Natural Sciences. Transferred to OCE/ GEO/NSF
- Scott Carr, Polar Environment, Safety & Health Section, Management & Program Analyst. Transferred to The Office of Diversity and Inclusion (ODI)/NSF
- Erica Sahler, Antarctic Infrastructure & Logistics Section; Program Manager, System Operations & Logistics. Transferred to another agency
- Wilson Sauthoff, Antarctic Sciences Section; Science Assistant. Temporary Appointment Ended
- Douglas Cromack, M.D., Polar Environment, Safety & Health Section; Chief Medical Officer, Department of Defense (DoD) Liaison. Detail Appointment Ended
- Gwendolyn Adams, Polar Environment, Safety & Health Section; Safety & Occupational Health Manager. Retired
- Peter West, Office of Polar Programs; Program Manager, Polar Outreach. Retired
- David Friscic, Office of Polar Programs; Technical Information Specialist. Retired

Dr. Arnold continued the presentation with a discussion of budget issues. He began with the NSF budget, discussing spending for Research and Related Activity (RR&A), which includes the OPP budget; the Directorate for Education and Human Resources (EHR); Major Research Equipment and Facilities Construction (MREFC); Agency Operations and Award Management (AOAM); National Science Board); and the Office of Inspector General (OIG).

National Science Foundation Budget

(In Millions)

	<u>Actual</u>	<u>Enacted</u>	<u>Request</u>
	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>
Research and Related Activity	\$ 6,578	\$ 6,737	\$ 6,213
EHR	934	940	931
MREFC	285	243	230
AOAM	333	337	346
NSB	4	5	4
OIG	15	17	18
Total*	\$ 8,150	\$ 8,278	\$ 7,741



* Elements may not add up to the total due to rounding

Next he presented the OPP budget, noting that the 2020 budget is \$12 million lower than 2019 because in 2018 NSF made a one-time investment in two polar projects that spanned two years, 2018 and 2019, for the Palmer Pier and the Multidisciplinary drifting Observatory for the Study of Arctic Climate (MOSAIC) project. In 2021, the OPP budget is expected to decrease \$57 million overall below the 2020 level. He also pointed out that the Antarctic Infrastructure Modernization for Science (AIMS) project is funded separately from the research and related activity that funds OPP's sustainment operations and grants. AIMS is funded through the MREFC appropriation that began in 2019 with the construction phase at \$103.7 million. This year is expected to be at about \$98 million and next year \$90 million.

Dr. Falkner added that the request is the President's budget request and the final appropriation is done by Congress, which has chosen over the last several budget cycles to give NSF more than the request. She said what will happen with respect to the request is not yet known, but the budget process is not over and so the numbers presented are not final.

Office of Polar Programs Budget

(In Millions)

	<u>Actual</u>	<u>Estimate</u>	<u>Request</u>
	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>
Polar Science Grants	\$ 139.41	\$ 140	\$ 111.28
Arctic Research Support & Logistics	50.15	46	40.50
Antarctic Infrastructure & Logistics	292.24	283	261.14
Environment, Safety & Health	<u>6.88</u>	<u>7</u>	<u>6.86</u>
Total*	<u>\$ 488.68</u>	<u>\$ 477</u>	<u>\$ 419.78</u>
AIMS Construction (MREFC)	\$ 103.70	\$ 97.89	\$ 90.00

* Elements may not add up to the total due to rounding



Discussion

Dr. Weingartner asked about the AIMS timeline. Dr. Falkner said there will be an update later in the meeting, but COVID-19 has delayed the original schedule.

COVID-19 Impacts on NSF Research & Operations in the Polar Regions

Ms. Short; Mr. Stephenson

Ms. Short said she would discuss the Antarctic and Mr. Stephenson would discuss the Arctic. She said COVID-19 presents particularly difficult challenges in light of the unique circumstances of working in the Antarctic. The close proximity and confined spaces of stations, camps and vessels can lead to rapid spread of the virus and clinics are not capable of effectively managing a widespread outbreak. Travel restrictions make medical evacuations more complicated. And most Arctic communities have limited medical capabilities, with venerated elders who are particularly vulnerable. For these reasons, OPP has been working with partners inside the foundation and outside to prevent the introduction of COVID-19 to the polar regions. For the Antarctic program, OPP worked with medical experts on two risk-mitigation strategies:

- Minimize the number of deployers to the stations;
- Implement the best available testing and isolation methods.

The pandemic impacted the end of last season when southbound deployments cancelled. All non-essential personnel were transported out of the stations, including AIMS construction crews. She said the construction sites and the stations were placed in safe and stable condition. In June, the first post-COVID southbound deployers were sent to Palmer Station to relieve the summer crew, which had been held over for more than two months beyond their planned deployment. Until now, that has been the only southbound deployment since March.

OPP replanned the season that is starting now in line with OPP's risk mitigation strategies and established a three-tiered set of priorities:

1. Resupply all three stations for the winter period that will begin next February.
2. Avoid irreversible damage to science or operational infrastructure.
3. Conduct any activities that can be supported without increasing deployers.

OPP is currently in the initial stages of deployments. The C-17 and crew are positioned in Christchurch, New Zealand, and the first cohort of essential deployers are there awaiting the first flight southbound to McMurdo Station, which has been delayed due to weather. Icebreaking support is being planned as usual for one resupply vessel and it will be provided by the US Coast Guard Cutter Polar Star. Passenger movements on continent will take place using reduced small aircraft support operating out of a single airfield. While there will be a small number of ski equipped LC-130s in Christchurch for medical evacuation support, there are no plans to deploy the typical fleet to the continent this year. Instead, OPP is focused on three full swings of the South Pole operations traverse, augmented by science traverse equipment to resupply South Pole Station.

Turning to the impacts on Antarctic research, she said approximately 40 percent of previously planned work must be deferred. She added that minimal science personnel turnover at South Pole will be supported for IceCube, Background Imaging of Cosmic Extragalactic Polarization (BICEP) and the South Pole Telescope so these instruments can be monitored and maintained. Support will also be provided for long-term critical data sets related to Weddell seal populations, penguin census work and the Palmer Long-Term Ecological Research Project. There was significant effort in staging equipment and fuel in West Antarctica last year and maintenance of fuel and field equipment caches at those camps will be supported. In addition, more than a dozen science projects can continue data collection without science deployers. And three research vessel cruises can be supported with no or minimal station interaction.

Turning to AIMS, Ms. Short said the project successfully started construction this past season. However, actions were cut short when work was halted in March and April to remove non-essential deployers and OPP cannot support sending construction crews South this season. Demolition was just being started for the Vehicle Equipment Operations Center and lodging when work was paused, so follow-on work will be postponed and replanned. However, OPP will continue focusing on design and, where possible, domestic fabrication on the lodging building and is seeking to re-baseline future construction work.

Ms. Short said it was a prudent and achievable plan but highlighted some challenges. The plan requires hundreds of participants to travel and quarantine in New Zealand and Chile. These transits are sensitive situations that could change with little warning. The first cohort in New Zealand now is proving the ability to do these transits safely.

Also, a robust response plan is being put in place in the event the virus arrives on station. For example, deployers are being trained on a condition stoplight approach, where precautions like wearing masks and physical distancing will be employed during times of elevated risk.

Next, Ms. Short highlighted a commonality between the Antarctic and the Arctic. Her team has been focused on communication, working closely with NSF, OLPA and others inside the foundation to keep the community informed. Hundreds of stakeholders have been hosted across multiple office hour sessions and there has been outreach to major interagency collaborators, such as The National Aeronautics and Space Administration (NASA) and NOAA. There have also been discussions with the Department of State, the intelligence community and others and close collaboration with other nations that conduct polar research. Feedback shows appreciation for the information and transparency.

Mr. Stephenson continued the presentation to discuss the Arctic, where the same technique of informational webinars is being used with the research community as have been conducted under the auspices of The Interagency Arctic Research Policy Committee (IARPC) to provide information in a broader context of the other Federal research activities in the Arctic, which have all been affected by COVID-19. As early as March, Program Officers (PO) began reaching out to lead principal investigators (PI) on every project that had field work. Researchers were told that OPP wanted the work to be a success. In some cases, he said, projects would have to be modified to protect those in the community.

There was initial optimism that field seasons could actually occur, but about 60 percent of projects were canceled going into the field, and others are waiting still to see if they can squeeze out some part of the field season. Luckily, there are folks in the field who live in the Arctic and were able to support projects by continuing measurements.

Two big projects were able to continue. One was MOSAiC. The original plan was six two-month legs. One of the exchanges was dropped and the legs got longer, but people worked to keep the project going. The ship will come out at the end of September.

Summit Station work was also mostly able to keep the cold measurements going with a series of turnovers. The last one took considerable effort working with the Air Force, the Air National Guard out of New York and the Greenland government. Final refueling of the station and the turnover of the crew was successful last month.

Dr. Stephenson said OPP is firmly committed to its role in maintaining the world class research it supports, maintaining that active and influential presence in the short term and preparing for picking up the efforts when management of the global COVID-19 situation allows.

Discussion

Mr. Iselin thanked everyone involved for their response to the COVID-19 challenges and Dr. Steig conveyed the thanks of the community, which he said is very appreciative of the amazing job that's been done.

Dr. Nettles also conveyed appreciation from the community and asked about the thinking moving forward. She noted that on the Antarctic side, OPP is in the middle of trying to move the next cohort onto the continent and that the group in isolation in Christchurch has been there for about 35 days. She stressed the impact it's having on those personnel who are in isolation. There is also concern about some of the high turnover for personnel deploying to Antarctica. Thinking forward to the rest of this season, and to the not totally unlikely prospect of having to do something similar next season, she asked about thoughts moving forward to help mitigate some of the psychological load on the personnel who are deploying.

Ms. Short responded that OPP was certainly quite concerned about the impact, noting that it was day 37 of their total deployment, including the travel, a much longer isolation than envisioned. This is the first cohort and OPP is learning a lot of lessons about ways to ease the burden on the deployers, ways to better prepare folks for what they're facing and ways to do effective testing. OPP is continuing to monitor the medical situation and has added medical resources to the team. There are also discussions about mental health as well as physical health. OPP is trying to monitor carefully the first few cohorts. She and Mr. Iselin on the Antarctic side have started talking about applying those lessons to the future season.

Also impacting the workforce is the physical qualification requirements that have been made more stringent to minimize impacts if the virus reaches the station. And so, recruitment ability is also impacted. We're doing everything we can, she said, to take care of the humans that are in Cohort One and getting ready to leave in Cohort Two and learning about how to do this better going forward.

Mr. Sheppard gave an example of how OPP is trying to take care of people. When it was learned recently there would be an unexpected delay of at least another 10 days for the cohort, two NSF employees in the cohort requested a mental health day to take people out into the country. Buses were brought in so everyone who wanted could go to a military base outside Christchurch where everyone could run around for a few hours and get some fresh air. The bus drivers drove folks around for some sightseeing to break up the day. He said OPP saw the absolute need to give everybody a break from the hotel and now has a minimum template of what can be done and how to keep everyone safe. OPP is building up other contingency options as unexpected issues arise. An investment has been made in mental health to not lose sight of psychological care.

Ms. Short added that OPP has deployed a full-time NSF member in Christchurch who was instrumental in arranging the mental health day and handling other challenges.

Mr. Stephenson noted that OPP has gained confidence that it can get people to the field and said early on there was limited access to testing. There is a hope that vaccines will play a role in 2021 to positively change the dynamic. However, this does not help with remote isolated indigenous communities if they do not get the vaccine. No way has been found to solve that problem. But it will be possible to get more people into the field where it's not an issue of putting people into remote, isolated communities.

Dr. Steig asked about graduate students who had expected to be able to complete a Ph.D. in the next few years on the basis of field research that is now delayed and what students can be told to give them assurances about how things will look going forward in terms of extra funding. He added that astronomy has more experience with delays of years or decades. When a planetary exploration mission fails, they don't get anything out of it. He asked if there are astronomers with this sort of experience who can speak to those of us with less experience with these kinds of delays.

Mr. Stephenson said that was part of the conversations in March to find out what were the hotspots for each project and what could be done. One thing that people in the community have done is work on datasets that are different from the ones they planned to work on. Under normal circumstances, a small number of projects do that every year, usually one or two. Some projects are able to continue to collect data in alternative ways, but some can't be accommodated and so will not be able to carry out their planned project. He said he'd like to hear more from the community on how people are approaching this important issue.

Dr. Steig replied that graduate students assume it won't be okay if the project is funded to do X and X does not happen. He tells students that NSF program managers and reviewers understand the situation if your first report says, "No, we couldn't do X due to these circumstances, but look at this other cool thing that we did." He said a more formalized message along those lines from NSF might be helpful.

Dr. Falkner responded that POs have been empowered to reach out on a project by project basis because the response depends on the project.

Dr. Isern said that was something POs can be encouraged to do one-on-one. She is working on establishing a set of milestones similar to this year's milestones. It was helpful to tell the community that on July 31 we will know this, and we will tell you what we know. The office wants to do that again, so people can plan to the greatest degree possible. They have also been emphasizing that there are a lot of existing samples and data and they're very open to getting supplementary requests and whatever is needed to ensure students and faculty have the ability to utilize those data sets and samples.

Returning to the point Dr. Steig made about astronomers, she said that was a good angle she hadn't thought of; it could be something to explore. It was encouraging, she said, that researchers and students get to talk to the POs. We're here, she said, to help everyone get through this as best they can.

Dr. Lynch added that her postdoctoral students are more anxious than the graduate students because their time fuse is much shorter, and they feel they are losing a whole year and they understand the dynamics of the job market more than graduate students. Also, not all PIs are as aware as people who have been in the game a long time that they can contact their program managers and are often hesitant to do so because we all know you're all working very hard. She suggested having something more general that goes out to help new PIs so we're not relying on them to contact already overstressed program managers.

Dr. Isern said those concerns are being emphasized in the office hours being conducted, where about 100 people attend per session, adding that it was important for everyone to spread that word as well. Even in a normal situation it's outstanding professional development for the early career researchers to reach out to the program officers. It establishes a relationship and they learn a lot.

Dr. Nettles said she tells people to contact their program officers, but they are hesitant now more than ever. Part of the message she has been trying to work on with junior faculty, graduate students and undergraduates is that the timeframe on this is unknown. A lot of people have held off diving into plans where they do research on existing data because they're hopeful we will soon be able to go back to a normal situation. Asking people about their plans gives you the timeframe of what they think they might do in the next month. It's very hard for people to wrap their heads around the fact we are likely to be in a similarly reduced situation six months from now or, for fieldwork, a year from now. So, we're trying, even at the undergraduate thesis level, to work with people on a plan and a backup contingency plan.

Dr. Nettles called what Dr. Isern said about giving out the information that's available on a certain date super helpful and asked whether that is part of the message POs could also be giving, that we're providing the information we have and no one has a crystal ball for where the pandemic is going. She asked if it were possible to be more proactive in encouraging people to come up with those kinds of contingency plans and not sit around for three months before they start doing that. She feared losing a cohort. Some universities aren't even admitting graduate students for next year. Having contingency plans in place on all levels is really important, she said.

Dr. Isern said last year the POs reached out project by project. Not only was the broad message being sent out that we will have the stepwise understanding of the big situation, but that POs are also reaching out on a project level. For some projects, it was clear that we weren't going to be able to support them or it was clear we were. So, there were two levels of communication, one very visible group communication pathway and the individual, so everyone that had an active field plan was contacted. For some of the bigger projects, like the Long-Term Ecological Research (LTER) project, there was extensive communication. That's the model we want to carry forward, she said.

She said the real complexity is also working with the operational side, because there are pressures for AIMS, Palmer Pier and other big activities. If the science is planned independently and they plan ops independently and we come together, we're going to have to redo it all. We're grappling with not only setting those milestones, but that process to do what is really going to be complicated and still not knowing what next season could look like.

Dr. Mack raised the Arctic perspective and terrestrial programs that are not part of the large NSF-funded logistics package. She said there is a separation now between support for participants, whether they're junior faculty members who have summer salary, or postdocs or graduate students as the logistics are pushed forward. For instance, we didn't go to Russia this year, she said, and everything's pushed forward two years into a no-cost extension. The support for participants has gotten used up and this is an issue that is going to be difficult to grapple with. The answer she has received from the POs is that the university should be taking care of this. There is going to be a lagged effect on projects that don't have a big support package that comes directly from NSF. She noted that it is unique and different from Antarctica or Greenland or some of the ocean research.

Mr. Stephenson said that in the Arctic, part of the field work community doesn't have a logistic support package. This is why the conversations with the POs are so important. The POs can understand the situation of the project they funded, or their predecessor funded. OPP has reached out to every project that at least OPP Arctic has funded. OPP has reached out to full PIs and there are probably other issues

with co-PIs that the lead PIs may not be aware of and that we're not aware of. So, there may be a need to make sure folks talk through the options. Knowledge of those options is really in in the project. It is reasonable to consider supplements for well-documented loss of opportunity for the funds we did provide, such as for tickets purchased for a project that could not go forward. That can be considered in the potential for supplements. There is flexibility in the way the programs are run. We as a program know we have to deal with both communities equitably.

Mr. Stephenson added that the question remains how to get that word out beyond the website and Town Halls. He told the AC that if people come to members asking what to do, talk to OPP, because it has quite a bit of flexibility as plans change. This happens every year, just not at this scale.

Dr. Loose said he was in graduate school during the financial crisis, which affected a number of projects and the department did a good job of internally reshuffling some people essentially moving some graduate students whose timeline was not going to work with the project timeline to different projects. He added that the supplemental request makes a lot of sense. But if we're trying to deal with this within our departments, maybe it was not appropriate to suggest a Graduate Research Fellowship Program (GRFP) as an indication they've been affected by the by COVID delays, but perhaps an Early-concept Grants for Exploratory Research (EAGER) if a student's timeline or a postdoc's timeline is not matching up with the project or the PI is saying to hold off and we'll be able to work this out, but the postdoc is planning to leave in six months or a year.

Dr. Isern said that kind of support would probably not meet EAGERs special definition. Alternatively, she recommended reaching out to the PO. There is a lot of flexibility and options, particularly without deadlines. If someone wants to submit something new, they don't have to wait. All the cases have subtle differences that put them into one category or another. So, reaching out is the best thing and a lot of supplements were given out, with POs open to helping and assisting where possible.

Dr. Borg said these issues are not peculiar to Polar or Geosciences. Across the foundation, people are dealing with limitations that have created disruptions not dissimilar to disrupted field work. Unfortunately, many of the issues rapidly get into policies from Office of Management and Budget (OMB) that govern how grants are used and it becomes very complicated. And that's where you get to the point that the solution has to be pursued and discussed on an individual project-by-project basis.

Dr. Borg said he wished there were more detailed general guidance. But the conclusion so far after extensive discussions is that people need to contact POs and talk about individual cases. He seconded Dr. Isern's point that there's quite a bit of flexibility to explore options, even though a research project might be aimed at a particular scientific goal and especially where there are graduate students and postdocs involved. Part of the goal of the research is training the student or postdoc. And so that part of the goal for the project is still very valid, even though it might be aimed at a different scientific question that is related maybe very loosely to the original award. If people are finding POs aren't being reasonable, that's where contact with management comes into play.

Dr. Kuklina said she does not have a permanent position at her university and depends on her grant. She has asked for a no-cost extension for her field work, which was postponed to next year. She asked if it would be possible to increase funding for such situations.

Mr. Stephenson said to reach out to her PO to work through the issues. OPP also advises documenting the process to have a good written case. There is a lot of flexibility to work through issues. The solution may not be exactly what is proposed; there may be a different solution that is supportable. We have rules, but we have flexibility. POs can't work magic, but it's pretty close. If it's not resonating, he said, come to Dr. Isern or myself or Dr. Falkner to nudge things along.

Mr. Iselin said the earlier budget discussion showed the impacts on 2020 projects that have been postponed. He said that in the 2021 budget, there will be even more projects that potentially can't get funded. At some point there's a capacity problem where you can't get enough people where they need to get to because of COVID-19. This challenge may only get worse if we have projects that were postponed with 2021 projects that are funded, or there's funding for them but it's not available.

So, while talking to your PO is important, at some point NSF is going to have to take this up a level and look across programs. There might even need to be some triage criteria established to help decide what are the really critical ones that have to keep moving. But another criterion might be the impact to people who are in critical stages of their development or who are critical to OPP research efforts.

He added that if there is the funding, but not the capacity to award projects, there may be an opportunity for NSF to seek other authorities to repurpose some of the funding to cover the impacts of people who are standing by idling in no-cost situations. We all know there are impacts because of those delays.

Dr. Falkner thanked Mr. Iselin for the good summary. She said the situation is very dynamic and reminded the committee that it is a two-way conversation; there are groups of people dedicated at NSF to listening to the community and trying to figure out what the issues are. We're always interested in knowing where your pressure points are, she said. A number of them have been raised here. She said similar pressure points have been heard from other places within the community. NSF is watching carefully as universities are trying to open back up right now, with many shutting right back down, which impacts people's ability to regain momentum. We've got to continue these kinds of conversations going forward, she said, and encouraged the Advisory Committee to keep the chair informed of challenges members are hearing about or directly experiencing. Any creative ideas are also highly welcome. This will be fed to the two groups trying to think of ways to tackle these problems.

Regarding outreach, she added that additional mechanisms are being explored for reaching out proactively, including a type of Listserv coming out of OPP to people who sign up for regular updates by email, which may be particularly helpful for anyone who may have reservations about reaching out.

In conclusion she thanked everyone for a useful discussion and said the AC would return to something like this in the next meeting as well as later in the present meeting, if there is time.

Letter from Western Alaska and Bering Strait Communities on NNA

Dr. Falkner; Dr. Anderson; Mr. Stephenson; Dr. Kuklina

Dr. Falkner said a request was received by the AC to discuss a letter which had been [posted publicly](#) that was sent to the Navigating the New Arctic (NNA) working group chairs with a copy to the then NSF Director, Dr. France Córdova.

The 10-page letter was from Kawerak, Inc. and several indigenous groups expressing concerns about NNA, among other things. It was received on March 19, 2020. It was shared with the entire committee by Dr. Weingartner.

At the time the letter was received, OPP/NSF was unexpectedly transitioning to entirely virtual operations. She added, as a side note, that when the COVID-19 situation erupted and the agency was trying to figure out what to do, we weren't immediately thinking we would jump overnight into fully virtual operations. That came upon us as the spread rate started to be alarming in many places. We were prepared to do it reasonably well because when we moved headquarters, it was in stages and as part of that were all issued laptops to keep business continuous between the two sites.

Also, the agency was about to adopt a government version of Zoom. There were some questions about whether we had the bandwidth capabilities to operate fully virtually, but we did it. And I think we've had very little stumbling blocks affiliated with the abrupt transition we made. But it was a lot of work and it was very difficult to understand how to get things done and pay attention to everything that's coming across our plate.

As soon as the letter was received, we acknowledged receipt and let the group know that it was going to take time to respond, in light of the pandemic and the abrupt transition to full time telework. The chairs of the NNA steering committee provided a written response on behalf of NSF to the letter on June 12. And Dr. Weingartner provided a copy of that for the committee as well. And part of our letter invited a possible future dialogue to follow up on some of the issues that were raised. So, two chairs of the working group, members of the NNA steering committee and other NSF personnel joined in with community members in a Zoom-based conversation on August 20.

Dr. Stephenson continued the presentation, noting the phone call was very helpful. Set asides, a point in the incoming letter, was not discussed. We pushed back on that idea. A set aside would be difficult to administer—A set aside exactly for who? The discussion included more positive options. We clearly see that building capacity in communities is a key issue that and we wanted to expose that issue more. The letter also talked about two themes that were very important, food security and community infrastructure in a changing Arctic. NNA has already made awards to proposals in this area that involve community participation. We're very excited about this investment, but there is more we could do. We ran out of time in the call to talk about another issue raised in the letter, the Interagency Arctic Research Policy Committee's five-year planning efforts, which he called a moving target. There has been a lot of outreach and a lot of input has been received. But, the sort of work that Kawerak and their partners wanted to be supported goes beyond NSF. That speaks to, potentially, a rich area of collaborative work amongst the agencies for IARPC over the next few years. There was also brief discussion about the [Dear Colleague Letter](#) (DCL) that is NSF's approach, being managed by OPP, not specifically tied to NNA. This mechanism could potentially support some of the work that is envisioned by Kawerak and their partners that would have been supported by the set aside. It wouldn't be a set aside, but it would be an area of potential NSF support for building capacity and supporting meaningful engagement and knowledge co-production.

Dr. Anderson, a co-chair for the NNA working group said that one of the strong concerns expressed in the letter was a feeling that a lot of time and effort would have been necessary on their part to be able to respond to a lot of the outreach attempts to engage with them to carry out research projects. Picking up

on the DCL Dr. Stephenson discussed, he added that NNA had already had some additional original feedback from its indigenous partners and other members of the community on knowledge co-production as an area of emphasis for the NNA and how to frame that in a way that is as productive as it can be. NNA already made some adjustments between the first NNA solicitation and the most recent one, to try to give some guidance to the NSF-supported research community about how that can be done well and aspects that need to be taken into account.

The program also has planning grants. These are projects to support the development of a convergence team to carry out future research. It is intended to enable a group that has an initial starting point for a project to be able to reach out to their partners and develop together, through a co-produced approach or through other approaches, the research questions for a future project and how the direction of the project would go and design it together. These planning grants are intended to be a mechanism for groups to come together like that over a couple of years to do that work, because we know it takes time to do it well.

Also underway is a competition for an NNA community office for the NNA program. It is not intended to be Arctic-wide. But one of the main roles for the community office is to act as a nexus for the PIs who have been funded through NNA and others who may be working with us to come together to share research ideas and what's going on to help coordinate activities to give each other information. It's also an opportunity, working with our indigenous partners, for them to have developed information they want to make available. We can use the office as a way of making that available.

One topic of discussion was best practices for working together. Dr. Anderson said they wanted to put that forward and that the office could be used as a way of helping to relay information to support PIs and the research community. The DCL is another activity intended to help build the capacity to help carry out this work. It's one of many tools we're already trying to apply.

Dr. Anderson said his office is going forward with a dialogue with Kawerak and their partners to understand concerns raised about our competition and timing relative to how long it takes to build a co-produced approach and how much time they need to communicate with potential partners. Also, the timing of proposal deadlines relative to the traditional indigenous calendars and doing subsistence food gathering and other activities. His office will be following up with the indigenous groups to see if there's any flexibility we have that might help address that.

He added that in April his office shifted gears for a virtual NNA PI meeting. In that meeting there were a number of indigenous representatives who came as advisors. They met in small groups with interested PIs to talk about how to do co-production and give their advice and involvement and how to make this work. It was an excellent way to have a really good dialogue that those individuals fostered for us.

As a final topic, Dr. Anderson referred again to the letter, which touched on having greater indigenous involvement in the review process for NNA. There are already indigenous folks involved, he said, but NNA is open to suggestions for good reviewers that can help us understand indigenous perspectives and bring that into the dialogue.

Discussion

Dr. Crowell said the letter from Kawerak was very comprehensive and he has experienced their leading role, especially in working with social science research projects in their region. Referring to the recommendation that indigenous advisors be involved in the proposal review process, he said Kawerak has been involved for years with the National Park Service and their grant system. He mentioned an example in which most of the people who review the proposals are from the native communities because it's their grants that are awarded for research of all kinds of scientific research and they have good experience being involved in that. He said they would be a great organization to work with and said he was glad the program is already actively engaged in getting their feedback and responding to them. It is a good direction and could be very productive. The letter was quite brilliant in laying out their concerns and he appreciates the process it has launched.

Dr. Weingartner said for a young PI in this region or topics of investigation, this is a problem in cross cultural communication. To enhance the prospects for new PIs engaging in this work there needs to be training or assistance that perhaps NSF can provide. You can walk into a situation and say, "This is what I want to do — Do you want to work with me?" That's going to be very off putting. Unless you've done this before you have a good opportunity to trip before you get anywhere without some guidance.

Dr. Falkner said OPP has been working on this for many years and there have been many approaches and the situation has been evolving over time. The DCL is intended on one level to help make sure people understand what is meant by meaningful engagement. It struck her, conversing with the group, that they want a say in what kind of information is relayed in that way. They don't want us to just roll in and impose that; they want to be part of determining what that information to be related is. We've been doing that to some extent, she said, but we really need to be sure we're doing that well.

Dr. Stephenson said OPP has been helping with this dialogue for quite some time. Not always successfully. We've been learning what works and what doesn't. It takes time to build a robust relationship and to build entities that can play a helpful role in sustaining a meaningful dialogue that transcends one proposal cycle to another. We want PIs with the best of intentions to create strong partnerships, but four [?] months is not the timeframe to do that. Also, some of these proposals could be planning grants. We have demonstrated an interest in past years and decades in this issue. But the DCL is intended to broaden that out. Our best efforts have been on the North Slope of Alaska; we are less successful in the area that Kawerak engages in. So, we need more regional and maybe statewide activity. But this is an exciting time. NNA and has produced a dialogue that we may not have had and that's helpful. Hopefully, we're going to be able to respond to this in a very positive way.

Dr. Emanuel said he liked the description of the community liaison or community office. But it takes interactions in both directions. He asked about the impetus, motivation and the requirement that either new or existing PIs engage with the person in this office to make sure it's effective.

Dr. Anderson said he could speak from the NNA community office perspective. He raised the question about how to make sure the PIs are actually engaging with the office and especially how to bring in newer PIs. In the solicitation, we have put a few sets of tasks out, he said. One of the pieces that's envisioned is that the office will have a role coordinating a PI meeting and keeping a Web presence with outreach materials that are live and helping foster and work with groups to make sure as workshops and other community outreach opportunities get developed, that those will be ongoing. Also, providing tools and information to the NSF-funded PI community about how to do the work that we're talking about for

NNA. He reiterated a point made by Dr. Falkner said, that a lot of that is information the indigenous communities and indigenous peoples have said they want to develop, and we want to hear what they have and it's not for us to develop. It's for us to use the office as a way of distributing that information, but only one way.

Dr. Stephenson said that what motivates the PI is to go on to do this. And because the NNA came out originally as a conversion activity strongly bringing in social science, the engineering and the natural sciences, the PIs got it from the word go. Some proposals have been declined in NNA because they did not have all of those components, but the successful proposals are highly motivated to reach at least two of those three components. Some are experienced polar researchers, and some are bringing their expertise from other areas, perhaps certainly science and perhaps in engineering and they want to have those partnerships to have research projects that do good. The motivation from the research community is really high. But it goes back to this question: How do you do it? And that can be quite tricky. How do you create partnerships even if you have a great research idea? How can you work with communities that could benefit from that idea and helping to shape it? What motivates PIs is not a problem. The PIs are a highly motivated if they get the point that NNA is trying to make, that you have to have this intersection of those three issues.

Dr. Mack said when she read the letter, she was looking for mention of issues faced by communities in the interior and the north of Alaska, at least south of the Brooks Range. It is important to keep in mind that there are all sorts of complexities that lead to the writing of these kinds of letters. But a lot of these interior communities have been underserved. Having something like the new NNA community office and more transparent and accessible ways for researchers to interact with communities might be one way we can make sure there's adequate geographic scope. Not just coastal communities, which have a long history of working with researchers, but interior communities that in many cases are economically substantially more disadvantaged so they can participate too.

She added that in Alaska this summer, she heard several people echo the comment in the letter that NNA is funding natural scientists to do social sciences and she was surprised by that. There are a number of proposals that were part of this program, with NNA in the title, but they were funded through other groups like the Division of Environmental Biology (DEB) prior to the formal grant solicitation. She asked if that is an explanation to bring to people when they say, NNA is just funding natural sciences to do what natural scientists have always done and whether it is an explanation that there are other funding mechanisms associated with NNA that are funding natural scientists to do natural science.

Dr. Anderson responded that NNA has had two solicitations specifically for what is the core NNA program. There are also other funding mechanisms that existed prior to the solicitations. And even this year, there was a co-funding opportunity where a proposal goes into another part of NSF and we view it as a good connection to NNA and in some cases, they have NNA in the title. What's distinctive about the NNA core solicitation is that the teams fundamentally have to be a convergence team. And the questions they're going after have to fundamentally be in a boundary space between either natural and built environments, natural and social systems or built environments and social systems. This overlap is critical. He said he did not agree with the characterization that we are funding physical scientists or natural scientists to do something else. The teams are convergence and they cross that boundary inherently, for the NNA funded ones. Also, some of the projects that have gone into other parts of NSF that have received co-funding, are written to be targeted to the competition that it's been submitted to.

Those competitions are written differently with different sets of goals, but they haven't overlapped with NNA's goals to warrant that tie. So, it's a diversity of approaches that's leading to a diversity of projects out the other end.

Dr. Loose said the comments from Dr. Stephenson and Dr. Anderson resonate with his understanding of things, like it's coming from the point of view of someone who is potentially a proposer to the NNA who's proposed in the past. There's a deep well of good intention coming from the community in an effort to approach this issue in a way that's sensitive and thoughtful and produces meaningful and successful outcomes. The letter, he said, is constructive in many regards, even if not everything requested was realistic. A lot of what was pointed out seems to be actionable. He also commended the response, saying he was hopeful the other side feels the same way. The fact that this has produced a strong reaction suggests NSF is getting even closer to where some acute needs are. Sometimes a strong negative reaction is an indication that you're getting people's attention and you're starting to connect.

He added that since we've gone through the pandemic and the introspection that the Black Lives Matter protests have brought up, there's a general collective understanding in the research community, in the geosciences community, that there are a lot of unconscious things that you can end up doing that put people off or exclude people. You really have to develop a thicker skin and to be willing to examine your approach. In situations like this it takes certain understanding of what the vernacular is, what are the terms being used and what do they mean. Knowledge co-production is something he said he's struggled with since first joining the Advisory Committee. But turning a definition into action is something he said he's struggled with.

Dr. Loose said he was sure there are people in the NNA community that understand the timing and the timelines that your potential project partner would be dealing with as an indigenous community or an Alaskan Native. But he was not sure there is a broad understanding of the typical work cycle or professional cycle.

He discussed making meaningful connections with partners you really understand. You understand a little bit about their business model, what they're able to actually contribute versus what is maybe too much to ask. These are all things that we can pursue, capacitating ourselves in an ad hoc way. That is maybe what NNA PIs have done, up until now. And it's probably true that people don't take as much advantage of the planning proposals as they should. And that's something that we could emphasize in the future. But what we learn here is going to filter out beyond NNA into the solicitations and science activities that will happen in the Arctic.

He asked if there is a way for NSF to lead us or at least provide opportunities to broaden this. This significant education and capacitation have to take place amongst the community in order to understand our partners, make meaningful connections with them and speak in a way that is sensitive but also effective. This could be what we have already learned through NSF, logistic support, and it provides a lot of training for people going into the field. Another option might be workshops or Town Halls, the kind of things NSF convenes regularly at conferences. These might all be ways for NSF to help kind of shepherd the larger community into a greater to a greater level of awareness.

Dr. Lynch said her understanding is that the community office is about the NNA PI and the scientific community, not necessarily about the way those scientists are in interacting with the communities in

which they may be working. The word “community” is ambiguous in that way. She said her group looked at the call and decided not to go for it because we felt we did not have the strong connections with the indigenous groups that we might want to engage with in a well-functioning community office. She read the call very closely and said her understanding is that it was about serving in NNA as a program. This element is one of several dimensions that office is going to be asked to respond to. We’ll see when it’s awarded exactly how that shakes out. But there are many of us who are working outside of the Alaskan Arctic and that brings with it a range of very different questions and responses and ways of interacting with communities in the field compared to what happens when you’re in Alaska. She said she has worked in Alaska and now in Northern Norway and Finland and the work she was doing up until the lockdown kind of cut us off in Greenland. Those are all really different and they are not interchangeable. The letter has been a really useful wake up call, as Dr. Loose said, it calls to our attention that there were things that we were not getting right in very fundamental ways. At the same time, responding just to that letter, is not going to be enough. We need to think about the Arctic as a whole. Because the national boundaries drawn in the colonial era across the Arctic are not the boundaries that are necessarily recognized by most of the people who live there. And it makes for a very complex context. She said she sees the letter as being something that alerts us to pay attention to this, but not necessarily something we should think about responding to element by element.

Dr. Stephenson responded that the office’s responsibilities outside of Alaska are a little different. We have invested not an inconsiderable amount of effort into building capacity in Greenland. Not so much in the other Scandinavian countries.

Dr. Lynch agreed but wanted to point out that the way you do that is different and it’s going to be different everywhere and that’s why this kind of work takes such an investment of time and attention.

Dr. Nettles added that there is a lot of discussion that echoes what we talked about in looking at the new principles for conduct of research in the Arctic and how we help PIs engage with this. There are certain things that NSF can probably do directly and certain things that aren’t really in their purview to do directly. But one thing she said she was confident this group will say is possible is to support PI training and education through proposals that support workshop-type training efforts. She said Dr. Lynch has done really useful work. Dr. Nettles said she has seen videos of some conferences Dr. Lynch has run. There are a variety of people who have a lot of experience who actually can be very helpful to the rest of us. And clearly NSF can choose to support appropriate workshops and so on. It is important that NSF continue to do directly what is happening with this letter and what is happening with the development of the new principles for conduct of research in the Arctic, which was a very genuine engagement with the people who are affected in the Arctic. We’re clearly coming from a place in our nation and institutions as a whole where we have a very long history. And for individual PIs, it is not something that is a question of a month of engagement. It’s really a long-term engagement and learning exercise for our Federal institutions and everybody else.

She commended NSF for taking the leadership in having these discussions and being very transparent about it, adding that one way NSF can impact the discussion is to continue proactively pursuing the type of discussion that followed from this letter and from the principles and continuing to be very transparent about those discussions, because that provides leadership within the community of what’s considered important at the NSF leadership level.

Dr. Falkner said OPP will keep this discussion moving forward. She also noted an article in the magazine *Science* that came out recently regarding the letter. Dr. Falkner said Dr. Strawhacker was quoted in the article but some of the points she made to the reporter did not appear in the article. Dr. Strawhacker gave an [example](#) that was a concrete instance of where engaging together meaningfully gets to a much better place than if you operated independently. For example, if you're trying to let people around you know why we would even bother in the first place to really try to get these things right, it's a concrete example of that. She concluded by saying good concerns have been raised about why we're bothering.

Subcommittee on Diversity & Inclusion

Dr. Weingartner; Dr. Falkner

Dr. Falkner said the previous discussion naturally segues into the next topic. If we had met in the spring, we were going to be formalizing the charter that was discussed in a previous meeting to set a subcommittee in motion to look at where we stand with diversity in the polar community. Just updating ourselves and where we stand, looking at things we've engaged in and possible other things and having a subcommittee come back to the full committee with recommendations on things that could make us a more diverse community.

Dr. Weingartner added that the new NSF director is very much interested in promoting inclusion and diversity. So, the formation of the subcommittee, though delayed because of COVID, is nevertheless very timely. There has been some discussion by email since last fall, when potential candidates were solicited, and there was a discussion of the charge for the subcommittee and the suite of people that have agreed to serve.

He said there has been a narrow community of researchers and we're soliciting ways to broaden the inclusion of people of different genders and underrepresented minorities, which the charter addresses:

As the planet experiences unprecedented and entwined natural and human system changes, the importance of polar regions to people everywhere is becoming ever more apparent. Given the pace and magnitude of changes, an all-talent-on-deck approach is needed to conceive and perform the very best polar research needed to inform our collective future.

The National Science Foundation's (NSF) Office of Polar Programs (OPP) supports and coordinates a diverse array of scientific research and education across a wide array of disciplines that is best done or can only be done in or on polar regions. The demographics of the polar research community being supported, however, do not reflect the diversity of the U.S. population. As with many Science, Engineering, Technology and Mathematical (STEM) endeavors, women and minorities remain significantly underrepresented in the polar research community.

Research clearly shows that diverse groups are more innovative and creative problem solvers. Given the projected national shortfall in available STEM talent, it is critical to tap into underrepresented groups to ensure a robust future polar research workforce.

The subcommittee has three tasks to address:

1. Characterize the current state of diversity of the NSF sponsored polar research community
2. Examine existing efforts by NSF and others to enhance diversity and inclusion
3. Identify and recommend the most promising strategies for OPP to pursue to significantly enhance diversity and inclusion in the polar sciences in both near and long-term.

OPP will work with the subcommittee to arrange and host a series of various activities regarding past and present NSF-sponsored efforts aimed at increasing diversity and inclusion.

Dr. Weingartner also listed the subcommittee members:

- Dr. Ginny Catania: Glaciology; University of Teas at Austin
- Dr. Aron Crowell: Arctic anthropologist; Smithsonian Institution's Arctic Studies Center
- Dr. Ryan Emanuel: Environmental Hydrologist and Ecologist; North Carolina State University
- Dr. Linda Hayden: Mathematics & Computer Science; Elizabeth City State University
- Dr. Gretchen Hoffman, Marine Biology, Ecological and Evolutionary Physiology, University of California Santa Barbara
- Mr. Steve Iselin: Civil Engineering; Iselin Consulting Enterprise, LLC
- Dr. Amanda Kelly: Marine Biology & Ecology; University of Alaska Fairbanks
- Dr. Vera Kuklina: Social, Economic, political and recreational geography; George Washington University
- Julie Raymond-Yakoubian: Anthropology; Kawerak Incorporated
- Herb Schroeder: Engineering; Alaska Native Science & Engineering Program
- Dr. Eric Steig: Glaciology & climate; University of Washington
- Dr. Anne Todgham: Marine biology & physiology; University of California Davis
- Dr. Marta Torres: Geochemistry; Oregon State University

Dr. Weingartner said it will probably be 12-month to 18-month effort to put OPP on a more diverse setting.

Dr. Falkner said she is trying to assess the first piece in light of Federal privacy laws. Only demographic information can be requested and overall at NSF there's been a downward trend of people voluntarily reporting such information. That has made it harder to collect solid statistics on where we stand, she said. But we felt it was important to gain a perspective over the last 10 years, 2009 to 2019. There have been various changes in the way such information is acquired, making it problematic to look back much further. Dr. Jones, who is in attendance, is providing information for the geoscience community. She said geosciences are also not diverse. Across the foundation, the geosciences realm is less diverse and certainly not anywhere near representing the diversity of our country. Ms. Walker has been putting together some information that will be shared, when possible, with the whole committee and the subcommittee will be informed by it.

Dr. Weingartner noted there is no representation from the disabled community on the subcommittee. He has been trying to contact one person but has not had success.

Dr. Falkner said there were a few people who were asked to join this group to fill in some areas of representation that haven't confirmed.

Discussion

Dr. Steig said he recently became department chair and COVID-19 and Black Lives Matter protests are virtually all that's talked about in the department and he will bring that experience. Also, he has suggestions for other members that he will convey by email, if more people are needed. Dr. Steig also said there had not been much communication about the subcommittee and had forgotten he had agreed to be a member.

Dr. Falkner said that if anybody on the subcommittee would prefer not to participate, they should not feel compelled. She added that there has been a gap as efforts were made to round out the roster.

Dr. Crowell said that at the Smithsonian, this discussion has risen to the top of our conversations both within his department and then with the Smithsonian as a whole. When Dr. Jones shared his report on diversity and inclusion in the geosciences at the AC-OPP meeting last fall, there was a report in preparation called Enhancing Diversity in the Polar Research Community. He suggested it as a starting point for the subcommittee.

Dr. Falkner said she is not aware of anything by that title.

Dr. Crowell said his notes from the last meeting included that title as a work in progress.

Dr. Falkner credited Ms. Walker for keeping the committee organized and noted a 2019 report on minority-serving institutions that came out of the Academy that has insightful findings. And she returned to what Dr. Weingartner mentioned about setting up learning activities for the subcommittee, adding that it could also include anyone on this bigger committee who wishes to engage. She said OPP will look to get somebody to present on that. There are also other things out there that would be beneficial for us to be exposed to, including all OPP staff. We're all learning languages to express some of the issues at hand and how we can avoid being perpetrators of problems. So, we'll take these learning activities as potentially beneficial to all of us. We're all excited at OPP to have compiled a list of such things and to make them available so people can partake of them as schedules permit.

Dr. Crowell mentioned as a possible partner the International Arctic Social Sciences Association, which has had a standing committee on gender in the Arctic for two or three years. He intended to see what kind of report or summaries they might have put together and suggested a possible presentation.

Dr. Weingartner said that would be helpful. He sent the link to that Academy report to the committee some time ago. He said it is informative and lengthy but encouraged members to at least browse it.

Dr. Falkner said the link can be re-recirculated but the GEO front office at NSF has also got a good focus on this. Dr. Patino is heading this up along with Dr. Jones. And as Dr. Weingartner mentioned, the new NSF director has definitely stated that one of his objectives is to enhance diversity and inclusion and has some activities that are set up at the foundation level to address racial equity.

Dr. Patino said she was eager to partner with OPP and learn along the way together and share resources.

Dr. Nettles said progress sometimes happens in discrete jumps and taking advantage of the current moment to try and achieve that is very appropriate. It is also worth recognizing that the problems being highlighted through the current discussion, thanks to the Black Lives Matter movement, have been here before. The problem is long standing and it's appropriate to take advantage of this moment to make significant progress. It's not suddenly a problem but a long-standing problem of the institutionalization of racism that that the country has suffered from. She said it is appropriate to leverage the momentum and make a significant impact.

She said she would be happy to participate on the subcommittee but said she was not sure she has the most useful expertise to contribute. She asked about expertise on the subcommittee, referencing research that is being done on the causes of underrepresentation and how to mitigate those problems in terms of things like understanding the effects of stereotypes and research on how networking works and the long-term impacts on the pipeline.

Dr. Falkner said there were some people who have yet to confirm who are along the lines of what Dr. Nettles suggested and the chair has been adamant that this be included on the committee. These people are a bit subscribed currently but said it was important to be informed by research in this topic area. Taking part in a number of seminars and panels going on within the foundation, and with the academies, there are plenty of very well-spoken, very knowledgeable people who would definitely be helpful in this effort. Dr. Jones and Dr. Patino have provided some very good suggestions. The process is ongoing of trying to enlist somebody that has the bandwidth to do it right now.

Mr. Iselin questioned the statement that polar is not diverse. There is some level of diversity, though it doesn't represent the nation, he said. We need to figure out the baseline and go forward to be more diverse. To that point, the first item in the subcommittee charge talks about expanding the researcher community, but in the previous discussion you're talking about outreach with indigenous communities. He suggested expanding the charter to be a little broader to say what else NSF is doing to engage diverse communities. As you engage those communities and show positive efforts, perhaps you'll attract interest from some of them to want to work more closely with us in other ways.

Mr. Iselin added that he has a targeted disability. And in his previous assignment was responding both for a large workforce and championing diversity issues, including issues associated with people with disabilities.

Dr. Weingartner asked Mr. Iselin to put his suggestion in writing.

Dr. Falkner asked Mr. Iselin if he was thinking of the fact that OPP has a research support community. We have people we engage with in the indigenous situation, she said, and asked if he would like to see this group consider possible ways of interacting to help with the polar community, writ large, becoming more diverse.

Mr. Iselin added that OPP is already working in areas where there are diverse people that are participating in the research. They may not be the researchers, but they would like to be involved and are involved; we have to be mindful of them as you go forward into these areas. He said he was thinking

about how that plays into efforts to try to be more diverse. He said it was a minor point and would try to nuance it a little bit more with an email to Dr. Weingartner.

Dr. Falkner said she was not sure it was minor. She said there are things we can capitalize on, by virtue of our business being somewhat different, particularly as we do research in remote settings. She thanked Mr. Iselin for his point and acknowledged he is correct that it is not entirely fair to say we're not diverse; we have some level of diversity. The measure of diversity that we don't meet is: Are we tapping into the diversity our country offers? Do we reflect the population in the US? And the charge captures the fact that we have some STEM talent shortages. As we go forward as a nation, all kinds of endeavors are going to be competing for that talent. Demographics show us if we don't tap into diversity in a better way in our country, we simply won't meet the needs that we have for STEM talent. She thanked Mr. Iselin for clarifying and said he was correct that it's not as though we're not at all diverse. We do have some good diversity. We really need to build on it to make sure that the future of the polar research enterprise is healthy.

Discussion of Topics Raised Earlier and in the Chat Dialog

Dr. Steig said there is a lot of talk about increasing diversity, but less talk about supporting people already in the community who have challenges that we don't recognize. An important part of our agenda should be figuring out the challenges we as a community and perhaps NSF specifically can address for people already in our community.

Dr. Falkner said she appreciated the comment because we were talking earlier due to COVID-19 about the possible loss of a cohort, be that students in the graduate level, postdoc or early career.

Dr. Crowell asked about what happens next with the subcommittee, how can we be involved with future meetings and the leadership of this committee and how the subcommittee can be really activated.

Dr. Falkner said she was waiting to get some confirmation of the additional expertise that Dr. Nettles raised. And Ms. Walker is on point and has got a passion to keep this effort moving and organized. Once that is fleshed out, she will pull together the group. We need someone from the group willing to chair and co-chair at first convening. Ms. Walker is keeping a list of learning activities and would be looking to the committee to try and flesh that out and then get things going. In parallel, Ms. Walker's been working on the data within the foundation to add an initial meeting to present what we what we know over the last decade. Dr. Falkner said she was hopeful the group might be called together within a month or so. There will also be other OPP staff to support the effort and make all of these learning events recorded and available to people.

Dr. Weingartner said he has compiled links that members submitted in the Zoom chat and will send them out by email after the meeting to the whole committee.

Dr. Falkner said there are people inside OPP who are also committing to be part of the core support team or brain trust but we're still finalizing that group. We're excited to have them join, but then a lot of it will be in the committee's hands. A fair number of the other committee members who aren't on the subcommittee will need to work with the folks around this subcommittee to flesh out how we're going to make this work for everybody.

Dr. Heimbach spoke up to reinforce the aspect of learning from universities. At department levels people have been saying we don't understand, that we have never paid attention and don't know the language. And we really need to listen and learn. He said it's great that the subcommittee places an emphasis on this. He supported the learning experiences or activities being conducted so they might eventually be accessible to a broader community. Some of it might be better served at a smaller level to have discussion. But other activities might benefit a wider community. All departments within universities are wanting to really make genuine progress in this and are seeking material to do so.

Dr. Falkner said that was a good point and noted that Dr. Patino has arranged for multiple GEO spots and this group will do certain learning activities. Hopefully, they'll be recorded. If you can record on Zoom, you can make these things available to larger groups. And I echo the comments that learning is what we need right now.

Dr. Kuklina raised the issue of diversity in disciplines that are presented. For example, there is very little representation of arts and humanities in our studies, especially for indigenous communities. It might be an important way of communicating the knowledge that might be useful and put an emphasis on science and on STEM.

Dr. Weingartner said he thought that representation was on the subcommittee.

Dr. Falkner asked if Dr. Kuklina was referring to Science, Technology, Engineering, Arts, and Mathematics (STEAM)

Dr. Kuklina said she was, but especially when engaging with indigenous knowledge sometimes there is more that can be learned through an arts and humanities course. For one side we have anthropology or archaeology or different kinds of arts that could be useful in the future for better communication and knowledge.

Dr. Falkner suggested bringing that point to the first convening of the subcommittee and see if we should be tagging someone else or creating learning activities around it. She said there is congressional support for STEAM.

Dr. Stammerjohn said the current cohort of new PIs and grad students and postdocs could be helpful. She encouraged building some kind of forum for them to express their views. She has experienced this in her own institute, and it has been really effective. The younger generation is very passionate on this. Tapping into a resource we already have would be mutually beneficial and it would also tap into some of the other concerns we expressed earlier and supporting our new investigators, particularly during this current time.

Dr. Falkner asked Dr. Stammerjohn if engaging the Accelerated Program Expansion (APEX) group in a set of learning activities would be beneficial.

Dr. Stammerjohn said she was thinking broadly about creating a two-way dialogue with the current funded grad students, postdocs and possibly early career scientists.

Mr. Iselin suggested a way to get at that would be to let that cohort know of the subcommittee's effort and even invite one to be part of the subcommittee and be a link to that cohort.

Dr. Falkner said she appreciated the great suggestions.

Antarctic Science Section, Committee of Visitors Report

Dr. Kump; Dr. Mack; Dr. Isern

Dr. Isern began her presentation by thanking the committee for being very flexible. Our Committee of Visitors (COV) in March learned we had to move to fully virtual and it ran extremely smoothly.

Dr. Kump listed the COV members and provided the following commendations:

- The self-study report was incredibly helpful to the COV.
- The COV commends ANT for its high percentage of awards that go to minority-serving institutions that are primarily Public Ph.D. universities.
- Program officers do a good job soliciting reviews; reviews and panel summaries are thorough, and POs communicate and document outstanding summary evaluations of both intellectual merit (IM) and broader impacts (BI) to PIs. Not clear that the ANT PI community fully appreciates this.
- ANT program management is effective and has established a structure that supports multi-disciplinary and innovative proposals with engagement from multiple POs.
- ANT has managed the elimination of deadlines effectively.
- The committee views the nimbleness of the ANT program as a huge improvement since community coordination is necessary to access some of the more remote, yet important regions of Antarctica.
- Information in the self-study and PO presentation documents the extraordinary diversity of the array of projects supported by ANT, as well as the typically compelling and societally relevant nature of these many endeavors.

Dr. Kump next went through the recommendations, which he broke into categories. The first was around proposal processing:

- All programs should incorporate panel review into their merit review process in addition to maintaining ad hoc reviews.
- There could be significant benefit to holding more virtual panels including increased opportunities for broader participation and more balanced participation by panelists.
- POs should encourage panels to provide more thorough rationales for proposals that are unlikely to be recommended for funding.
- ANT should strive to reduce dwell-times to the NSF norm, especially for less complex, non-field-based studies.

Next, Dr. Kump reviewed programmatic recommendations:

- The programs should support workshops that facilitate different disciplinary groups within ANT to work together.
- Providing wider community access to international collaborative opportunities, such as Thwaites, as they are being formulated.
- Encourage consideration of whether there are inherited programmatic preconceptions about the typical size of an award based on prior funding experience.
- Encourage the programs to continue increasing interactions with programs outside of GEO.
- There needs to be clearly identified pathways for increasing research productivity in states or institutions that do not have a strong history of work with the ANT Section.
- Continue and enhance efforts to solicit input from the research community on research priorities; inform researchers of national priorities to frame proposals.
- ANT should develop similar formal collaborations with other Antarctic programs as with the Thwaites project.

Turning to BI, Dr. Kump said COV made the following recommendations:

- NSF should clearly indicate that PIs should budget for BI activities that are not covered in standard budget categories.
- NSF should clearly indicate that PIs must assess the impact of BI activities in annual and final reports and in the Results from Prior section of subsequent proposals. Reviewers, panel and POs should assess the success of past BI activities.
- NSF should consider adding BI experts to panels, especially when large, expensive proposals are being evaluated.
- ANT should consider showcasing especially impactful BI activities.

Regarding education and outreach, the COV concluded:

- There was a lack of discussion of education opportunities in the ANT Self-Study.
- The committee suggested two pathways for increasing awards to Public Master of Science (MS), historically black colleges and universities (HBCUs), and other institutions: (1) highlight funded researchers from these institutions doing Antarctic research, and (2) supplements for faculty and students from these institutions to partner with ongoing research.
- ANT should take steps to engage new investigators.
- ANT should take care not to use education and outreach proposals to balance ANT-wide award demographics.
- Supplements should be used to diversify the proposal base.

The COV also made NSF-wide recommendations:

- NSF should revamp its reviewer solicitation and tracking system to allow for automatic confirmation or declination of the request.
- Recommend removing or finding a mechanism to objectively determine an answer to “Does the program portfolio include awards for projects that are innovative or potentially transformative”.
- Build greater flexibility for cross-program and novel research directions by allowing PIs to propose to sections or divisions, rather than solely to programs.

- Demographic reporting should be modified to reflect modern identities (non-binary genders and multiracial cultural identification).
- Challenges in handling Conflicts of Interest should be assessed for their impact on the review process.

Turning to the final set of recommendations, Dr. Kump made the following points:

- New PIs should be encouraged to build professional relationships with Program Officers.
- Improve connectivity in the labs at both bases.
- Continue to maintain a balance between rotators and permanent Federal employees.
- Future workshops, Town Hall meetings, etc. should be held via Zoom or a similar virtual means. This could provide a myriad of benefits.
- Sponsor some combination of workshop and Webinar materials to address best practices around sexual harassment and overall safety in field operations. ANT might consider a similar approach to deal with inclusion and equity for intersectional and underrepresented researchers or developing innovative BIs with appropriate assessment.
- Logistics hurdle to performing field work in Antarctica is significant for PIs with young families (training, logistical issues, etc. that could be done ahead of travel to the field).
- Future COVs should also have the benefit of a self-study report.

Discussion

Dr. Weingartner thanked the COV members for a thorough report and asked if they had any thoughts on what metrics they would use to evaluate BI, aside from graduate students, etc.

Dr. Kump responded that the recommendation would be that assessment be built into the BIs, which would include metrics so NSF and committees like his would be able to look at that assessment. It's really hard to assess the impact of any activity, if it's not thought of in advance. So, if were a recommendation it would be additional description in the guide to proposals about BI and building an assessment and metrics.

Dr. Mack said there was an explicit discussion about external assessment, particularly for education-focused BI. There was not a lot of evidence of that in the proposals reviewed, but it wasn't necessarily clear it wasn't there. But the recommendation was that in these more education-focused programs, there would be a formal and external assessment of some of these outcomes.

Dr. Kump added that it's an area we all need to be working on. And maybe in terms of charges to the COV we can make that a more explicit request. We all need better metrics to assess success in this area, he said.

Dr. DeGrandpre said the Arctic COV report came out much more strongly in terms of their feeling that loss of panels was an issue and the scheduling of the proposal evaluations could even increase dwell times and asked if that was their sense too.

Dr. Kump said his COV called out both of those issues, if not the connection between the two, but the kind of the reduced proportion of panel use in that. He asked if there are recommendations around that.

Dr. Mack said she thought the COV discussed a lot of the Antarctic-specific logistics challenges that go into extending that dwell time that might not necessarily be the same as people are experiencing in Arctic science. And so, we didn't really discuss the panels as a contributing factor, she said.

Dr. DeGrandpre said it was even broader in the sense that it changed the whole dynamic for the program officers and that an evaluation needed to be done to get a handle on that change of dynamic.

Dr. Kump agreed that the combined recommendations are the important ones and it sounds like both committees call out this as an issue. It probably does need some serious consideration.

Dr. Bartlett noted that one of the recommendations was to revise the panel template to provide a requirement for both emphasizing the weaknesses but also the strengths of proposals, adding that he liked that idea and endorsed it. NASA does that in their reviews and it would be a helpful change.

Dr. Kump said it was not included on the bulleted list but was one of the things we thought could really benefit the whole panel process and the panel recommendation process.

Dr. Quinn said she was also interested in the recommendation to increase the use of panels. She was on the Arctic COV and it came out there also. One reason was the lack of deadlines. So, it was hard to get people focused together around a certain set of proposals at a certain time. She said she was also interested in the recommendation for using Zoom to allow people to participate more. She said her COV worked well virtually. She asked if you can use the virtual route to make panels more possible.

Dr. Mack said the Zoom meeting provided more equitable distribution of talking time and the evidence of certain people having dominant opinions did not bear as heavily on the outcomes as in group situations. The lack of eye contact makes it more equitable because they can raise their hand and don't have to wait for an awkward break in the conversation that might not be easily interpreted by people from different backgrounds.

Dr. Kump said that as chair he could moderate that as well. They insisted on the hand raising process when the whole group was together but relaxed that rule in breakout groups. He said he's run other meetings where somebody's continuously raising their hand. The committee talked about the value of in-person panels and it's the social and networking opportunities. The report recommends that if there's a shift toward more virtual panels that NSF be cognizant of the lost opportunities for networking and cross-generational and cross-disciplinary sharing and find ways to replace that. There probably are more effective ways to replace that with in-person gatherings of key people to promote those sorts of networks. He suggested taking the money NSF is saving to bring in roundtables and workshops, being mindful of the composition of those committees and the goals and tasks.

Dr. Mack amplified the last comment. Everyone, she said, was saying maybe we could take some of the funding that goes to panels and put it towards building these sorts of collegial collaborative interactions that are focused on science and broader impacts.

Dr. Lynch agreed that doing virtual meetings has vastly expanded inclusivity. She said it was spectacular and she supported it, particularly for women, junior researchers, people who are differently

abled and people who live a long way away and for whom travel to DC is a burden. But it's absolutely critical that it's run with a view to continuing to promote that equity and inclusion. She was on a panel that had elements that were deeply inclusive and positive and elements that didn't work well and were problematic and led to offline conversations amongst panelists who said they were not feeling heard. One of the things that would help is to learn from good practice, because it has enormous potential for inclusion.

Dr. Kump added that NSF does not have published guidelines for strategies about ensuring inclusivity and broadening participation using Zoom. There are people who are going to abuse the system no matter what the venue is but there are opportunities with Zoom that are more challenging. In a face-to-face meeting it's a little more awkward to stifle those loud voices.

Dr. Mack said there is a best practices for community meetings on Zoom [document](#) that was handed out with the NNA community meeting earlier this year. She said it was a super resource.

Dr. Nettles said it's good to see the attention to this because part of the problem with in-person meetings is that many of us haven't had much training in how to run meetings well, so maybe we can all learn from the Zoom experience. She said she has experienced something similar to what has been highlighted about the benefits of meetings on Zoom, but we really miss out on important things with the in-person interaction. And in the panel setting, part of that is the chance to interact with NSF program officers who might not be your program officer, which can be a rich and rewarding experience. She said she would not like to see everything go completely virtual.

She added that about 10 years ago after a COV meeting, maybe from OCE, there was an [Eos article](#) the committee wrote that highlighted their findings as a way of conveying that positive view outwards. That kind of thing is very useful, especially for early career researchers. There is a sense of, "Do I even have a chance here?" When you hear things like how well run and how fair the process is and how well documented and that the statistics are that program officers are doing a great job of making sure early career researchers are receiving awards, and that those things are taken into consideration in the review process, that's powerful for reassuring people. The whole reason we have the COVs in the first place is to assess the process, but also reassure the research community that it is being carried out in a fair, well-documented, well-run way.

Dr. Kump said that was an interesting suggestion and to the extent the Eos editors are interested, he would be happy to pursue it with the group.

Dr. Mack said it would be powerful for the community, though she could not speak for them. Also, she suggested it might be good to also talk to the Arctic COV for a combined effort.

Dr. Falkner noted that the committee formally endorses the report and thanked everyone for their hard work.

United States Antarctic Program (USAP) Vessel Update
Mr. MacDonald; Dr. Swift; Dr. Weingartner; Mr. McGovern

Mr. McGovern began by noting that the Antarctic Research Vessel (ARV) project has not been formally approved and that everything in the presentation is conditional and notional.

Mr. McGovern provided a brief history of the project, recalling that a subcommittee produced a report compiling, summarizing and prioritizing new vessel requirements, released in August of 2019. He then brought the AC up to date, stating that the science mission requirements were aggregated and sorted based on which of the characteristics and capabilities met the broadest science community needs, resulting in three high-level required vessel characteristics:

1. Ability to provide year-round access to ice-covered seas
2. Ability to collect data and samples within seasonal and multi-year ice
3. Provide a stable platform for work within and transit across the Southern Ocean

He also listed required capabilities as:

- High-resolution geophysical mapping (seismic, multibeam)
- Geological sampling (coring, dredging)
- Biological sampling (acoustically quiet, nets, trawls, etc.)
- Remotely operated and autonomous vehicle deployments
- Water sampling and water column measurements
- Long endurance vessel able to support large science parties for multidisciplinary research

This led to three key performance parameters (KPPs): icebreaking, endurance and the number of science and technical personnel the ship can accommodate. These are the major cost drivers of the vessel. For each parameter, he reviewed the requirements, both minimum and desired.

Parameter	Requirement	Threshold (minimum)	Objective (desired)
Icebreaking	The capability to independently break ice	≥ 3 ft at ≥ 3 kts (PC4)	≥ 4.5 ft at ≥ 3 kts (PC3)
Endurance	Maximum endurance without replenishment	≥ 70 days underway	≥ 90 days underway
Science & Technical Personnel	Provisions for messing, berthing, sanitation, and scientific workspaces	Crew plus ≥ 45 science and technical personnel	Crew and ≥ 55 science and technical personnel

He noted that the decision to go with either objective or threshold capability would depend on the level of funding. There are many other requirements, but they are not considered KPPs. Summing up the KPPs, he said, if we're able to provide a new ship with objective level or desired capabilities, it will give the science community greater access to regions around the Southern Ocean that are subject to extreme icing, which is what the science community has been pressing for.

He noted that in Antarctica and the surrounding Southern Ocean there are expanses of sea ice that are inaccessible because the ice is too thick, cutting off the entire western edge of the continent. Some of

these regions have strong scientific interest. With the enhanced icebreaking capabilities proposed with the new ARV, these inaccessible areas open up to researchers for year-round access.

He said that last June, Glosten Naval Architects and Marine Engineers, which is under subcontract to Leidos, the Antarctic prime support contractor, completed the preliminary design concept for the new ARV to ensure design solutions exist that meet the identified performance requirements, and he showed the initial concept design.

Mr. McGovern said the key thing to ensure is that all the lab and deck spaces and other requirements are included and arranged in ways that makes sense. Currently, the rough dimension are 335 feet long and approximately 10,000 gross tons. He stressed that the ARV specs are conceptual and, in all likelihood, will evolve.

In July, an NSF group composed of shipboard science and operational folks from OPP's Antarctic and Arctic sciences, Antarctic infrastructure and logistics, and Ocean Sciences met with Glosten to walk through the requirements and performance characteristics of the ARV and ultimately provided them with feedback that is now being used to develop the final performance specifications, which will establish the requirements any shipbuilder would need to meet. The next immediate steps include having Glosten perform a refined cost estimate and then finalize the performance specifications. The refined cost estimate is expected to be completed later this month and the performance specification by early next calendar year.

Mr. MacDonald continued the presentation with a discussion of the NSF-required Major Research Equipment and Facilities Construction (MREFC) process to minimize uncertainty and risk. There are a number of design and project reviews built into the process. First is a conceptual design review. This is based on preliminary design to show designs exist that could accommodate the requirements.

The preliminary design review is the next stage after conceptual design review. At this point the project is mature enough, and we've narrowed the uncertainty and risk to a point where we are able to set what is called the performance management budget. That is the baseline scope, schedule and cost for the project that informs the initial budget request to Congress. At that point, we're putting a marker down that the project is mature enough to ask for money from Congress and we want to ask for X number of dollars.

The final design review is the last formal review. This is the point at which we make our final go no go decision on construction and awarding and construction contract to a shipyard.

Once it's approved, after final design review, there's a surveillance and oversight portion of the process. We work closely with our Large Facilities Office (LFO) on ensuring that our contractors are performing as close to that performance management baseline as possible. This is a decade-long process and construction is three to four years of that process the six to seven years before that is all spent making sure the ship is meeting requirements and we think we have risk constrained to a manageable range.

Mr. MacDonald next discussed the management structure, which consists of a Core Integrated Project Team (IPT), made up of representatives from AIL, ANT, LFO and the Division of Acquisition and Cooperative Support (DACs). The Core IPT will:

- Identify steps/documents required for MREFC
- Conceptual Design Review
- Establishing paths forward with Leidos/ Antarctic Support Contract (ASC)

The team is developing an internal management plan that sets down how we are going to manage the project and an operational model of how we will operate the ship, whether it's government owned, contractor operated or contractor operated, contractor owned.

Mr. MacDonald concluded with a presentation of a near-term timeline:

- Entry into MREFC
 - Submit ARV MREFC Package for Facility Review Board (FRB) review (Sep 2020)
- Conceptual Design Review (CDR)
 - Prepare for CDR (in development)
 - Conceptual Design Review (Mar 2021)
- Integrator Solicitation
 - Prepare solicitation (Oct 2020–Feb 2021)
 - Compete & award Integrator (Feb 2021–Oct 2021)

Discussion

Mr. Arnaudo asked for a ballpark estimate of the cost. He also asked if the ship would be big enough to break ice into McMurdo and resupply it. His third question was whether the completion date is 2026 or 2027.

Mr. MacDonald addressed timing and cost. He estimated 2029 to 2030. For cost, he estimated having a refined estimate this month. Previous estimates have only been based on a general understanding of what we think we want the ship to do. At this point, there is only the rawest estimate because the uncertainty is so great. He said he did not want to put a number out that is not based in reality but estimated from \$700 million to over \$1 billion.

Mr. McGovern added that the vessel is not designed to break into McMurdo. The Coast Guard is developing its polar security cutter. One of its missions is the support of the break into McMurdo.

Dr. Loose said the vessel's ability to operate in all the ice cover that's around Antarctica in a year-round capacity will excite a lot of scientists and researchers. He asked about the operational model.

Mr. McGovern said that going through the MREFC process, it would by default be a government-owned asset. But we would still need an academic institution or a company to crew and maintain the vessel on behalf of NSF. The operator would need to work closely with our prime support contractor. It's possible we would task Leidos or the next support contractor with providing the crewing and the operational side of maintaining and operating the vessel. These are all things that are being explored.

Dr. Swift said it was an amazing moment for him to hear the presentation and that his subcommittee will be extremely grateful to NSF and others for considering the subcommittee's recommendations and the approach being taken. Also, he asked about how Palmer Station would be supported.

Mr. McGovern thanked the subcommittee for their essential efforts. Resupply of Palmer Station is absolutely at the forefront of our minds, he said. He added that in the last couple of years there has been a growing commercial market working out of Punta Arenas to supply the 20-some-odd other stations in the Antarctic Peninsula. We are looking to capitalize on spot charters for resupply to Palmer Station. In addition, with the British Antarctic Survey reducing their fleet, they're looking to partner, and we are in active discussions about how we can better collaborate on sharing, research, vessel access and resupply.

Mr. Iselin asked if NSF can confidently move forward, given the cost of the vessel or if it is still at the request stage.

Mr. MacDonald responded that we're not at the request stage yet, which is probably three to four years away.

Mr. Iselin also commented on what NASA has done with SpaceX, using a private company to build delivery vehicles. He asked if the type of research that could be done with the ARV is interesting enough to our nation and the world for philanthropists or a company to make this investment. In return they would get publicity and advertising as the guys who are getting out this cutting-edge research that might be able to help turn the tide of climate change and probably 50 other things.

Mr. McGovern said that public-private partnerships are something that has been discussed and will continue to be discussed. But the argument for a government owned asset is the rising costs of chartering vessels, particularly when chartering for the life of a vessel. And if some billion-dollar philanthropist wants to approach us and strike a deal, I'll listen.

Dr. Flanner asked if thought has been given to how the propulsion system might influence atmospheric measurements and how the design of the propulsion system might take into consideration the needs of scientists doing sensitive measurements of the atmosphere.

Mr. McGovern responded that there are talks about different propulsion approaches. Some other countries have developed vessels that can go silent or run on electric for a period of time. And these are things we're exploring.

Dr. Swift noted that the report calls out a hybrid system for that reason.

Update on NSF GEO Activities

Dr. Easterling; Dr. Borg

Bill Easterling presented an overview of major activities in GEO, starting with a few research highlights and accomplishments at NSF. He discussed a software package developed by a University of Wisconsin PI who created ultra-high-resolution visualizations that allow a supercomputer to resolve every detail of the process of tornado genesis. He also discussed the NSF-funded supercomputer at the University of Illinois that gives the ability to look around the inside of a tornado as a supercell forms. In addition, he

reviewed the MOSAiC expedition, which is completing its first is field season. The German icebreaker Polarstern was frozen into the ice starting in October and iced out about the last couple of days of July. It was aimed at trying to get observations that allow us to understand the biogeochemistry of a winter Arctic Ocean. The operation was a success and something that we could all be proud of. It created quite a lot of buzz in the non-science community here in DC.

Dr. Easterling next compared the FY 2020 requests to OMB, the FY 2020 appropriation from Congress and the current FY 2021 request. He said the FY 2021 request submitted to OMB is larger than the FY 2021 request, reversing a couple of years of declines.

GEO Funding
(Dollars in Millions)

	FY 2020 Request	FY 2020 Appropriation	FY 2021 Request
Atmospheric and Geospace Sciences (AGS)	\$221.97	\$279.68	\$234.45
Earth Sciences (EAR)	156.97	199.36	168.24
Integrative and Collaborative Education and Research (ICER)	93.2	113.78	94.71
Ocean Sciences (OCE)	314.91	398.05	339.21
Total	\$787.05	\$990.87	\$836.61
 Office of Polar Programs (OPP)	\$403.39	\$477.35	\$419.78

Next, Dr. Easterling discussed Earth System Science. He said the National Academy of Sciences will do a fast action study advising NSF on how best to utilize its facilities to promote an Earth System Science program of research, education and workforce development. They are going to give us a report we hope to have in the early summer of next year. He presented the five charges to the study committee:

- Describe potential value and key characteristics of a robust, integrated approach for studying the Earth system.
- Discuss emerging opportunities and barriers to progress, including consideration of interdependencies and synergies among all components.
- Identify potential synergistic opportunities within current facilities, infrastructure, and coordinating mechanisms. Ideas for new facilities, infrastructure, and coordinating mechanisms may be considered.
- Discuss computational, data, and analytic support for Earth systems research, including guidance on harnessing existing, planned, future NSF cyberinfrastructure.
- Discuss workforce development to support personnel needed to advance Earth systems research. Draw upon relevant scholarship to consider new and existing approaches. This can include

undergraduate and graduate education, technical training to support facilities and infrastructure, and increasing diversity in the future workforce.

The committee is co-chaired by two National Academy members, Dr. Ruth S. DeFries of Columbia University and Dr. George M. Hornberger of Vanderbilt University. Regarding other members, Dr. Easterling said NSF is very happy with all the forms of diversity that are represented by the membership, culturally, racially and in terms of disciplinary content.

Turning to GEO major project updates, Dr. Easterling reviewed some activities underway, emphasizing the importance of research facilities:

- Construction on the National Center for Atmospheric Research's (NCAR) Research Aviation Facility is on schedule and on budget, with anticipated completion by end of CY 2020.
- Construction activity on Regional Class Research Vessels (RCRVs) has been re-planned and restarted following an 8-month pause to improve and complete 3-D structural modeling.
- Ship delivery dates have been delayed approximately 9 months from the original schedule.
- GEO is exploring different models to manage geophysical capabilities to serve Earth Sciences community; leading working group to identify needs other agencies have for capabilities currently provided by Seismological Facilities for the Advancement of Geoscience and Earthscope (SAGE) and Geodesy Advancing Geosciences and Earthscope (GAGE).
- Alaska and Canada Transportable Array network stations will either be removed or transferred to new operators by the end of FY 2021.
- Some stations will be adopted through funding to UA Fairbanks from GEO/OPP's Arctic Observing Networks program.

Dr. Easterling concluded with a discussion of efforts in the geosciences to diversify the geosciences. Historically, we have had a very tough road to travel in trying to increase the participation of minorities, with some success recently in increasing gender diversity. He presented figures showing we haven't moved the needle very much over the past 40 years. The numbers are all disappointingly low.

He noted some of the innovative ways that are being used to approach this in the geosciences that has the promise of maybe increasing organically the participation of young scholars, particularly in our undergraduate programs, which it is hoped will increase participation in graduate programs on up through our professions.

He discussed Improving Undergraduate STEM Education: Pathways into the Earth, Ocean, Polar and Atmospheric & Geospace Sciences (IUSE:GEOPATHs), which is designed to:

- Use evidence-based strategies for improving student engagement.
- Expose students to meaningful experiences through creation of geoscience learning ecosystems (GLEs).
- Leverage STEM stakeholder networks, academic and/or non-academic research activities and instrumentation infrastructure.

He also discussed two other GEO diversity and inclusion efforts:

- Geoscience Opportunities for Leadership in Diversity (GOLD) to unleash the potential of geoscientists with interests in broadening participation to become impactful leaders.
- The Active Societal Participation in Research and Education (ASPIRE) GOLD project, which supports a generation of geoscientists with leadership skills to make geosciences socially relevant.

Discussion

Dr. Weingartner asked if the Earth System Science models include an economics predictive package that would forecast what might happen to the global economic system in the event of climate change.

Dr. Easterling responded that it is rare to see much of the Earth System Science including economic and social system models. But there are examples. He referenced his own research experience with integrated assessment models. One at the Massachusetts Institute of Technology (MIT) includes a strong economics component and gives investigators the opportunity to follow some perturbation in the system, whether climate change or a change in land cover, and trace how that affects supply and demand principles and ultimately the prices and costs for various goods and services. So, these are often the vehicles used for estimating the costs of a certain amount of climate change unabated.

Dr. Heimbach asked how other directorates are going to be involved or maybe excited about the outcomes. The report might have significant repercussions, for example, for the Office of Advanced Cyber Infrastructure and the social science directorates and how the report would inform those directorates.

Dr. Easterling said that before approaching the National Academy, NSF brought together a group of staff from various directorates and created a discussion group which reached an agreement in principle across the foundation that this was a useful activity and that we would have wide investment from other directorates in supporting the study. And there is more than one directorate contributing. Not only do we have broad participation, but there is genuine interest from other directorates in participating in this type of science.

Dr. Borg added that NSF is at least talking about asking the Academy to have a short discussion at the AC/GEO meeting next month about this and he agreed that there was very strong buy-in from across the foundation for the study.

Dr. Easterling added that the real target for the study is not necessarily the leadership at NSF, it's POs in the trenches who are at the tip of the spear, where a lot of funding decisions are actually made. It's not that they're not accepting of an Earth System model for funding science. It's that they want to see the community speak to them of the benefits and the scientific opportunity that an Earth System approach provides that they can achieve just with business as usual.

Wrap-up and Adjourn for the day

Dr. Weingartner; Dr. Falkner

Dr. Weingartner and Dr. Falkner thanked everyone, briefly reviewed the agenda for Friday and adjourned for the day.

Friday, September 11

Advisory Committee Liaison Updates

Ms. Walker; Dr. Heimbach; Dr. Lynch

Dr. Backe, serving as moderator, said the AC has three liaisons: Dr. Ryan Emanuel, who liaisons with Committee on Equal Opportunities in Science and Engineering (CEOSE), who is not able to be present today; Dr. Lynch, who liaisons with the Advisory Committee for GEO (AC/GEO); Dr. Heimbach, who liaisons with the Advisory Committee for Cyberinfrastructure (ACCI).

Dr. Lynch reported that AC/GEO met in the spring only for procedural issues. The last business meeting was fall, 2019. At that meeting there was the 21st century geoscience report and COV reports, from Geospace and Integrated Programs. The primary focus has been on the new 21st century geoscience report, which was requested by the GEO director about two years ago.

The draft report has three themes. The first is the value of a systems-oriented approach to the geosciences, underlining why geosciences research is fundamentally important to American society and how a systems-oriented approach supports that. The second theme is the importance of building a more diverse geosciences community to ensure the best research is done and to develop ideas for how NSF might best support that goal, drawing upon the excellent work that's being done in other places to reflect on the concrete actions we can take. Dr. Lynch said she took note yesterday of the comment about supporting inclusion for the people who are already engaged in the geosciences and that it's more than just bringing new people in; we have to support people once they're here. At Brown University, we've been thinking about the tenure process and the leaky pipeline. The third theme was the importance of continued appraisal in terms of the processes and procedures used within GEO to evaluate research proposals. It's kind of a portfolio review idea with specific suggestions for pilot studies aimed at testing new procedures. And thinking about how we can do that better. Draft sections have been completed and the next job is to pull that together into a single document, which will be led by the chair, Dr. Kip Hodges. In the full meeting, we'll be discussing the report as an entire document.

Another element is the impact of COVID-19, particularly on early career researchers. There's a new GEO facilities person that we wanted to introduce and have a discussion with. And the National Academy systems study that this committee has already discussed.

In conclusion, she noted the next AC/GEO meeting is in October.

Dr. Heimbach began his presentation by noting that ACCI advises the Office of Advanced Cyberinfrastructure (OAC), which is within Computer and Information Science and Engineering (CISE):

- OAC coordinates and supports the acquisition, development and provision of state-of-the-art cyberinfrastructure resources, tools and services essential to the conduct of 21st century science and engineering research and education.

- OAC supports the preparation and training of current and future generations of researchers and educators to use cyberinfrastructure (CI) to further their research and education goals, while also supporting the scientific and engineering professionals who create and maintain these IT-based resources and systems and who provide essential customer services to the national science and engineering user community.

He said that OAC also supports CI resources, tool and related services, such as:

- supercomputers, high-capacity mass-storage systems
- system software suites and programming environments
- scalable interactive visualization tools, software libraries and tools
- large-scale data repositories and digitized scientific data management systems
- networks of various reach and granularity
- an array of software tools and services that hide the complexities and heterogeneity of contemporary cyberinfrastructure while seeking to provide ubiquitous access and enhanced usability

Next he discussed the CI ecosystem to support researchers and deploying CI for discovery. There is a recognition that with fast and disruptive changes in science and engineering and the CI landscapes that the CI ecosystem must evolve.

Focusing on Artificial Intelligence (AI) and machine learning, he said AI means a lot of different things. A lot of research that's going on within OPP, like autonomy, AI infrastructure modeling, machine learning, massive data management, sensing and data acquisition, are areas where AI is trying to make advances.

He noted that earlier in the month NSF awarded new National AI research Institutes, which are national hubs for universities, agencies, industry and nonprofits to advance AI research and education. He highlighted in particular the NSF AI Institute for Research on Trustworthy AI and Weather, Climate and Coastal Oceanography. The University of Oklahoma is the lead but many other institutions are involved.

Dr. Heimbach discussed a solicitation for the next round of National AI Research Institutes and listed the topics being put forward:

- Human-AI Interaction and Collaboration
- AI Institute for Advances in Optimization
- AI and Advanced Cyberinfrastructure
- Advances in AI and Computer and Network Systems
- AI Institute in Dynamic Systems
- AI-Augmented Learning
- AI to Advance Biology
- AI-Driven Innovation in Agriculture and the Food Systems

The proposal deadline for the solicitation, which involves a partnership with Accenture, Amazon, Google and Intel, is December 4, 2020.

Next he turned to computing research in a post-Moore world, explaining that hardware can no longer sustain doubling computing resources every two years. Technology and application trends are reshaping computing, creating a challenge:

- Across many different topic areas, a fundamental need to design new interface layers and design practices.

It also creates an opportunity:

- It could introduce sweeping changes across many CISE research topics.

He added that there are opportunities for new hardware development and innovation, including new software to work on this hardware, as well as the curriculum that goes with it to train everyone.

In this vein, a workshop was held in June 2019, Rethinking NSF's Computational Ecosystem for 21st Century Science and Engineering. He said it should be openly available online. He added that in 2015, the White House had issued The National Strategic Computing Initiative and last November an update was released, which is important for climate modeling and astrophysics.

He turned next to data-intensive discovery pathways, sometimes called the missing middle, where you have data sources that are very large and distributed across the world. The need is to make this data rapidly accessible for scientific discovery. The challenges include:

- Data access: realtime, streaming, on demand
- Data discovery: knowledge networks, intelligent data delivery
- Data fusion: data integration and interoperability

These topics led the OAC to ask some big questions of the Advisory Committee:

- Research Agenda:
 - What constitutes CI research and what is the OAC research agenda?
 - How does OAC foster/nurture its research community to ensure innovations?
- Sustainability:
 - What is OAC's role in sustainability of resources and services including compute, data/storage, networking, software, educational?
 - Difference between making resources/services sustainable and sustaining resources/services? Should OAC focus on the former and work with the community on the latter?
- Reproducibility:
 - What is the unique role of CI and OAC in the broader conversation on reproducibility and repeatability of research results?
- Strategic Investments:
 - What is OAC's role in a rapidly changing application and technology/service landscape?
 - How does OAC prepare for technology disruptions (e.g., beyond Moore's law, quantum, etc.)?

- How can OAC partner with industry?
- Integrated CI Ecosystem:
 - How does OAC evolve its priorities and programs to address the growing need for an integrated CI ecosystem?

ACCI has established a subcommittee on reproducibility and sustainability and a subcommittee on predictive modeling and uncertainty quantification. He noted that the subcommittee on predictive modeling and uncertainty quantification is a good example for climate modeling or seismology and prediction capability. The subcommittee is trying to understand some of the bottlenecks in different disciplines to understand whether there are limitations that cut across different domains and what can improve the state of the art. He added that there is also the emerging question in AI of how well we understand these algorithms, and whether we can ensure sufficient attention is paid to the challenges of predictive modeling and new queuing systems that are built on physical models.

He concluded by discussing software and data professionals, where the question is about the need in disciplinary communities for software and data professionals and whether awareness of this need is pervasive within the community. There is also the question of how much training should be done for these separate professionals versus how much training should be done for the domain scientists.

Discussion

Dr. Weingartner asked if NSF has formal partnerships with Amazon, Google and the other companies mentioned.

Dr. Heimbach said there is formal involvement with these companies, as well as cross-directorate collaboration and involvement with other agencies, including the Defense Advanced Research Projects Agency (DARPA) and others. There is discussion on how much NSF should invest into dedicated systems supported directly through NSF versus testing models by which Amazon and Google cloud resources would be provided. He distinguished between data storage and portals, or data as a service. There is an increasing recognition, he said, that science as a service is the way things need to go, citing the example of climate model output on the order of petabytes. It's not something you want to download. The providers of data should provide compute resources, so you do your analysis close to the data, instead of copying it over to your domain and then doing the analysis. A lot of agencies are trying to get their heads around how to do this and the financial models on how to enable this.

Dr. Weingartner asked if the companies are providing in-kind support or funding for outside investigators.

Dr. Heimbach responded that it is a rapidly evolving type of model. GEO currently supports a very successful effort in which some of the providers have been supplying cloud resources. But the long-term funding model is one of the things people are grappling with; whatever it might be now it might be different in two years.

Dr. Bartlett commented that machine learning is taking off in an incredible way. His institution is preparing for a research retreat and one of the most popular topics is machine learning, which cuts across all the different kinds of work we are involved with. He also asked Dr. Heimbach if his group

thought about cybersecurity and whether in the future when we submit NSF proposals, we might have to account for the cybersecurity measures in place.

Dr. Heimbach said the group was briefed but didn't talk much about it. Though it was very high on the minds of people at the top level of the directorate. He said he didn't know if cybersecurity will be a required part of a data management plan but said it's very high on their on their minds.

Dr. Lynch said data security is something we deal a lot with when we're dealing with data that's protected by our institutional research boards and the best practice there is very strongly in favor of airgaped storage. The problem is how do we resource the infrastructure to do that and in the medical realm there's some good practice that we could learn from. But on the social science side, we err on the side of stick it on a thumb drive and lock it in a safe.

Dr. Heimbach said that for a massive data storage facility and high-performance compute systems, they have to get certification just to store and work with medical data. So, there's certainly an awareness and procedure at least on the medical side. How much certification is done on the social science side is a good question. Maybe a way forward is to see what can be learned from the certification process on the medical side.

Dr. Nettles said one of the big challenges for taking advantage of some of the new approaches within disciplinary research, like seismology or oceanography or social science, requires deep understanding in statistics and computer science. And in the discipline also. It's incredibly difficult even to learn to speak the same language. It takes a year or more to get to the point with intensive focus where you're speaking enough of the same language that you can make progress across those areas. She asked Dr. Heimbach to say more about what the committee is thinking about how to bring those things together in a productive way.

Dr. Heimbach said it's the wild west right now. There's a lot of promise and a lot of buzzwords. The question is, what is new, what is promising and what is maybe overhyped. So, we have sparse data science. We don't know much of the ice sheets' interior, we don't know what's going on under the ice sheet in oceanography. Clearly, we can generate huge amounts of data through simulation. But if it comes to real observations, we remain a sparse data science. And the question is how to merge some of these topics. We have to recognize the heterogeneity and the vast volume of new data at least may have promise and the fact that the private sector has been developing at scale statistical tools that can work not just on the data set that fits on your thumb drive, but on the massive data sets and probe those data.

He referred to trustworthy AI and interpretable AI, saying these are buzzwords that say we need to understand what these AI and machine learning tools actually do and whether these networks we train provide something reliable if they go out of sample. We train them on data we know, and they should be doing predictions for a range we no longer know. And this is exactly what this subcommittee on predictive modeling and uncertainty quantification wants to do, to understand how we to combine models, whether they're statistical machine learning or physics guided models.

There is an increasing recognition that one needs to understand the inner workings of these networks such that the predictions these networks and machine learning algorithms are giving us can be trusted for informing decisions that are important.

Dr. Nettles responded that a lot of the issues are similar to other efforts to try and be necessarily cross-disciplinary and interdisciplinary, where nobody can have all the expertise in each of the necessary fields. And this is an even harder one.

Dr. Flanner said there has been attention recently to rebranding the GRFP towards artificial intelligence and advanced computing and asked if this will affect or influence the types of awards made to polar-focused research fellows with an altered emphasis or priority towards computationally intensive focused polar research, specifically in the GRFP.

Dr. Falkner responded that the notion that attention was called out specifically to this area as being one of national need does not detract from the fact that there will still be support for all the other domains. The competition is very complicated. What happens is that in part it's parsed out by proposal pressure. So, the fields that are funded depend on how many applicants apply from a particular field.

Dr. Rom identified herself as the education program officer representing GEO for the graduate research fellowships and said this year for the first time they identified three priority areas AI, computational intensive research and quantum to encourage students who were going to use those techniques to make sure they talk about that in their applications.

Dr. Loose asked if Pangeo or any other entity is offering free access to high performance computing for education, a sandbox domain to demo the tool and the resource to students.

Dr. Heimbach said there has been success getting Google and Amazon to provide resources to make this happen. So, tentatively, yes. If it is not on the Pangeo page, get in touch with the Pangeo organizers. They have been organizing town halls and there was an ocean hackathon about a month ago, with Pangeo involvement. It's a way to engage the community to use these tools through tutorials. The question is, what is the funding model going to be in two to five years? And potentially, would it be that you put in compute requirements within an NSF proposal and then NSF would have to provide some funding or commitments towards the cloud providers. I don't think anyone knows just how to do that yet. Discussions are happening at NASA, where some data centers are facing the same questions and challenges. But for a start, definitely on the educational level, for sandbox models, I'm fairly confident they will provide free computing resources.

Dr. Falkner asked to confirm her impression that Dr. Loose would like OPP to make clear to the polar community what the opportunities are in this space. I take that as an action on our part, she said, to be sure we're providing as much information as we can as these opportunities are materializing across the foundation and with our partners. She said she wants the AC structure to be one robust way to communicate. However, OPP may need to push that out in the same way that we make adjustments for COVID-19 and everything else as we're looking at ways of informing our community, that this is another type of information that would be beneficial.

Dr. Rom said there was a lot of confusion about whether that was a requirement of the GRFP and it was not. We are still accepting proposals that do not include those topics. It's just that they were trying to encourage students to apply if they were doing that.

Dr. Falkner said the [GRFP solicitation](#) was interpreted by some incorrectly that it was going to be the only topic and it never was intended to be the only topic; it is one we'd encourage people to consider.

Wrap-up any action items or Questions for the Office of the Director (OD)

Dr. Weingartner; Dr. Falkner

Dr. Weingartner led the AC through the process of developing a list of questions to pose to the NSF Director, during his upcoming appearance before the committee. The committee also used this time to discuss a number of other topics:

Current Status of the Polar Fleet:

Dr. Stammerjohn said the current status of the polar fleet is unclear to her, based on rumors that there's been significant changes. She asked if, for example, the Nathaniel B. Palmer and Laurence M. Gould (LMG) ships were being retained. Dr. Stammerjohn said she had heard there's COVID-related changes to the functionality of the fleet that could impact science.

Dr. Falkner suggested a full session dedicated to that at the next meeting devoted to the whole polar fleet.

Dr. Weingartner added that there had been a suggestion to add an agenda item for the next meeting on the Coast Guard's development of its icebreaker. Dr. Falkner agreed it should be added to the agenda.

Diversity and NSF Funding Decisions:

Dr. Steig spoke about diversity and best practices in graduate admissions and faculty hires, asking if NSF has considered diversity as part of the funding decision process. That is, panels being instructed on how to avoid bias in decision making and the selection of proposals.

Dr. Lynch added she was on a panel recently that was so instructed.

Dr. Falkner said COVs repeatedly reference impacts not being clear, which has triggered a focus on how to do better. The Office of Integrative Activities has instituted the practice of briefing panelists about implicit bias and other factors in order to be fair and correct in our judgments. There is a certain goal for the percentage of panelists receiving this training.

Dr. Rom said there is a video that reviewers are asked to watch that covers how to write a good review and how to avoid bias. It includes examples of bias in other fields to make people think about being unbiased in their opinions. The video is not required but is strongly encouraged. But an effort is made to brief all panelists on implicit bias.

Dr. Isern added that there is a series of courses for new POs called merit review basics and generally there is someone from the social and behavioral sciences who gives a lot of value-added information regarding how to how to run a panel and mitigate bias.

COVID-19

Dr. Steig said one of his biggest concerns is that nobody in his departments is talking about COVID-19, because people are treating it like ancient history.

Dr. Nettles added that many people in important leadership positions are spending a big fraction of their time on it and taking it extremely seriously. She said her sense is that programs have been doing a terrific job managing the response to COVID-19, both in terms of the complicated logistics aspects that we see in polar and reaching out to PIs, working hard to figure out how to continue supporting science and also the openness and transparency. As with the government shutdown, we're seeing that NSF is, at least at my university, leading the pack on providing information about how to deal with impacts and so on. She noted all the work that's been done over the last few years to deal with things like the government shutdown and risk management efforts that a number of people in the polar group have put so much effort into have helped make that response possible.

Dr. Falkner said research money made has been made available at NSF to address research issues around COVID-19 itself. And in the polar realm, we have funded some work, particularly in Alaska, trying to understand the impacts and the situation there for communities and so forth. We have been impacted in extreme ways in polar, maybe more so than many other organizations because we were having to move people to our field programs, north and south. But we've also contributed to being part of the solution to the problem with a set of research that NSF can uniquely support in basic research.

Dr. Stammerjohn spoke about COVID-19-related impacts on research in general and specifically the oceanographic component. There are going to be repercussions downstream, not just with the ocean side but with catching up with the field deployments in general. She asked about current ship capacity and whether it is that going to change in the next year or two and if that is a result of COVID-19-related impacts.

Meeting with the NSF Director and Chief Operating Officer

Dr. Panchanathan; Dr. Crim; Dr. Weingartner

Dr. Lynch and Dr. Weingartner welcomed Dr. Panchanathan to the meeting, AC members introduced themselves and Dr. Weingartner briefly summarized the agenda items that the AC meeting has covered.

Dr. Panchanathan thanked the committee and complimented the breadth of knowledge and the intellect assembled and expressed his gratitude for their valuable service.

Dr. Panchanathan said he was part of the National Science Board for six years, so had a good understanding of the broad aspirations of NSF and some of the major projects, including the Office of Polar Programs. He recalled what he said was a life changing trip to Antarctica and thanked Dr. Falkner and others who helped him understand the importance and excitement of the science there. He said he has, as a result, as deep an understanding as one can get from being an outsider of the importance of the Office of Polar Programs. The highlight of his trip was when he saw a graduate student who was unbelievably dedicated and the makeshift tent the student was living under, and so excited about the science without any complaints because the student felt this was an unbelievable opportunity to pursue their dreams. And for me, that was the highlight of my job.

Turning to his role at NSF, he said he had a reasonable understanding when becoming director of what NSF is and what NSF is capable of doing but did not know the unbelievable people at NSF. As director he is interacting with all of them almost daily and has taken deeper dives into every directorate and the programs. When I see the quality commitment and intellect of the people, I'm just unbelievably impressed with what they are accomplishing every day at NSF, he said.

Dr. Panchanathan spoke next of his vision for NSF and three things he wanted to advance. The first thing is the frontiers of science and engineering research. NSF is about basic, fundamental research. That's the unique mission of NSF. He said was deeply committed to that mission. To advance that, there are a lot of contexts to enrich that learning. That's what happens when you start to work in domains like his own area of computer science and engineering and start to work with industry or you start to work in context, like his own personal research, which was designing devices and technologies for assisting individuals with a range of disabilities or a range of abilities to empower them to ensure they are successful, productive members of the scientific society. And that's something he said he was deeply passionate about.

Another pillar he talked about was access. He is very committed to access in every form. There is unbelievable talent across this great nation, but some of the talent is not being brought to life as we should because we need to work harder and go farther to be able to excite, inspire, motivate and nurture the talent. Diversity inclusion access is something he cares about very deeply, he said. He spoke of his previous job in a university that deeply cares about the socioeconomic demographic of students from all segments of society and the nation having the opportunity to excel and his own research in ensuring all segments of society feel they are included.

Referring to Alaska natives feeling excluded, he said NSF will do everything to make sure people feel included as they rightly should be. NSF will do everything to make that happen because that's one of the major pillars of his vision. Talent that is resident across the socioeconomic demographic and across the nation needs to be given the opportunities to succeed. That's our collective responsibility in NSF. And NSF can be a great catalyst and facilitator.

The third part is global science leadership in these very difficult times, particularly COVID-19, where we are not even able to have these conversations in person. We are limited by the technology yet enabled by the technology at the same time. Global science leadership is an exceedingly important imperative. Global talent should be welcome, but global talent should be augmented, not substituted. Domestic talent needs to be brought out in its full force and full capacity. Global talent then becomes augmented on top of that in order that the unbelievable scientific explorations can be had. And we as a nation, which believes in openness, transparency, scientific integrity and research integrity, have to always be that nation that sets these values as a basis of how we collaborate with nations across the globe. He recalled fantastic conversations with global research council members, the new head of UK Research and Innovation (UKRI), the new head of The Natural Sciences and Engineering Research Council of Canada (NSERC), ambassadors and others, all of whom aspire to be partners with the United States. He told them that as long as we share common values and common aspirations and as long as you can develop mutual trust, most certainly we will collaborate. That collaboration is best exemplified by the kinds of work that we do in the polar programs. Global science leadership is an absolute must. What we mean by leadership is that we subscribe to those values and principles that others also lead with.

The three pillars of advancing the frontiers of science and engineering, access, global science, leadership, and all of this accomplished through horizontals or threads. One is, how might we do this through unbelievable partnerships. In two months at the agency, he said he has talked to all the heads of agencies, including NASA, the Department of Energy (DOE), NOAA and The National Institute of Standards and Technology (NIST),

DARPA other parts of the Department of Defense (DOD), including the Secretary of the Air Force, who talked about the Arctic program. These conversations are about partnerships. As an example, he discussed partnerships between OPP and GEO with ENG, CISE, BIO, EHR and others, which can only mutually enrich the directorates. In these very difficult times of COVID-19, can we have remote exploration possibilities, can we keep advancing science with what we have today, notwithstanding the challenges, but doubling and tripling our commitment to ensuring that we will make sure that when things do get back to normal that we make sure we are putting everything in place that people are able to get access in a physical sense. But if anything is possible through remote access to data as well as remote exploration possibilities, what can we learn from the experience so we might set the stage for both kinds of instrumentation possibilities that helps build this scientific infrastructure to be even more robust for the future. So, partnerships, inter-agency partnerships, industry partnerships. He recalled a great conversation with The Science Philanthropy Alliance about how to leverage collective investments. And he talked to others who can be co-investors for the advancement of basic scientists. They asked him to come and speak to their board members to hear how philanthropy can contribute to the excitement of basic research. He also emphasized partnerships with community colleges and higher education sectors. It is a very important imperative that we partner in order that we might take what NSF can do and with scale and speed do the things that we need to do and enrich NSF through those partnerships, not just only with resources, but with ideas and the many other things our partnerships can bring.

The other thread is innovation. We should be constantly innovating and looking at new ideas and new ways of doing things. As much as the existing ways of working should be carried forward, what are other innovative ways we can move the scientific enterprise forward. So, these are the overarching approaches that I that I would like to emphasize. He pledged to triple down on these to make sure that we are making significant progress over the next decade. This is a very important decade and is a defining moment. Our global competition is challenging us and that is an opportunity. The missing millions of domestic talent is a challenge but also an opportunity and he noted the fact that there was bipartisan support in his confirmation hearings. He said he has found bipartisan support for science on the Hill. There is an understanding all science is important in solving grand challenges like what we are facing today. And therefore, this is a defining moment and such moments can be leveraged as a catalyzing factor in terms of moving NSF forward and in general moving science forward.

On diversity and inclusion, you have a partner in me, and you can trust that we will work together to make sure we increase diversity, he said. We embrace inclusion in OPP and I look to you, the experts in terms of giving NSF great ideas, and you're doing that already. You are on the ground solving problems and you have an unbelievable understanding of the context as well as potential solution pathways. He said he was eager to listen to solutions and said NSF is open and willing to look at all kinds of creative ideas to see how we might do better.

On the COVID-19 impacts, NSF will do everything possible to make sure we are providing an environment that promotes scientific pursuit at the highest level of intensity. He referred again to the inclusion of Alaska Natives and said he has experienced this firsthand with the Native American population in Texas and Arizona. The important thing is first to have conversations that allow us to understand and build trust and allow us to develop solution pathways together as a team. It is not us versus them. It is us together, all of us working together to find solutions to such issues in a timely way.

He said he was very grateful to the committee of visitors for the selfless work they do. As a board member, we talked about the unbelievable commitment of the Advisory Committee members and the COV and how they enrich NSF, for which we are very grateful. He said he was very excited to see that they see the merit review process at NSF as robust, while there might be improvements. Coming from an engineering background, we always talk about continuous improvement. There's always room for improvement. And improvement happens when ideas come from all of you. And we will make sure you work hard at seeing how we might do even better. At an upcoming retreat the board is having, the board is very keen to discuss broader impacts and how can we broaden the definition of broader impacts and have even more impact.

Dr. Crim said the three pillars Dr. Panchanathan talked about are already being integrated into the automatic responses NSF makes. He said they were nice organizing principles that span the space of what an agency like NSF should be doing. The AC members can think about how the area they know the most can connect to these areas where we're going to try to move at speed and scale. We learn a lot from hearing folks respond to the points of view that we're taking.

Discussion

Dr. Lynch said one of the new organizing principles that has been a tremendous force for mobilizing the scientific community has been the 10 Big Ideas and asked Dr. Panchanathan how he saw them going forward and how they meshed with the pillars he presented.

Dr. Panchanathan noted that he chaired the committee of strategy on the National Science Board when the big ideas were germinated. He said he was enthused by the 10 Big Ideas because it brought together several things. He said he has always been a firm believer that we need to think big as a nation. Thinking big inspires all the unbelievable young investigators in doing their science and is inclusionary. It is also a framing that allows you to think about how to collaborate across directorates. If we take bio or engineering or CISE, etc., that can add unbelievable value to OPP and OPP can be exciting to a computer scientist trying to design a machine learning algorithm. Therefore, these Big Ideas present a platform for enriching the synergistic work that happens between disciplines. But the most important thing is what we can do for the scientific community with those two ideas. You can make unbelievable leaps in scientific progress. Like anything, these things evolve with time. So, the first pillar is all about the Big Ideas evolving with time, not going away. The Big Ideas should become bigger, better and evolve with time. In fact, the Big Ideas have to become bigger through partnerships. How might we make the Big Idea, Navigating the New Arctic, bigger by bringing in other agencies to come and partner with us? This makes communicating the impacts much more straightforward to constituencies like Congress and brings more confidence to further seeking investments at scale.

Dr. Nettles asked Dr. Panchanathan to say more about what he sees as the most important actions that NSF can take as an agency, with its very special role in US science and within the Federal government, to increase and improve our talent pool and improve diversity. How can NSF have the biggest impact?

Dr. Panchanathan said NSF has tremendous power through the strategic investments it makes. NSF also has a tremendous power of getting people to the table. At the end of the day, money helps. But money is not the be all and end all. It's how do you get the people to sit together and have conversations. And this is a conversation that needs to be had, with many constituencies coming together, including academia, community college systems and communities. The AI Institute spanned 20 states with seven Minority Serving Institutions (MSI) and Tuskegee University, an HBCU. He said he has challenged NSF in its next iteration for all 50 states to have a presence in this, and not all in the same way where there is a research university having a project. Some of them will be community college systems. Some will be in fully degree granting colleges. Some will be research universities. You've got to lift talent from every part of this nation. This AI Institute is not just about AI. It's about a platform or model that needs to be replicated. It's got to tap into and inspire talent across the nation. We need to understand from the community and have conversations to understand where the problems are and not pretend that we know the answers. And we need to find solutions co-produced with the community. And NSF empowers those solution pathways by its investment. In the last couple of weeks, the board had an outstanding discussion on black scientists and engineers. And then we had in the Mathematical and Physical Sciences (MPS) Directorate a panel on black scientists and engineers and the questions all revolve around identifying the barriers and challenges. What might NSF learn to unleash the latent talent present across the nation? Dr. Panchanathan said he has been very impressed with the cadre of unbelievable programs for veterans, HBCUs and MSIs for different segments of society. The challenge is we don't have scale. He said he was pushing for more action at scale. To achieve that scale, you need resources and if you wait for them to come from only the Federal government, there is a lag time. But that's where partnerships are helpful. He said he has had conversations with foundations that are very passionate about talent in every form being inspired, so we can unleash those kinds of resources because NSF has an unbelievable platform of being able to get the best ideas to life. So, can we get these foundations to partner with us as a co-investment strategy to see if we can scale that faster than just by resources from the Federal government alone, as important as that is.

Dr. Mack asked what the plan is to support polar science during this period of uncertainty, of lost opportunity and of increased complexity of access and how will NSF as a whole support the recovery and hopefully the resilience of the polar program? What are the mechanisms to make this recovery possible?

Dr. Panchanathan said NSF is doing what it should do now while learning from the situation to see what it can do better in the future. For now, what we are trying to do is to see how access to the scientific research can be best preserved even under these tough circumstances. He has constant conversations to see how we are enabling scientists to have access to the data, even though you don't have access to the physical environment, and how might technicians be helpful in terms of seeing what can be done if physical presence is not possible, if there ways to get better access to the environment with other mechanisms in the near term. There is still the possibility of going to the ice and now that we are getting into the next season, the ways we can do that safely. Safety is the most important thing. For the future, what might we do with technology that can guarantee people more access and more ability to explore remotely and what might we do if such a thing were to happen again to not allow the slowing of the

scientific spirit? In March universities that probably would have taken several years to switch to the digital model of learning switched in two weeks. Yes, there are glitches and challenges and a lot of people worried about whether the learning process would materialize. But we were able to deliver reasonable quality learning outcomes to our students. It is not the same, but we did our best to take advantage of the moment and do something different and hopefully better for the future in the form of programs. Lastly, he said his humility has been greatly increased by thousands of fantastic students over the years with much more clever ideas than I could have ever thought about. So, the ideas for doing better are not just at NSF, they are amongst all of you, the community. So, if you have other ideas by which we could do better, I am all ears.

Dr. DeGrandpre noted that the Arctic and Antarctic COV reports highlighted the change in the review processes that occurred because of the removal of proposal deadlines and, particularly, the reduction in the use of panels for reviews. He asked how this policy is going to expand throughout NSF and how NSF will adapt to these changes.

Dr. Panchanathan responded that he did not make those sorts of unilateral decisions because these are very important positions in the scientific community. Folks that have tried this have told me that this has raised the quality of the proposals because people are able to send it when they have the highest quality ideas and are able to put those ideas together and it raises the quality of the proposals. While it has complicated the life of people at NSF having to do the reviews, by and large it has improved the quality of the process and therefore the outcomes. In fact, we've got higher funding rates because of this. But I'm also mindful of some of the challenges that might be there. So, the directorate and the scientists should have input into the process and then we will take a decision based on what makes the best sense.

Dr. Crim added that NSF had over a period of years moved from ad hoc reviews to many more panel reviews. The agency and the community are becoming pretty comfortable with the way panels are working. The premise of the question that it will reduce the number of panels is not necessarily correct. It is more challenging to put together the right panels. One of the things we may do, because of this technology we're talking on right now, is run many more small panels, more tailored panels. The big stress on the program side is how do you review proposals appropriately or efficiently. Dr. Crim recalled a program officer who told him that the day after the deadline, he opened the proposal app and had 275 new proposals sitting there. The PO said it was daunting. The PO said that now, when he opens the app, he has a few proposals that have come in and they come in on a regular cadence and he is much more able to think about how they fit together, how they fit into his program and who else ought to be looking at them. So, there are prices to pay and there are upsides and, as Dr. Panchanathan said, we want to know what you think about how it's working.

Dr. Panchanathan encouraged the AC to engage with [?] and Scott and they will address some of these things so that you have the opportunity to engage more. He also expressed his gratitude to everyone for their service. Hopefully you've gotten the vibe already, even though it's virtual, that I'm a welcoming person for ideas, he said. I'm a person that is open to suggestions and improvements. So, I hope that makes you feel comfortable to know that this is not just a one-hour conversation, and then goodbye, we'll see you at the next meeting. But instead that if you have good ideas that you will always say, Panch, we thought of this idea. We just want to send it to you. And I welcome those kinds of interactions. So, I hope you find comfort in knowing that that's how I operate. I always say my actions speak louder than words. So, thank you so much.

Dr. Weingartner thanked the Dr. Panchanathan and Dr. Crim for spending the time with the AC.

NSF Response to the Arctic Portfolio Review

Dr. Lynch; Dr. Stephenson

Dr. Stephenson began his presentation by noting that the effort of the Portfolio Review Committee was started in 2017. The main meeting of the Portfolio Review Committee was held in September 2018. The report out was to the spring meeting of AC-OPP in 2019.

Dr. Stephenson highlighted what he said was a key recommendation of the committee at the time:

- It is recommended that ARC be re-constituted as three standing programs that invite proposals using one or more defined approaches:
 - Programs:
 - Natural Sciences and Systems (NSS)
 - Social Sciences and Systems (SSS)
 - Coupled Human-Natural Systems (CHNS)

When the report was produced, in May of 2019, the outcome of the new funding in NNA was not known to the committee or the community. It was the first year of the competition and the proposals had been received. But awards had not been made and nothing was known publicly. And we see fundamentally a very exciting development with NNA, which is doing a tremendous job bringing in engineering, social systems, natural systems and computational assets. This is where we have invested significantly to fill the gap that the Portfolio Review Committee. It was a significant gap and was hurting to some degree the science we were accomplishing.

The report recommended that each of the three program areas invite proposals using one or more defined approaches:

1. Deep Dive Investigation
2. Strategic Envisioning
3. High Risk and Exploratory Research
4. Synthesis and Integration
5. Long-Term Perspectives

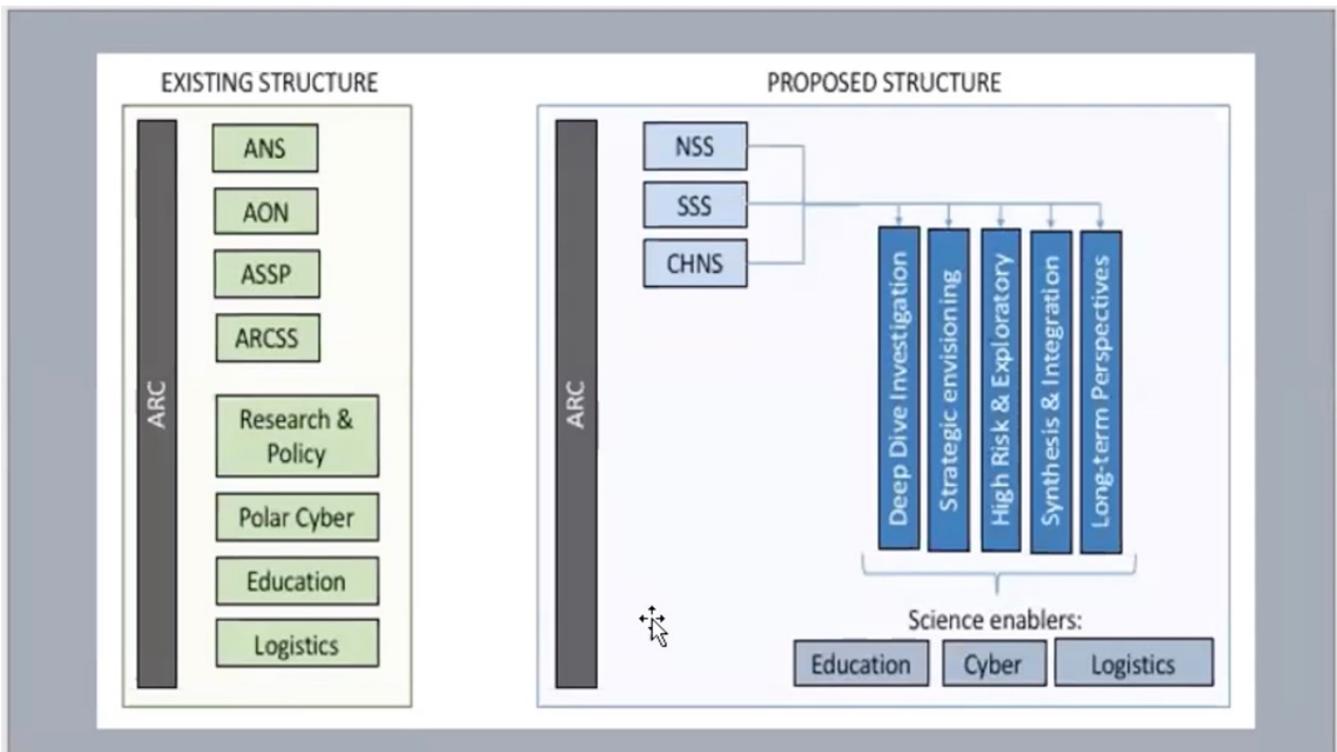
He said there were deep dive investigations in three areas. In addition to basic research proposals, he discussed strategic envisioning, which was a point the committee felt was very important. It has been a strength of the program in the 2000s. It wasn't clear where that was going now, other than in the social science program, which had gone through a significant envisioning process. Also, high risk and exploratory research and synthesis and integration have always been a relative strength of the Arctic System Science program, but perhaps less strong elsewhere. And long-term perspectives, the original term for the Arctic Observing Network (AON) program. We agreed the program needs some rethinking.

Another point from the Portfolio Review Committee is how does this long-term perspective of observations support the fundamental understanding of natural systems, social systems and combining those two systems.

The COV also picked up on the AON program. We have been thinking about looking at some of the strategic envisioning, the synthesis of integration and long-term perspectives and perhaps doing something like what the social science program did, a year-long engagement with the community that looks at both AON and the Arctic System Science program together. How are those two programs working together? That is something that is being considered. One of the keys responses will be in a revised solicitation that hopefully is quite responsive to the people who wrote the portfolio review report. It is in its final draft and is going through a clearance.

He said NNA does have fairly tight constraints on it. Looking at the intersection of natural, social and engineered systems, there is some really good work that doesn't quite fit. So, we've actually ended up declining some strong scientific proposals, just because they didn't have all of the pieces. And we see an opportunity for the ARC program as a response to this committee's input, perhaps having a more open, less constrained space for that socio-environmental research, or perhaps in the AON/long-term perspectives some of the observational capabilities promised in the in the report.

Dr. Stephenson presented a diagram showing how it was envisioned:



He said it is not clear what NNA will look like in three or four years. It was envisioned as a five-year program; year three is about to start. Awards have been made from year two. It could end as a Big Idea, which is a typical trajectory of some larger assets. If it does end, he does not want the collaborations it has brought with partners throughout NSF to end. He said some may remember Biocomplexity in the

Environment (BE) [?]. When it ended, there was a program maintained coming out of Biocomplexity that's still continuing. He said he would return to the core recommendation on programs when it looks like NNA is in a transition to something else. This area of research has shown itself to be so important and there has been such strong demand in response to the NNA call and there are still plenty of things to do and to develop, that if it does end in its current form, we will have to rethink how are we going to continue to support specifically socio-environmental research. And that might be a couple of years away. So, I could see very clearly a program for that in the Arctic, he said. And that might give us time to think a bit more with the community's input on how an Arctic observing network and the Arctic System Science program and if they should be reworked as well in that light.

Dr. Lynch continued the presentation, adding that there were two elements, the idea of the programs and the approaches and we felt those two could be considered as separate recommendations. The idea of the programs comes from an observation that's quite common in political science around the idea that program implementation is common and program appraisal is rare. But that was what we were doing. Program termination hardly ever happens in any context in any institution. We wanted to open the door to the idea that it wasn't the end of the world to actually terminate programs if there were better ways of organizing ourselves. And so that was our flagship idea. The second part, the approaches, was something where we wanted to highlight that there were very specific types of things people could propose to do, especially new PIs, who were not always aware of the types of things that they could propose. And we felt that that list of five items was a way of making explicit what the potential realities were without necessarily relying on that PI-Program Manager relationship. Early career researchers often don't know that that's available to them. It was a way of opening the space for all these ideas to be admitted. The other recommendations were more specific and tangible things associated with stuff like broader impacts and diversity that didn't fit into this overarching vision of these two pieces that we wanted to open the space to for people to think about. They were more concrete ideas and some of them, pertaining to graduate fellowships, may not be so timely anymore.

Discussion

Dr. Mack picked up on Dr. Stephenson's point regarding how NNA is taking up some of the slack identified by the previous review. Having just had a proposal declined, she quoted the Program Director, who is not in OPP, who said NNA is not about fundamental questions in the natural sciences, it's not about natural sciences being in the driver's seat. How can we have a new \$30 million program where fundamental inquiry in the natural sciences is not part of this? Understanding there are many different requirements of the program, that quote struck me as somewhat in contrast to the program solicitation and to my understanding of the importance of this program for advancing all aspects of Arctic research.

Dr. Stephenson said he may have written it a little bit differently, that alone NNA is not about the natural sciences but it is there to be combined with either a social issue or an engineering or a built environment issue. And it is important for NSF to have a home where that coupling is not as tightly coupled as NNA wants to have.

Dr. Anderson said NNA is about questions that are in the overlap space between the natural sciences and social science and engineering — at least two of those three elements. The question itself its going after has to be something that needs contributions intellectually from a science coming at it from these directions. We're looking for two or more of that. Also, we are looking for convergence research,

fundamentally. The different intellectual contributions, the methods and the questions that you're going after, come together in a way that can't really be pulled apart in any sort of meaningful fashion and still have the viable kind of project that wants to go forward into NNA. We often use analogies of food. The project that would be appropriate for NNA is a smoothie. You've put a bunch of different fruit flavors together and blend them; you can't take the individual components apart. It just doesn't make any sense. NNA is not in any way meant to supplant other programs that have funded Arctic research for a very long time. For something that is strongly a natural science focus, but at the system's level, come and talk to Dr. Strawhacker and me about an ARC proposal. And some ARC proposals do cross into socio-economic and socio-ecological systems. And that's perfectly fine for ARC. There's a difference between an NNA versus some of these other programs. And the difference is a strong convergence and the question itself is in that overlap space.

Dr. Lynch responded that this was one reason why even though we didn't know what was coming down the pike within NNA, we wanted to reiterate in those categories that deeply disciplinary research still needs a place because that's where we're going to be looking for fundamental advances of that particular type that will further enable converging research that we can't imagine right now. And by the same token, sustained observations are needed for that same reason, and so the idea of the approaches was to call attention to all these things and make sure that the science community was heard in our support of those activities.

Dr. Weingartner asked for an elaboration on the differences between strategic envisioning and long-term perspectives.

Dr. Lynch said strategic envisioning was about the thing that we all felt as a community, the older ones among us in the community, that we used to have these meetings and sometimes extended exercises in saying: Where is our science now and where is it going? This was very active when I started as a postdoc and it continued into the 2000s. And a lot of these reports about where the scientists got together and said this is where the science is now this is where it needs to go in some particular area. The only really recent example of that that we had seen, which was actually kind of an even more ambitious and impressive effort, was the Arctic horizons work looking at Arctic social sciences, where it was now and where it needed to go, and that's been meetings across five different universities and a lot of synthetic reporting and we felt that was very valuable to the communities in terms of signaling this is where we need to go next. But it can't just be a volunteer effort. It needs resourcing. So, that's strategic envisioning.

Turning to the long-term perspectives, she said the mantra is that NSF doesn't do monitoring. But at the same time, sustained observations, or the long-term perspectives that come from ice cores or sediment cores and things like that, which take a long view on the time horizon, was something we wanted to call attention to. AON is part of that, but not all of it. And so, the long-term perspectives was really about the work that either observes over long temporal scales or derives proxy observations over those scales, or paleoclimatic modeling over those scales, historical work, archaeology, etc. So strategic envisioning is about is about strategy. Long-term perspectives is about time scale.

Dr. Nettles asked what led Dr. Lynch to say that the recommendation about the graduate fellowships was not as timely anymore, adding that it was also mentioned in the COV report.

She also said she had heard Dr. Stephenson say that some of the considerations of the recommendations are not as relevant at this point because NNA has kind of filled part of this space. And yet, I think that what Dr. Anderson said is very consistent with what Dr. Anderson and his team have said previously, which includes that this is something quite different from what a typical proposal to Arctic sciences would look like for very well defined and thought-out reasons. She asked for clarification on what Dr. Stephenson said about moving forward in the Arctic program. How does the success of NNA mean that there needs to be changes or not in the way that the Arctic program itself — which is overlapping with but quite separate from NNA — needs to evolve.

Dr. Lynch said the feeling was that the landscape could change because the COV had made that recommendation. We didn't want to step on each other's toes. But for us, it was just to fling it out there and wouldn't it be great if the polar region should have their own Graduate Research Fellowship Program, that we should have our own thing because we're special and we deserve it. But then the COV came in and kind of dealt with it in a much more substantive way.

Dr. Stephenson added, regarding Dr. Nettles' other point, the take home from the Federal review committee was that there was a gap in socio-environmental research. And yes, it has evolved in the way that NNA covers that space very nicely. He said that, yes, it has some specific criteria. And if there is some work that is related to NNA but isn't an NNA, we, as an Arctic program, should be open to supporting our work in our regular programs. He referred to the power right now to bring in the other directorates, which we've not been able to do so well in the past, particularly with engineering. We reached out and they said you've got some really interesting problems, but we're just not there. Whereas NNA hit it just right. And engineering has come on board as a very strong partner. So that's the engine, in part because that's where \$30 million goes. But we need to be thinking now about what happens if NNA does ramp down or transitions. And just as we did when it was ramping up, we put our own money into the FY '17 and FY '18 calls to support the work that was coming out of those early efforts. And that was the time that NNA went from primarily an observational program into a convergent program, with a very strong engineering input. We already had some good partnerships with social science, but I think they broadened. We had some good partnerships with bio, but they broadened. My takeaway is NNA is sort of the engine right now. And assuming that it does end we need, NSF wide, to make sure we're ready to transition into something new and keep that spirit of cross-NSF collaboration going, even if it's basically polar underwriting, as social science did with the CNH.

Dr. Anderson said that in addition to preparing for the longer term, we're trying to make sure that in the present and in the shorter-term future, that the Arctic programs, not NNA but Arctic System Science, AON, Arctic social science, Arctic natural science [?]. We are, as Program Officers, working together on a daily basis as a team to figure out a variety of things and make sure we're being responsive to the needs of the community over the short term and into the next few years. One of them is making sure we're in communication with each other when an idea comes forward. The first thing we do when someone comes to us with ideas is to ask for a one-pager. Then we as Program Officers discuss that to try to figure out what the best home might be for that and give feedback to the PI. We also do a lot of outreach to the community in the form of Town Halls. Also, we've done Webinars and office hours. Several of us participate in the early career visits to NSF each year to make sure we're reaching folks and explaining these opportunities to make sure people are aware of that. Dr. Anderson said he is relatively new to polar, having come over a little more than two years ago. Where things are today is different in a lot of ways from the way things were when he arrived, and when the report was being

done. Things have evolved, and one is making sure we're trying to give the community the best information about what the programs are interested in and making sure the boundaries between the programs are not overly rigid, but also not overly confusing. It's trying to hit that sweet spot through a lot of outreach and a lot of dialogue with the community. And we've also talked about planning and how can we sort of go out to the community on a more systematic basis.

Dr. Lynch offered an observation for Program Managers and to Dr. Falkner. She said she has noticed in doing these kinds of reports and other interactions in other programs across NSF that the institutional culture is very different in different divisions. And Polar Programs has an incredibly open flow and exchange of ideas with PIs. The culture here feels very welcoming to your average PI in a way that I haven't felt in other divisions.

Dr. Falkner said she heard something that concerns her. If people are submitting what might be fully viable proposals in a slightly different context in NSF, then I really think we really have to give hard thought ourselves to how we treat those proposals. You've heard some thoughts that Dr. Anderson's had already, but I'm sure it's going to spark a lot more discussion internally. One immediate Band-Aid we could apply, because I don't like hearing what I heard from you, Dr. Mack. We don't have deadlines for our programs and hopefully that means if there's a really good idea that can be submitted to the active programs that it could come right back in. That said, I think we have to have some internal discussions that we may inform people of ahead of time. But then what do we do when we receive something that sort of slips into one side or the other of these boundaries? So, we'll keep talking and the comments are appreciated, along with all the effort the portfolio committee put into this review.

Addressing Dr. McGovern, Dr. Falkner said a question came up regarding a rumor that there was an immediate change in the fleet for us, since we sent our ship north. For the first time in a long time. Maybe we've spawned some rumors, but if you could just give our near-term outlook for our ships for Antarctica.

Mr. McGovern said we are fully engaged with planning to use both the Nathaniel B. Palmer and Laurence M. Gould this upcoming season to support both science and logistics. We're continuing to assess COVID-19 impacts, given the difficulties we're experiencing deploying people through Chile in general, and in particular Punta Arenas. Currently, there's a lack of viable onshore quarantine locations for our personnel in Punta Arenas. We're planning on using our vessels as floating quarantine platforms. Our AIL team and our support contract partners have been working basically non-stop since mid-March just to sustain our operations. First, our focus was getting all our folks back from Palmer Station and from the ice and from active cruises and getting them home. And then we immediately had to pivot to planning for the upcoming season. The situations continue to evolve, both in the US and around the world and South America. It's been an incredibly dynamic situation. And we're certainly cognizant that this time next year, we're going to still have to be dealing with at least some aspects of COVID-19. So, in out years, at least for the next few years, we continue to plan to operate both vessels. And we're continuing to review our long-term posture relative to budgets and partnerships and other commercial opportunities. The Nathaniel B. Palmer is about to load up with a group for a very, very long journey that includes quarantining and whatnot, as well as a transit all the way south from California. We've got folks getting ready to try and fly down to Punta Arenas to join the Goud for a quarantine and we started to line up the successive cohorts to move through South America and either onto Palmer Station or to

conduct science on the Gould or just to sit on the Gould as a quarantine vessel before they transit through. So, we need both ships right now and we're using them.

Dr. Stammerjohn asked if Mr. McGovern could elaborate on what he had said in light of the ships having lifetime issues.

Dr. Falkner noted that the committee is planning a discussion of this topic at its next meeting, where Mr. McGovern will be able to elaborate further.

Mr. McGovern said both ships are being well maintained. And, he said, we are keeping the necessity to sustain them in forefront of our minds as we're moving through all the upcoming seasons.

Dr. Falkner said the committee will return to the topic in more depth and will work with members to understand other questions that may be out there that should be addressed.

Arctic Sciences Section Committee of Visitors Report

Dr. Sfraga; Dr. Quinn; Dr. Stephenson

Dr. Sfraga thanked everyone involved and said the bottom line of the COV report is that there are no red flags or flashing yellow signs, only issues the COV wanted to advance in support of the mission and highlight for the AC and OPP leadership. The COV met using phone, email, audio conference and Zoom meetings. Everyone had a lot of input and direction to the report with a lot of good debate.

Dr. Sfraga presented the following report highlights:

Section I: Quality and Effectiveness of the Merit Review Process

- Are the review methods (for example, panel, ad hoc, site visits) appropriate? YES/NO
The COV found that panels provided useful synthetic discussion of a collection of proposals. We recognize that NSF does not require ad hoc and panel reviews. In our review, we found panels played a critical role in highlighting positive and negative issues in the ad hoc reviews. The COV strongly recommends that panels be implemented whenever possible.

He explained that a recurring theme was interest in bringing back the panel composition. This group felt strongly that that ARC OPP should take a hard look at where we could and where it makes sense, understanding full well why panels aren't the standard. This group felt strongly there's high value in the panel structure for the give and take, instead of just the response back to a PO.

- Are both merit review criteria addressed? YES
The COV believes a more clear articulation of broader impact expectations for each program should be made to the research community. Consultation within a panel structure could provide guidance for broader impact expectations.

Dr. Sfraga explained that BI kept coming up, i.e. the idea of communicating what a broader impact is to the community and how the POs digested that and how they then reflected on what a BI would be. Maybe it should be looked at how each program might better communicate what they consider to be a

BI. It could be teaching utilities, videos or Town Halls — there's a list of options in the report. It is not about standardization, he said, but ways in which we might be able to help and influence the discussion.

- Does the documentation in the jacket provide the rationale for the award/decline decision? Very successful approaches in the Review Analyses are those that provide context to the reviewers, e.g. explaining the credentials of each reviewer may provide insight into priorities and rationales. The previous COV encouraged all ARC POs to adopt this format and we encourage even more widespread adoption. ARC leadership should consider regularizing a review analysis template form with input by the POs that would encourage a more systematic inclusion of review analysis materials. Furthermore, a statement about research priorities of the panel and some background into the number of proposals, number funded, etc., was exceptionally helpful for later analyses. The panel's program rating should be included in any template. We recognize that review analyses may require a certain degree of flexibility that may warrant deviation from any strict template format.

Dr. Sfraga elaborated that the group was trying to figure out ways to streamline, provide systematic input and standardize where possible to provide more efficiency and more time for POs.

- Does the documentation to the PI provide the rationale for the award/decline decision? YES Similar to the review analyses provided by the POs, the panel summaries vary in quality as to how informative they may be to the grant applicant. A template form for panel review could reduce this variation and provide more systematic inclusion of review analysis materials. For instance, a requirement of inclusion of both strengths and weaknesses in intellectual merit and broader impacts would facilitate decision support by the PO and provide the PI important feedback.

Dr. Sfraga added that it was important to retain flexibility to be responsive to the community, but are there administrative ways that could help the PI in terms of the rationale, whether it was accepted with award, was forwarded or was declined?

Section II: Selection of Reviewers

Additional comments on reviewer selection:

After careful consideration, it is the opinion of this COV that the ARC program does select ad hoc and panel reviewers of appropriate expertise and qualification. This COV agrees with COV 2016 and encourages NSF to continue efforts to improve the participation of under-represented groups as reviewers. We encourage the program to increase the participation of minorities in the review process, particularly women and early-career scientists (post-doctoral and assistant-level professors/scientists). We suggest that the program can crosscheck with databases such as Association of Polar Early Career Scientists (APECS).

Dr. Sfraga commended the inclusion process and encouraged the programs to increase participation of minorities in the review process, continuing to strive for a more diverse group in the reviews.

Section III: Management of the Program Under Review

Management of the program.

The COV is impressed with the dedication, diverse skills and energy of the group. The COV recommends that ARC continue to strive for a balance between permanent staff and qualified rotators and build on the strengths of the group. We also recommend that ARC consider practices that ensure continuity in training and program practices.

The removal of submission deadlines for all ARC Programs has dramatically changed the workflow since the previous COV...Some of the programs have adjusted to this change by decreasing the number of panels... Other programs have done away with the use of panels.

The COV recommends that ARC re-institute the use of panels wherever feasible. The COV encourages ARC to evaluate the impact of no-deadlines on submission rates, proposal quality, and the review process.

Dr. Sfraga reiterated that the COV looked at stability, training and career ladders and thinks the organization has stabilized in terms of rotators and people transitioning out and permanent staff in place. If there was a concern it might be the removal of submission deadlines for the ARC programs has changed a lot of the workflow, number and types of proposals. It recommends ARC reinstitute where appropriate the use of panels and evaluate the impact of no deadlines.

The COV commends the ARC program for organizing a portfolio review in 2018. The portfolio review committee recommended that ARC science programs reorganize into three sections: NSS, SSS, CHNS. The COV recommends that ARC consider this recommendation in light of decreasing proposal submissions.

Dr. Sfraga added that there was a recommendation to look at the consolidation of a number of programs. There were not strong opinions one way or another, but a recommendation that ARC consider this in light of decreasing proposal submissions throughout the different programs. It might or might not make a difference, but the leadership might take another look at having an organizational structure that has synergies with the community and reflect the community better while also helping the organization. The group felt it was worthwhile to tease that out and to provide that recommendation.

Responsiveness of the program to emerging research and education opportunities. The COV applauds ARC involvement in NNA and supports coordination between NNA and ARC programs, particularly in sustaining diverse research portfolios.

Of particular interest, he noted, was the ARC-NNA relationship. He said here is a responsiveness to the program to emerging research needs and educational opportunities.

Responsiveness of program to previous COV comments and recommendations.

NOTE: This COV's comments are in response to COV 2016.

Extensive Dwell Time, Section III.1 page 4.

2020 COV: Dwell times remain high. The COV encourages all possible efforts to decrease dwell times and to keep investigators informed of pending decisions.

Dr. Sfraga added that the issue of dwell time is still a challenge and is noted in some detail. Many reasons are listed for why it might still be high. He added this should be taken in the context of government shutdown and the continuing resolution. But he said there was good discussion about ways it could be addressed.

AON Program Management, Section III.4 page 10; Section IV.2 page 12: Some form of a high-level, external, strategic planning initiative needs to be mounted to assist the AON PO to identify the rationale and the structure of a functional AON network.

2020 COV: AON. The COV recommends that ARC form an external (or internal to OPP) advisory committee to evaluate the AON program balance and proposal submission trends, the viability of AON as a distinct program, and to aid the PO in developing a strategic plan.

Dr. Sfraga said the group had a long debate process on AON and felt a positive review would be helpful, especially with the dynamic need for more observing networks. It would also help this particular PO build that strategy and a good analysis would further inform that program rolling forward.

Section IV: Resulting Portfolio of Awards

Does the program portfolio include awards for projects that are innovative or potentially transformative? YES (QUALIFIED)

Many ARC-awarded projects are engaged in potentially transformative research (PTR). However, as noted by the 2016 COV, the assessment of innovative or potentially transformative projects is highly subjective.

The COV recommends a systematic assessment of PTR in review, clearer justification for a PTR assessment, and comparative assessment of PTR at the panel and PO levels. For example, having a panel vote for designation of PTR projects would more clearly identify these projects.

Commenting on Section IV, Dr. Sfraga highlighted potentially transformative projects, asking if there is some systematic assessment of what it means to be transformative? The recommendation for a clear justification addresses that by, for example, having a panel have influence in designating what is a PTR project.

Section V: Other Topics

Please comment on any program areas in need of improvement or gaps (if any) within program areas.

Select Strategic Planning:

The COV recommends ARC form an advisory committee to evaluate the AON program balance and proposal submission trends, etc., in an effort to support and aid the PO in developing a strategic plan that meet ARC's vision for the program and reflect the PO's desires to support the Arctic community's growing need for AON-related initiatives.

Please provide comments on any other issues the COV feels are relevant.

Discussion with the POs of the ARC revealed several areas of potential reform that the COV supports.

A. Development of a mechanism that support emerging technologies is warranted. New instrumentation and approaches are oftentimes risky and as a result, meets resistance by reviewers.

B. Managing conflicts of interest among reviewers and panelists in small fields is a barrier for effective institution of panels. We support relaxing the strict adherence to COI standards, in light of increased collaboration that characterizes modern science. We suggest instead adopting applicable mechanisms to appropriately adhere to the intent of COI requirements while allowing for flexibility in the case of modest collaborations e.g. when authors are part of larger consortiums.

The issue of ways to help support emerging technologies came up with POs multiple times. Sometimes when a reviewer sees something on emerging technology it meets resistance. He asked if there are ways for further review of that component in the overall process. He underlined the issue of holding with the intent and requirements of COI while allowing for a broader base of reviewers.

Discussion with the POs of the ARC revealed several areas of potential reform that the COV supports.

C. The hiring of a Science Assistant would be of benefit and allow POs to target development of other programmatic needs.

D. There is a need for “seed type grants” to generate preliminary data for later submission. Currently, this need is filled by supplement to existing award, EAGER, and Rapid Response Research (RAPID) mechanisms. Unfortunately, these mechanisms require significant administrative time and development of a small seed grant mechanism that is more efficient may be explored.

Dr. Sfraga said the COV heard about the need for more staff and resources. The hiring of a science assistant would be very helpful to the program officer so they can they can spend time on other things while having a support mechanism.

Regarding seed grants, he said these can help generate the data for later submissions or to get a good idea moving forward. It would be good to set up some mechanism so there is something very clearly for seed grants, across ARC.

The Future of Arctic Research: Issues and Realities for Consideration.

The COV offers for consideration the following list of issues, drivers, questions, and themes that we believe will, to varying degrees impact ARC in both the long and short-term.

A. Is ARC well positioned to manage and deliver its mission during a prolonged COVID-19 scenario?

B. Is ARC well positioned to address the many diverse, yet interconnected research needs and demands that the new and dynamic Arctic requires? NNA is noted and celebrated.

C. Is ARC well positioned to address the pending needs of the research community to address and execute relevant components of the multi-national Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean?

SECTION V: OTHER TOPICS

The Future of Arctic Research: Issues and Realities for Consideration.

The COV offers for consideration the following list of issues, drivers, questions, and themes that we believe will, to varying degrees impact ARC in both the long and short-term.

D. Is ARC well positioned to address applicable aspects and articles of the 2017 Arctic Council binding Agreement on Enhancing International Arctic Scientific Cooperation?

E. Will ARC short and long-term research needs and requirements be met by the nation's Polar Security Cutter fleet and ice strengthened Research Vessel capabilities?

F. To what degree should/can ARC influence design and functionality of the future Polar Security Cutter fleet so the research community's equities are considered and addressed?

Dr. Sfraga, noting the report was written in June and July, said the section on the future of Arctic research a reflection at that time of what would happen if the pandemic continued, not just for the programs and enabling of the research that goes on, but the effect on the very nature of the research that goes on. This includes how to fill gaps in what's happened this summer in funding next year cycle. They looked at how best could ARC be positioned for not only taking up the gaps in data and the research but taking care of what hopefully will be a season next year and what happens if there isn't a season. What if it looks next year like it does this year? Also, is ARC well positioned to address the quickening of the Arctic. There is a lot of interest in getting data and supporting good basic research. ARC is situated well, but there are going to be more opportunities likely and more focus and more demand for asset probes, or program calls.

Dr. Sfraga turned next to the international Arctic research component, the link to ARC and the crosswalk between those. China still needs to sign the agreement to prevent unregulated High Seas fisheries in the central Arctic Ocean, but that is likely to happen. Ant there needs to be a science plan. And how does that ripple through organizations like NSF, OPP, all the way down to ARC? What are the demand signals going to be? We don't quite know yet, though we have some insight. Similarly, we have a binding agreement on enhancing international Arctic science cooperation. ARC is well positioned to fulfill that cooperative agreement. He raised the issue of impacts, hurdles that remain, whether there are advantages or disadvantages, and whether there are things that can be exploited to the good in that cooperation agreement.

There was also a lot of discussion about icebreakers and support of Arctic research and research vessels in the north. At least the first and maybe even the second new polar security cutters are likely going to be heavies and they're likely going to focus on the Arctic. And with the USCGC Healy and its challenges it raises the flag even further about the future to support Arctic research. Also, the degree to which ARC and OPP have an influence and whether the community can support that influence and ensuring the research community is taken into consideration.

Dr. Sfraga concluded by saying that the bottom line is that the organization is healthy and well situated and commended the leadership team and said there were no red flags.

Discussion

Dr. Loose asked if the committee looked at what was happening in place of the panels when those weren't part of the review process. His understanding of a panel, he said, is that it provides an additional thorough review from at least one of the panelists and some more cursory overview and functions like a bandpass filter where the write-in reviews are either amplified and validated or somewhat mitigated by the panel that filters to the proposer through the panel summary so they get a feeling for which critiques might be more out of left field. So, is the PO stepping in to serve that role, or is that whole component just removed?

Dr. Stephenson responded that to some degree, Dr. Loose's comment is true. The PO is in a position to synthesize the input he or she gets from the ad hocs and if they're uncomfortable with conflicting input, they can get more input from additional reviewers. A panel that sits and considers a set of proposals, even if they're quite diverse, can provide the program an additional synthesis that's independent of the program offices. Most programs agree. An earlier comment that we have moved from ad hoc reviews to panels at NSF is probably true. Polar has tried to do both. But maybe we should have panels that deal with smaller numbers of proposals that are more focused. Maybe we should share more panels with other folks around the agency. Maybe it needs to be pushed a little harder than we've done in the past.

Dr. Stieglitz said it is a mixed system; some groups do ad hocs and panels. Most of the time, the ad hocs are the specialists that can evaluate the technicals of the proposals. And we have the panelists come in to give a broader view and to agree or disagree with certain comments. Some of the groups go one way and some of the groups go the other way. And we each have our reasons. When we don't have the right expertise, we will always partner with another division. So, in many cases our proposals are going to two panels.

Dr. Stephenson said that, fundamentally, ad hoc reviews are used. And what we're hearing from the COV is we need to push a little bit harder in exploring how can we add panels and that's the challenge.

Dr. DeGrandpre said it seems like it is a consequence of the proposal deadline removal. As proposals slowly trickle in, decisions can be made until somewhat of a critical mass is achieved and then a panel could not be had because it was far along in terms of the proposal review process.

Dr. Stieglitz said in Arctic Natural Sciences (ANS) they look for that critical mass, but are always sending out ad hoc reviews as the proposals come in. And that is the advantage of no deadlines. It allows us time to find the exact reviewer who is ripe for a proposal. But once we reach critical mass we choose

panel members and bring them in. So, it is correct that we have to hold it to where it has statistical meaning. When we have those submissions or when we're getting close to them, we're then constructing the panel that needs to be held. He said it is the no deadline that is reducing the proposals for one reason or another, but he does not see it affecting the way we hold panels. Traditionally, we had one or two per year and ANS is actually doing the same. For the proposals that are coming in, we're averaging about two sets of panels for the last couple of years. The decline is NSF wide. We see that all throughout GEO and the places that are having no deadlines.

Dr. Isern said one great thing that's happened over the past couple of years is that the Antarctic Glaciology Program has been having a joint panel with Arctic and that is a fantastic synergy. Dr. Stieglitz is correct that what's happening across the foundation probably is that panels are being used at the expense ad hoc reviews, which is also a trend we don't necessarily want to see. GEO is very unique and for the most part we endeavor to do both ad hoc and panel reviews, because we feel that it's the gold standard. And we have the proposal numbers to be able to manage that workload. Dropping deadlines, we've seen about a halving in the number of proposals and we're still learning how to deal with that. We're starting to see what the director alluded to, more virtual, shorter panels and in that we're certainly seeing a way to deal with this. But as Dr. Stieglitz highlighted we do a lot of cross reviews. So, if a program has just a small number of proposals that need panel review, for example, our oceans and atmosphere program in the Antarctic co-reviews a lot with OCE as well as AGS. It's good that the COV highlighted this so it keeps it on our radar. But it is something we want to continue doing.

Dr. Borg added that there are downsides to panel only and yet there had been a trend of increasing use of panel only to deal with larger numbers of proposals. GEO and OPP in particular likes the hybrid model of ad hocs and panels and it does bring a lot of strengths. He noted that both COVs would have looked over the last three years and there is some truth to the notion that removal of deadlines has made it harder for convening of panels. Some of that seems to be the notion that you convene a traditional panel in person with a fairly large panel on a fairly large number of proposals. Since the COVID-19 situation has forced us to become more digital, people are being a little bit more creative and they're forming smaller panels and bringing smaller groups to panels. And there's enough of this going on now that for the next COV it might be useful to look at that question.

He added that one thing Dr. Sfraga talked about early on in a summary of this COV is the value of panels. Having a bit of active cross talk to discuss any number of things brings a particular value and I agree with that wholeheartedly. One of the things that might emerge from this COVID-19 experiment is that as smaller panels are convened, can you bring together, say, 15 people that would serve on a panel over a year. And every six weeks or so a subset gets together and talks about the proposals in batches that way. There are things like this that are being talked about and it might be useful to have any ideas AC members have about this experiment on the table. But if you were to do something like that, would the kind of synergistic discussions described earlier be as effective? If you had smaller groups and then essentially different people discussing them, would you be able to get the same level of synergy in terms of value in the advice that goes to the PO?

Dr. Steig said he was unaware of the shared panel, Arctic to Antarctic, and asked if this implies it will be easier to evaluate and fund proposals that are bipolar, because there's a historic problem of that being in two different programs.

Dr. Isern responded that, yes, that's what she has seen with what's coming through and awards, an increased ability to do just that. That's also been so within our diverse science co-review with the Earth Science Division. There again, we've seen for geomorphology and some low latitude glacier work a bit more coming in.

Dr. Cutler said the answer to Dr. Steig is yes. It's partly that we're more aware of everything that's coming in and we make those collaborative discussions early in the process. Both programs are on board and we've been doing several of those joint funding actions in the last year or two.

Dr. Stephenson also answered yes to Dr. Steig.

Mr. Arnaudo asked Dr. Sfraga to elaborate on what NSF was looking at for new construction of polar vessels and such.

Dr. Sfraga said the COV's reflections were a sign of the times and just thinking through what's in the mill for the Coast Guard and what does that do to the research endeavor going forward and as those ships are being designed and hopefully built and put in the water? What influence should OPP have in ensuring the research communities' equities are put before designers before it goes forward. That was the bottom line. If we as a nation are going to build these vessels that could support science, what role does the scientific community have in influencing they're design to ensure the equities of the research community are taken into consideration.

Dr. Stephenson said that hopefully the next meeting would get into some of these questions.

Dr. Falkner noted to Dr. Sfraga, who was not present earlier, that the AC committed to getting the Coast Guard in for a brief discussion with the committee.

Dr. Weingartner oversaw a vote of the AC in favor of accepting the COV report and thanked the committee. Dr. Weingartner added that there was some discussion of formalizing the report in brief for possible publication in Eos or a similar publication and asked if Dr. Sfraga would assist.

Dr. Sfraga said he'd be pleased to do so.

Action Items, Closing Remarks and Adjournment

Dr. Weingartner; Dr. Falkner

Dr. Weingartner thanked everyone and said the meeting went well, given its virtual nature and expressed his appreciation for the effort everybody put in.

Dr. Weingartner next moved to capture some of the to do activities that came out of the meeting. The first, he said, is that the AC will be instituting the diversity subcommittee in short order. Dr. Falkner and Ms. Walker are going to largely handle that.

Dr. Falkner said she was relying on Dr. Weingartner to keep the AC informed of progress, but Ms. Walker is helping to coordinate. And there's a team within OPP that's being a brain trust for helping come up with ideas for the learning activities. We'll need to get with you, Dr. Weingartner, when we've

got the final roster, she said, and make that clear to the whole committee and then we'll make sure the learning activities get advertised so people know they can participate.

Dr. Weingartner said the next to do activities were the COV summaries and getting something together for Eos. He said Dr. Kump and Dr. Sfraga have offered to do that. He asked if Dr. Quinn and Dr. Mack could help, with the AC available to comment on or help in any way.

Dr. Borg said he was going offline but first wanted to thank the committee.

Dr. Falkner said she recently engaged with Eos on another matter. They have made some radical changes in what they have for material that they're using. We need to be sure Eos is still accepting that kind of material. Provided they are, we can do some legwork to help you out.

Dr. Weingartner said perhaps this is something Dr. Heimbach can help with regarding the presentation to the Polar community on developments and opportunities in the computing and cyber infrastructure.

Dr. Falkner said that will be a topic for the next meeting. She said Dr. Stiglitz played a key role when he was with us previously and there are more people who will be on board dedicated to this in the next meeting. It is a very dynamic, active area and we will want to hear from the committee as well, if they have any specific things they feel would make that session worthwhile.

Dr. Heimbach said he would help with that. His question for the next meeting is to see what the current engagements are between OPP and CISE, for example, so we can provide something from the community perspective, but also the other way around.

Dr. Falkner said that would be possible. We wanted to do that joint session but COVID-19 undid our ability to do that. But we are going to see if we can't reprise that in a productive way. So that would be a great opportunity to work with them. We'll definitely be in touch, she told Dr. Heimbach. We'll try and make sure some of us are listening in carefully to the CISE meeting, so we can inform ourselves for that. She added that OPP will put together something informative.

Dr. Weingartner added that for the next meeting there will be an agenda item that will give an update on the Coast Guard, the current Antarctic ship situation and any further progress that's made with respect to the Antarctic research vessel.

Dr. Falkner said Dr. Nettles had raised the issue of security. And Dr. Rebecca Keiser, who was unable to attend, will be rescheduled.

Dr. Weingartner asked if that related to the issue of international pilfering.

Dr. Falkner said it did. She added that as the agenda is developed, if members have anything to suggest, they should feel free to contact Dr. Weingartner.

Dr. Borg thanked the AC members for the time they put into the meeting and for the discussion. It is a very important part of the process, he said. He also asked that appreciation be passed on to the COV members on behalf of himself and Dr. Easterling. It is very important for keeping an eye on our own

processes and execution, he said, and a very important part of keeping the merit review process strong. Dr. Easterling sends his regrets that he was unable to join for the concluding segment.

The meeting was adjourned.