

## NATIONAL SCIENCE FOUNDATION (NSF)

Advisory Committee for Polar Programs (AC-OPP)

Fall Meeting, September 15-16, 2022

Meeting Held Online

### MINUTES

#### Action Items Arising from the Fall 2022 AC-OPP Meeting

1. Items that arose for possible inclusion in the agenda of the next AC-OPP meeting (spring 2023):
  - a) Possible joint AC-OPP/Committee on Equal Opportunities in Science and Engineering (CEOSE) meeting.
  - b) Ways to facilitate international collaboration.
  - c) How to make polar science more accessible to those not physically able to travel to the poles who may be inspired by the work there.
  - d) Explore ways the AC can recognize those acting in a positive way to combat harassment and bullying.
  - e) Polar partnerships.
  - f) Further discussion about providing a response to the diversity, equity, and inclusion report.
  - g) Town Hall meetings that are complementary to OPP's development of convergence dialogues.
  - h) Community input and involvement in thinking about difficult problems and future research directions.

#### Attendance and Membership

AC-OPP Members Present:

Dr. Meredith Nettles, Lamont-Doherty Earth Observatory, Columbia University, Chair, AC-OPP

Dr. Philip J. Bart, Louisiana State University

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

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

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

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. Michelle Mack, Center for Ecosystem Science and Society and the Department of Biological Sciences, Northern Arizona University

Dr. Kristin O'Brien, Associate Professor of Biology, Institute of Arctic Biology, University of Alaska

Dr. Jessica O'Reilly, Associate Professor, International Studies, Indiana University - Bloomington

Dr. Patricia Quinn, Pacific Marine Environmental Laboratory, National Oceanic and Atmospheric Administration (NOAA)

Dr. Eric Steig, Earth and Space Sciences, College of the Environment, University of Washington

AC-OPP Members Not Present:

Dr. Adam Marsh, School of Marine Science and Center for Bioinformatics and Computational Biology, University of Delaware

Dr. Mary-Louise Timmermans, Professor, Yale University

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

Dr. Brittany Schmidt, Associate Professor, Cornell University, Department of Astronomy

Dr. Sharon Stammerjohn, Institute of Arctic and Alpine Research, University of Colorado

AC-OPP Subcommittee, Office of Polar Programs, and other NSF staff (presenters and speakers):

Dr. Roberta Marinelli, OPP Director

Mr. Paul Sheppard, Executive Officer, OPP

Ms. Renée Crain, Research Support & Logistics Manager, OPP

Dr. Linda Hayden, Director, Center of Excellence in Remote Sensing Education and Research (CERSER); Co-Chair, Polar Sub-Committee on Diversity, and Inclusion

Dr. Gretchen Hofmann, University of California, Santa Barbara Marine Science Institute; Co-Chair, Polar Sub-Committee on Diversity, and Inclusion

Dr. Amy Leventer, Antarctic Research Vessel (ARV) Science Advisory Subcommittee (SASC), Colgate University

Mr. Timothy McGovern, Program Manager Ocean Projects, OPP

Dr. Karen Marrongelle, NSF Chief Operating Officer (COO)

Dr. Vladimir Papitashvili, Program Director, Astrophysics and Geospace Sciences & Antarctic Instrumentation

Dr. Timothy Patten, Deputy Assistant Director, GEO

Dr. Polly Penhale, Senior Advisor, Environment, OPP

Mr. Mike Prince, Antarctic Research Vessel (ARV) Project Manager

Ms. Stephanie Short, Section Head, AIL, OPP

Mr. Brian Stone, Chief of Staff, Office of the Director (OD)

Dr. Nancy Sung, Science Policy Advisor, OPP

Ms. Sara Eckert, Communications Specialist, OPP

Ms. Karen Sloane, Program Specialist, OPP

Ms. Erika Haymes, Program Specialist, OPP

Mr. Brian Dawson, GEO

**Thursday, September 15**

Welcome and Introductions; Conflict of Interest (COI) Review

Dr. Nettles; Dr. Marinelli; Dr. Papitashvili

Dr. Marinelli and Dr. Nettles provided brief introductory remarks, including an introduction of the AC’s five new members. Dr. Papitashvili briefed the committee on conflicts of interest and the role of Federal advisory committees under the Federal Advisory Committee Act (FACA).

Dr. Marinelli discussed the NSF budget:

**National Science Foundation Budget (\$M)**

	Actual	Enacted	Request
<i>Line Item</i>	<i>FY21</i>	<i>FY22</i>	<i>FY23</i>
Research and Related Activity	\$6761	\$7159	\$8,426
Education and Human Resources	1,111	1,006	1,377
MREFC*	161	249	187
AOAM, NSB, OIG**	407	424	502
Total	\$8,440	\$8,838	\$10,492
ARP (2021)***	\$240		

\* Major Research Equipment and Facilities Construction (MREFC)

\*\* Agency Operations and Award Management (AOAM), Office of the National Science Board (NSB) and Office of Inspector General (OIG)

\*\*\* American Rescue Plan (ARP) Act of 2021

She also discussed staff updates:

- New Hires:
  - Marc Tunstall - Antarctic Infrastructure & Logistics Section - McMurdo Station Manager
  - Kate Ruck - Arctic Sciences Section - Associate Program Director, Arctic Research Support & Logistics
  - Liam Frink - Arctic Sciences Section - Program Director, Arctic Social Sciences
  - Rebecca Gast - Antarctic Sciences Section - Program Director, Organisms & Ecosystems
- Details
  - Alison Peck, MPS - Antarctic Infrastructure & Logistics Section - Antarctic Infrastructure and Logistics (AIL) Facilities Manager
  - Greg Anderson- Arctic Sciences Section - Program Director, Arctic System Sciences – Office of Integrative Activities (OIA)
  - Lt. Col. Scott Stenger - Antarctic Infrastructure & Logistics Section – Department of Defense (DoD) Liaison
  - Lt. Col. Graham Boutz - Antarctic Infrastructure & Logistics Section - Air National Guard (ANG) Liaison
- Retired
  - Terry Melton - Antarctic Infrastructure & Logistics Section - McMurdo Station Manager

- Patrick Haggerty - Arctic Sciences Section - Arctic Research Support & Logistics
- Peter Milne - Antarctic Sciences Section - Program Director, Antarctic Ocean & Atmospheric Sciences
- Departures
  - Randall Sisco - Arctic Sciences Section - Program Support Contract Specialist
  - Karla Heidelberg - Antarctic Sciences Section - Program Director, Organisms & Ecosystems

Upcoming Field Seasons and COVID-19

Ms. Crain; Ms. Short; Dr. Kuklina

Ms. Short reviewed the numbers for Antarctic deployers:

FY	Total deployments	Total grantees deployed	Deploying Science events
20	3094	651	108
21	1072	93	19
22	1442	213	42
23	2614	530	90

She also noted the safe deployment of a construction crew to Palmer Station and showed the rebuilt station pier.

Ms. Crain presented highlights from the past field season:

- Progress catching up with fieldwork delayed by COVID-19
- Completed three new buildings supporting research in Alaska
- Kicked off recapitalization of Summit Station infrastructure

She also discussed Arctic section field activity and contractor support.

FY	Total Field Projects	Deploying Researchers	Science Staff Deployed	Remote Sampling, Non-Deploying	Deferred Projects (COVID)	Unimpacted Field Projects	Canceled Projects
19	139	950	120	3		139	
20	48	200	41	42		48	83
21	126	422	121	34	23	126	53
22	154	1092	149	66	64	154	9

Ms. Crain highlighted a 2022 Navigating the New Arctic (NNA) field work project involving renewable energy solutions and the Beaufort Lagoon Ecosystems Long-Term Ecological Research (LTER) project, which focuses on understanding the trophic relationships, productivity, and biogeochemical cycling. She listed 10 Arctic research cruises in 2022 that took place, which she described as a normal tempo. She concluded with a discussion of COVID in 2022 and planning for the 2023 Arctic field season:

- Travel procedures are posted on the Battelle Arctic Gateway - Everyone must follow state/local/tribal requirements
- Travelers to Toolik Field Station in Alaska and to Greenland are required to be fully vaccinated and boosted.
- All research teams should have a written protective plan describing mitigation measures and response to COVID approved by an authorized institutional representative; this plan documents informed consent and shared responsibility of the institutions and team members.
- In 2022, several field teams had COVID outbreaks that were managed; COVID occurred in the dorm building in Greenland; most COVID cases were caught in quarantine; no cases were severe.
- Continuing with a risk-based approach; quarantine times will be reduced or eliminated for 2023 with greater reliance on testing and individual responsibility.
- Research teams are responsible for responding to COVID cases in the field.

Ms. Short continued the presentation, listing COVID protocols for the coming Antarctic season:

- Continued focus on managing risk
- Vaccination requirements will continue
- Physical qualification standards remain the same
- Antigen testing of deployers
- Quarantine protocols follow gateway requirements

She reviewed Antarctic Infrastructure Modernization for Science (AIMS):

- Replacing lost lodging capacity is vital
- Re-baseline efforts are complete
- Construction will resume next season

Ms. Short concluded with questions for discussion:

- How do we foster robust polar research in times of limited field deployments?
- How can we build resilience in the polar community to mitigate impacts in the future?
- How can OPP and the AC work together to share this kind of information with our community?

### *Discussion*

Ms. Crain noted that Dr. Kuklina had previously pointed out there are students who graduated and never got to have field work, due to COVID. Dr. Kuklina emphasized the need for cooperation with local and indigenous communities; if there any plans to develop this she would like to be informed.

Ms. Crain responded that there is more recognition of different ways to collaborate with communities and noted special solicitations for deep collaboration and co-production of knowledge. There can be other types of collaboration, such as soliciting help with data or measurements or instruments, which can engage schools. She noted that scientists who didn't get to service their instruments for several years need to go to the field at some point. She referenced

Dear Colleague Letters (DCL) to develop deeper collaborations, where there's room for scientists to expand and work in deeper ways with communities.

Dr. Marinelli added that there were a number of native Greenlanders who helped scientists get their projects done. In some cases, it was possible to do more with a limited number of people on site in Antarctica. NSF has an opportunity for students who could have served in Research Experiences for Undergraduates (REU) roles but graduated and weren't able to because of COVID. Some of the REU roles have been extended or modified to get these field experiences. Supplements have been awarded to grantee institutions to make up for losses incurred in field work. One opportunity not taken advantage of is bending the perspective on what OPP considers polar research. In the Arctic, it's typically research about the Arctic; in Antarctica, it's what is only done in Antarctica, limiting who goes, losing the opportunity to train people in environments like the Arctic or Antarctica and losing capacity. She asked for other perspectives on facilitating training to bring more people into research without having to send them to polar areas.

Dr. Mack responded with her experience on the Polar Explorer Project, which is creating virtual reality field trip experiences for students to learn about permafrost. It included indigenous perspectives and scientists from diverse backgrounds. She suggested capitalizing on Toolik Field Station to provide classroom-based research experiences for students; this would allow training more students per unit of time than through an REU program.

Dr. Bart said he received a supplement for his Antarctic grant and is going to a site in Convict Creek, California, which is like what is being reconstructed in the Antarctic. He mentioned a cruise that was rescheduled, requiring finding projects for five graduate students. After two years, they are back on the schedule for this season and a lot of the students are still around and will get to do a field experience. With the core repository it is possible get projects started in a situation where it would otherwise be difficult to find projects for students between acquisition. It is getting difficult to get people in and out at McMurdo. Some colleagues won't be able to go because the season is so long. That has kept a couple undergraduates from participating because they can't stay away that long. And there's no space for them on flights get back to the US.

Dr. Marinelli asked if they would be able to take classes remotely with better bandwidth in McMurdo. Dr. Bart responded that they need to take classes for field camp, so it wouldn't work online.

Dr. Hindle said that with better bandwidth at McMurdo, principal investigators (PI) could teach classes online, making an enormous difference to how labs are run while only taking part of a group into the field. Regarding where it is possible to do polar research, she said The National Aeronautics and Space Administration (NASA) doesn't send all its projects to space; it has a set of analog environments to learn how to work in space, which she compared to working with animals that live in Antarctica. Framing this as an analog experience, could be a way to think about individual research projects that could justify more inclusion of fieldwork that is not necessarily at the poles, but still trains students.

Dr. Nettles said not all polar science needs be field based; a lot of good science in the polar regions does not require deployment to the poles. A lot of data processing and model theory development doesn't require deployment. With respect to students who have not been able to go to the field, patience in the promotion process is needed; we need to be prepared that students who have finished in the last few years who normally would have been expected to deploy to the field haven't had that opportunity, she said. She suggested looking at opportunities within the post-doctoral programs. We need allow for that in the late-stage students and postdocs we're mentoring and think about providing those opportunities in a different way and bringing along those early career scientists in a in a slightly different manner than we have traditionally.

Ms. Crain asked about having a two-week field experience for a cohort of people, possibly in the Arctic, as an analogue for both poles, or in an alpine region. There could be ways to make up some science field training in other ways and create gear to pick up that knowledge base that was missed. Things can be done that don't have to be extremely costly or lengthy that can impart knowledge.

Dr. Kuklina cited a graduate student who didn't have a chance to do fieldwork had focused on remote sensing and had become part of a NASA team; another was unable to go to Russia and instead did fieldwork in Alaska. There was also field work in Mongolia instead of the polar regions; it has permafrost and climatic conditions like the Arctic. It may be an option for some students to visit indigenous communities where they can get exposure to different cultures and traditional ways of life.

Dr. Mack discussed the Division of Environmental Biology's (DEB) Research and Mentoring for Post baccalaureates (RaMP) program for undergraduates not exposed to lab or field work as a model for undergraduates who missed their research experiences. It can provide a cohort experience, particularly in the Arctic and Boreal regions; NSF has more infrastructure that can relatively inexpensively support a classroom-style research experience.

Dr. Marinelli responded that the typical summer experiences we're used to hearing about don't work for a lot of students because they can't always take that time. We have to cater to people that come from slightly different or radically different circumstances.

#### Polar Sub-Committee on Diversity and Inclusion Update

Dr. Emanuel; Dr. Hayden; Dr. Hofmann; Dr. Crowell

Dr. Emanuel said he is the liaison between AC-OPP and CEOSE, established by Congress in 1980 to address the underrepresentation of women, minorities, and people with disabilities in the nation's Science, Technology, Engineering, and Mathematics (STEM) workforce. It prepares a biannual [report](#) to Congress on NSF efforts to broaden participation of underrepresented groups. The latest CEOSE report recommended NSF demonstrate and promote bold leadership actions to create, integrate and make visible elements within and across programs that enhance broadening participation of underrepresented groups. CEOSE is working on a report that focuses on intersectionality. The reports are helpful for those working on getting a broader context for what broadening participation looks like and where an institution or a PI may be situated in those larger efforts.

Dr. Nettles commended the reports and encouraged members to review them. She added that there has been discussion about a joint AC-OPP meeting with CEOSE, which would provide a productive dialogue.

Dr. Crowell said the CEOSE reports were useful for the Polar Sub-Committee on Diversity and Inclusion, which applied them more specifically to OPP.

Dr. Hayden listed the members:

- Dr. Ginny Catania, University of Texas at Austin
- Dr. Crowell
- Ms. Raychelle Daniel, Pew Charitable Trusts, U.S. Arctic Program
- Dr. Emanuel
- Dr. Hayden
- Dr. Hofmann
- Mr. Steve Iselin
- Dr. Amanda Kelly, University of Alaska Fairbanks
- Dr. Kuklina
- Dr. Julie Raymond-Yakoubian, Kawerak Incorporated
- Dr. Herb Schroeder, Alaska Native Science & Engineering Program
- Dr. Anne-Marie Nuñez, The Ohio State University
- Dr. Steig
- Dr. Anne Todgham, University of California Davis
- Dr. Marta Torres, Oregon State University

Dr. Crowell, Dr. Kuklina, Dr. Hayden, Dr. Kuklina, Dr. Iselin and Dr. Steig continued the presentation of the report:

- 1.0 Characterize the Current State of Diversity of the NSF Sponsored Polar Research Community
  - From 1987 to 2022 OPP made a total of 1,588 awards to Minority Serving Institutions (MSI), or 21 percent of all awards (Appendix A).
  - OPP also made awards to non-profit Alaska Native organizations including the Barrow Arctic Science Consortium, Alaska Federation of Natives, Yukon River Inter-Tribal Watershed Council, Calista Elders Council, and others.
  - Total awards and MSI awards peaked in 2007 during the International Polar Year and again in 2009 during the ARRA (American Rescue and Recovery Act) and have declined in recent years. This situation calls for focused exploration of how OPP collaboration with MSIs might be broadened and increased, creating opportunities to bring new talent and perspectives into the polar sciences.
- 2.0 Examine Efforts by NSF and Others to Enhance Diversity and Inclusion
  - 2.2 Broadening Participation at OPP
    - Based on analysis of the NSF online awards database, OPP has made 7,419 grant awards of all types since 1987. Of these, 1,421 (19 percent) included “broadening participation” in the title or abstract, indicating researchers’ intentions to support DEI goals in their work, even if only as



a secondary objective (Appendix B). The number of OPP awards with these keywords increased until 2009–2010 then declined, even more than noted earlier decrease for total and MSI awards.

- 2.3 Research with Indigenous Peoples and Co-Production of Knowledge
  - NSF has specific requirements for research conducted near local and Indigenous communities or their lands (<https://www.nsf.gov/geo/opp/arctic/ace/community.jsp>). Significant efforts to converge different sources of knowledge and perspectives have been made in NNA. NNA encourages proposals for projects that leverage partnerships with stakeholders, dedicate budget and time to collaboration, and work closely with community partners. It allows exceptions to the data reporting requirements for social science data and Indigenous knowledge. Communication with communities is emphasized: “Researchers should coordinate their field activities with nearby communities and are expected to share results with the community following each field season and/or at the end of the project. Investigators should include travel funds for this in their proposal budget. Some projects may require discussion with Indigenous or subsistence co-management organizations. Time for dialogue should be included in the project schedule and funds for these meetings, both in person and virtual, should be included in the proposal budget.”
  - The NNA Community Office is an example of new efforts to build sustained connections between Indigenous communities and researchers.
  - NSF efforts to converge different sources of knowledge and perspectives in NNA:
    - leverage partnerships with stakeholders,
    - dedicate budget and time to collaboration,
    - work closely with community partners.
    - exceptions to the data reporting requirements for social science data and Indigenous knowledge.
    - emphasis on communication with communities
- 2.4 Collaborative STEM Education
  - Starting in 2014, OPP developed a new approach to support polar education in collaboration with NSF’s Education and Human Resources directorate (EHR). This effort has been promoted by a series of DCLs that encouraged the community to submit proposals to EHR’s Division of Undergraduate Education and the Division of Research on Learning, including programs that spanned K-12, undergraduate, and informal education. OPP supported or co-funded these awards, helping to ensure that polar logistics were adequately resourced and that the proposals were not declined due to a lack of understanding about the high costs of implementing polar STEM. During the 2015–2021 period, EHR awarded over \$20M in polar-related projects with \$7M of OPP support or co-

funding. This collaboration has benefitted the polar community and supported important DEI efforts and educational products that OPP could not have funded alone.

- 2.5 External Models of Successful DEI Programs
  - The NASA Minority University Research and Education Program (MUREP) model was documented during the subcommittee's (SC) Learning Activity (LA) 11: Best Practices for Broadening Participation at NASA, led by James L. Harrington. Mr. Harrington's work demonstrates the impact that a program officer who is committed to the DEI effort can have. One take-away was the strong benefit of working with MSIs to prepare them for future solicitations. A second take-away was the success of the Network Resources and Training Site (NRTS) model for developing MSI infrastructure (see Appendix C). The NRTS program was an ambitious effort to reach hundreds of MSIs and Tribal Colleges and to insure they had the infrastructure and training to bring them onto the information superhighway. All MSI institutions responding to the solicitation were funded as NRTS lead sites or as satellite institutions assigned to one of the leads. The solicitation required an industrial partner to provide the technical expertise and support for this challenge. One NRTS site partnering with NASA Goddard Space Flight Center (GSFC) and NSF The Center for Remote Sensing of Ice Sheets (CReSIS) identified a new world feature in Antarctica that is now named for that university.
  - This subcommittee encourages future partnerships between NSF and NASA and encourages coordination with Mr. Harrington to facilitate these partnerships.

The presentation continued with a discussion of Global Learning and Observations to Benefit the Environment (GLOBE):

- GLOBE is an educational partnership between NASA and NSF that impacts thousands of precollege students and teachers worldwide. Through interdisciplinary activities and inquiries into the various Earth spheres, GLOBE gives students a hands-on approach to the scientific method. GLOBE protocols are developed by the scientific community and validated by teachers. These protocols currently include lessons, activities, and assessments related to the Atmosphere, Biosphere, Hydrosphere, and Pedosphere. This subcommittee suggests that OPP invest in development of GLOBE protocols for the polar regions, building on GLOBE as a highly successful model. An OPP effort to develop polar protocols for GLOBE would give immediate exposure to thousands of students and teachers.

Agency Program Resources:

- National Oceanic and Atmospheric Administration
  - <https://www.noaa.gov/office-education/epp-msi/undergraduate-scholarship>

- Center for Science Education (UCAR SciEd)
  - <https://scied.ucar.edu/>
  - [https://www.ucar.edu/sites/default/files/documents/related-links/2020-12/ODEI\\_StrategicPlan\\_Final.pdf](https://www.ucar.edu/sites/default/files/documents/related-links/2020-12/ODEI_StrategicPlan_Final.pdf)
- Texas Academic Computing Center (TACC)
  - <https://www.tacc.utexas.edu/education>
  - <https://www.tacc.utexas.edu/-/changing-the-face-of-cs-education>
- 3.0 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.
  - 3.1 Long-Term Strategies
    - 3.1.1 Support and Increase the Inclusion of Indigenous Knowledge and Local and Indigenous Communities in OPP Science
      - Recommendation 3.1.1.1 Provide the polar science community (OPP staff and PIs) with training, education, and resources on ethical principles for engaging with Indigenous communities and knowledge systems.
      - Recommendation 3.1.1.2 Increase funding and programmatic support to broaden the participation of Indigenous Peoples in NSF-sponsored polar science and education
      - Recommendation 3.1.1.3 Provide funding and other support for activities that focus on strengthening Indigenous knowledge systems and the co-production of knowledge.
      - Recommendation 3.1.1.4 To further promote equity and inclusion in polar science, NSF should consider establishing an Arctic research facility to support multidisciplinary work that aims to, in part, characterize climate change impacts on Indigenous Peoples and the ecosystems they depend on for their cultural and physical well-being.
    - 3.1.2 Collective Impact Model
      - The Collective Impact (CI) model, currently employed by NSF Inclusion across the Nation of Communities of Learners that have been Underrepresented for Diversity in Engineering and Science (INCLUDES), provides a framework to enable a community to organize to advance a program or goal. OPP should adopt the CI model with a focus on diversity, inclusion, and equity in polar sciences (Kania & Kramer 2011). In application to polar programs, the five elements of collective impact would be: Common agenda, Centralized support, Continuous communication, Mutually reinforcing activities, Shared measurement
      - Recommendation 3.1.2.1 Employ the CI model to set, measure and sustain the OPP DEI agenda and to drive results.
    - 3.1.3 OPP DEI Program Officer
      - Other organizations that have been successful in reaching greater diversity, equity, and inclusion have established dedicated staff to oversee their programs. OPP should similarly consider hiring a senior program officer (PO) to lead its DEI efforts. The DEI officer would have an appropriate budget to develop activities and intentionally drive change within OPP, serving in effect as the leader implementing the Collective Impact model described in Section 3.1.2

- Recommendation 3.1.3.1 Recruit and hire a new program officer responsible for DEI issues in OPP. This individual would have a budget and portfolio of activities to advance DEI efforts in OPP.
- 3.1.4 Improved Tracking of Broadening Participation
- Broadening Participation (BP) goals and activities included in OPP proposals (discussed in Section 2.0) have not been systematically tracked or reported and could only be approximated for this report by running keyword searches on the NSF online awards database. Improving and regularizing BP reporting would establish a baseline and allow assessment of future progress. Principal investigators would be required to account for progress and outcomes in their annual and final grant reports, elevating commitment to DEI goals and genuine impacts.
- Recommendation 3.1.4.1 Establish a new reporting system that better tracks and emphasizes expectations for BP outcomes. Sufficient funding, commensurate with stated DEI goals, should be provided for diversity and inclusion in awards where appropriate. The SC recommends requiring DEI reporting in annual grant reports. In addition, the “Result of Prior Funding” section of new proposals should be encouraged to articulate both research and DEI outcomes.
- Recommendation 3.1.4.2 Track demographic and social/career obstacles for polar researchers over time.
- 3.2 Near-Term Strategies
- Recommended near-term strategies are options that OPP can implement more quickly and without major new financial or organizational commitments. The near-term recommendations include increased engagement with MSIs, support for early career researchers, institutional partnerships, training, REUs, and introductory field experiences.
- 3.2.1 Engaging MSIs to Diversify Polar Science
- The most underrepresented of the MSI community are historically black colleges and universities (HBCUs). A review of OPP funding of HBCUs from 1987 to 2022 (see Appendix A) revealed that only 6 awards were made for a total of \$2,353,792.
- No current awards to HBCUs were identified.
- 3.2.1 Engaging MSIs to Diversify Polar Science
- Recommendation 3.2.1.1
- Work collaboratively with NASA, HBCU-UP and CAHSI to build a polar component that identifies and nurtures participants who have interest in OPP related disciplines.
- OPP should examine ways to further invest in HBCUs with a history of OPP capabilities.
- OPP should explore mechanisms to create on-ramps to polar science and research at MSIs via institutional partnerships, encouraging new PIs, and engaging early career researchers with training opportunities (e.g., REUs or graduate training courses).
- 3.2.2 Early Career Researchers
- Recommendations in this section would support early career researchers, increasing their success and retention in polar sciences. These include

- postdoctoral scholars, “soft money” researchers working in polar sciences, and new PIs writing proposals to OPP.
- Recommendation 3.2.2.1 Create a portfolio of Broader Impact and Broadening Participation opportunities. We envision this as a capability to reside with the new OPP DEI office.
  - Recommendation 3.2.2.2 Enhance programmatic professional development support for the OPP-Postdoctoral Program, make small changes to the operation of the program, and track postdoc career paths.
  - Recommendation 3.2.2.3 Increase transparency of the proposal submission process and seek to expand funding opportunities for soft-money researchers.
  - 3.2.3 Set-Aside Awards
  - Each Federal Agency has goals for awards to small businesses, including minority-owned, women-owned, and other types of small and disadvantaged companies. Small Business Program laws allow direct, sole source contracts to businesses that have been certified by the Small Business Administration, thereby reducing the barrier to entry into federal contracting programs for these emerging businesses. There is even a mentor-protégé program where large businesses partner with emerging small businesses to help foster their success. NSF and OPP should adopt a pilot program that supports direct awards to PI’s or institutions that advance polar research while also supporting OPP DEI goals.
  - Recommendation 3.2.3.1 Establish a pilot program for direct set-aside awards to Principal Investigators (PI) and/or early career PIs at Minority Service Institutions. This set-aside program would be similar to programs that support small business participation in federal procurement.
  - 3.2.4 Institutional Level Recruitment and Partnerships
  - The formation of institutional level partnerships can advance diversity and inclusion in polar science. Academic institutions or research institutes with a traditional strength in polar sciences could partner with PIs at MSIs and assist with developing proposals or including the MSI PIs in existing research projects. One important element of this recommendation is that OPP could invite groups to collaborate rather than to call for proposals. OPP could foster this approach through an inclusive workshop where the needs of minority or other underrepresented groups are expressed, emphasized, and supported.
  - Recommendation 3.2.4.1 Form institutional level partnerships that are facilitated by OPP. These can include mutually beneficial partnerships between R1 and MSIs, a group of MSIs, or the development of an IDEAs-type activities (see GOLD in Geosciences). In the style of Dear Colleague Letter NSF 20-112, the subcommittee recommends the formation of these institution-level partnerships that would form strong partnerships with Arctic residents.
  - 3.2.5 Training, REUs, and Field Experiences
  - Recommendation 3.2.5.1
  - Establish new REU sites that focus on scientific areas where minorities are well represented such as computer science, biology, chemistry, remote sensing, and engineering. To increase participation from target groups, work to align these areas with OPP interest or offices.

- Any model for new REUs should leverage a component of past programs that have a documented success in DEI, and further, REU programs that have expanded underrepresented participation (e.g., the Juneau Icefield Research Program, CReSIS-Arctic, and Antarctic (AaA), and Joint Science Education Project (JSEP)).
- Envision an articulated pathway for underrepresented students, which currently begins with REU to graduate school, be preceded by academic year training experiences hosted on MSI campuses. It is recommended that OPP explore opportunities to support academic year training programs housed on the campuses of the targeted HBCU/MSIs. Such programs should be designed to prepare students for the next level by providing them with exposure to the polar research community and building competency with relevant technology and language, including team-building skills. A pre-college component would enhance this effort allowing the impact to reach deeply into the targeted populations. Infrastructure components at these MSI host campuses should be anticipated. This includes need for student, staff, and curriculum development support.
- Recommendation 3.2.5.2
- Set high DEI goals and prioritize a greater DEI outcome for all existing and future OPP large budget programs. The SC would like to draw attention to the success of the CReSIS-AaA REU and consider setting DEI goals for current and future Science and Technology Centers (STC) at the CReSIS-AaA DEI levels (e.g., women 42 percent to 63 percent and minorities 66 percent to 89 percent over a five-year period).
- Within these high-profile programs, both research outcomes and DEI outcomes should be equally impressive and worthy of front-page spotlights.
- 3.2.5 Training, REUs, and Field Experiences
- Recommendation 3.2.4.3
- Expand opportunities for graduate students in both the Arctic and the Antarctic. Training programs that focus on the experience of the early career researcher, led by PIs trained in inclusive mentoring, would advance diversity in polar sciences, and over time would mirror the success of the undergraduate-focused site REU programs across NSF.
- 3.4.6 Graduate Fellowships
- Recommendation 3.4.6.1
- Increase the flexibility of use of the NSF Graduate Fellowship through the following mechanisms:
  - 1) establish earlier notification (e.g., February) for all NSF Graduate Research Fellowships;
  - 2) encourage NSF to modify the strict requirements on the timing of Graduate Research Fellowship Program (GRFP) applications;
  - 3) allow NSF Graduate Research Fellows to use their fellowship funding more flexibly – for example, quarter-by-quarter or semester-by-semester rather than having to opt-in or opt-out for an entire year at a time; and
  - 4) increase the total number of GRFs in polar science. OPP should explore avenues for directly funding a number of GRFs aimed at increasing diversity in polar research, similar to the recommendation for the Postdoc program, and

- 5) in order to create on-ramps to polar science, work with the NSF GRFP program to develop an OPP training experience comparable to Graduate Research Opportunities Worldwide (GROW) (<https://beta.nsf.gov/funding/opportunities/graduate-research-opportunities-worldwide-grow>) or the Graduate Research Internship Program (GRIP).

### *Discussion*

Dr. Nettles said the subcommittee had set out short- and long-term options and put the big picture pieces together. The three big recommendations were a good way to think about the big picture. The collective impact model amounts to figuring out what you're trying to do and how and pushing it forward across the organization and having people know the goals and what they're responsible for. Also, having a point person can catalyze action. That person should not be responsible solely for moving this forward. She said the recommendation is for someone's who is knowledgeable, engaged and has institutional memory to help coordinate and be a resource internally and externally. Those big-picture pieces are reflected in the subcommittee's approach to individual actions. Also, there is a fundamental piece of broadening participation: people doing this work need to be and feel safe in their working environment. She noted questions related to the intersection between 1) the DEI work OPP needs to do; and 2) the response to the recent report on the Antarctic programs, sexual assault and harassment needs assessment. That highlighted part of the intersectionality the subcommittee brought up. Tomorrow, the AC will talk about the Sexual Assault/Harassment Prevention and Response (SAHPR) report and the NSF response. There is an important intersection with the work of this subcommittee. It's fundamental that we make a safe working environment for everybody.

Dr. Mercer said she appreciated the recommendations in the report for co-production of knowledge and engagement with indigenous communities. That moves into areas of capacity building and increasing participation and indigenous-led research. In addition to OPP funding levels, there's the NNA program, which is at the forefront of improving how co-production and indigenous-led research is conducted and supported. In addition, The Interagency Arctic Research Policy Committee (IARPC) is about to start a review of the principles for conducting research in the Arctic, working with communities and other entities across the Arctic, such as the Greenland research community, about ethical standards for conducting research. Everyone benefits from the experiences with NNA and the constructive feedback in terms of making improvements; a lot of steps have been put in place.

Ms. Crain said an August 2020 [Dear Colleague Letter](#) is an open call for proposals to deepen relationships. It provides funding to build deeper collaborations and co-production of knowledge that may come in later to other programs as research projects.

Dr. Nettles said it was good to see OPP has continued to move forward on a number of these fronts, rather than waiting for a finalized report.

Dr. Bart asked if anything is in place to keep faculty and retain them. Dr. Hayden responded that at MSIs, faculty teach a minimum of four courses per semester and easily get pulled off these projects unless they have funds to support their time. Also, these projects are demanding on the

university in terms of infrastructure, which is one reason for the recommendation that there be some understanding that working with MSIs requires infrastructure support. Dr. Bart suggested program-level guarantees of teaching release.

Dr. Schmidt noted the committee is more heavily minorities or women. We are asking people who are potentially at a disadvantage to do the work for us. So, the recommendations about resources and infrastructure are key. If you're looking to make real, long-lasting change, infrastructure and resource development changes need to be made. She was glad to see recommendations regarding that, because often it's thought of as just selecting more of these proposals, which is harder to accomplish than changing infrastructure and adding additional programming to address those specific goals. She asked if there is a similar program that best made such infrastructure changes to use as a model. Dr. Hayden said the conversations with James Harrington would add to that discussion. They looked at these institutions and their needs.

ARV Update and Review of Sub-Committee Report #2

Mr. McGovern; Mr. Prince; Dr. Quinn; Dr. Leventer

Mr. McGovern briefly reviewed his spring ARV briefing to the AC and said today's presentation would be an update. He began by comparing the ARV design to the Nathaniel B. Palmer (NBP):

	Nathaniel B. Palmer	Antarctic Research Vessel	Summary
Length	309 ft	365 ft	Bigger
Sci/Tech Berthing	45	55*	More scientists
Total Lab Space	3,805 sq ft	4,497 sq ft	More lab space
Working Deck Space	4,054 sq ft	7,197 sq ft	More deck space
Endurance	65 days	90 days*	Longer endurance

AND greater icebreaking capability  
 >4.5 ft @ 3 kts (Polar Class 3)\*  
 \*Key Performance Parameter

He compared the Polar Class (PC) of the NBP, PC4/5, to the ARV, which is PC3. Accessible ARV areas will include Pine Island Bay and the Thwaites Glacier regions and the Larsen Ice Shelf, for a massive increase in access throughout the Antarctic region.

He showed an updated rendering of the ARB with a more vertical bow to allow for greater space on the main deck. An additional 20 feet have been added to the length of the ship, now 365 feet, for stability and to meet key performance parameters. The feasibility of support a single small helicopter is being explored, a modification of the forward flight deck currently designated for autonomous aerial vehicles.

There have been two market research surveys, for a vessel integrator and operator:

- Vessel Integrator (VI): Single vendor to oversee finalization of the ARV design, shipyard selection and construction, operational testing, and transition to operations.
  - Interested in engaging with a wide variety of organizational types as potential providers, including, but not limited to, for-profit corporations, academic institutions, or other non-profits.



- Vessel Operator (VO): Single vendor capable of performing ARV operational services, including:
  - Maintaining custody of vessel and be responsible for security, regulatory compliance, insurance, port costs, etc.
  - Coordinate and facilitate all maintenance and repairs
  - All crewing and operational support (fuel, food, supplies, minor equipment)
  - Science cruise planning and vessel scheduling
  - At-sea science technical support services (laboratories, on-deck, and over-the-side deployments, etc.)
  - Maintenance and operation of scientific instrumentation and equipment

An open competition is planned for the vessel integrator to carry the project to completion. The operator will be responsible for overall operation and maintenance. Mr. McGovern said there is confidence there will be a competitive acquisition for integrator and operator. The project is in the preliminary design phase, which will continue until next February. The final design phase will begin late next year and include the vessel integrator in support. This phase will include the selection of a shipyard and starting the detailed design phase around January 2027. Vessel launching is scheduled for mid-2029 with delivery to NSF by mid-2030.

Mr. McGovern discussed the preliminary design phase, which has included optimizing, icebreaking, seakeeping, efficiency, and acoustic performance. A physical model will be tested at a test basin in Germany. The next design review will be in October.

He also discussed science community engagement:

- Science & Technical Advisors (STAs)
  - 2-10 individuals
  - Broad range of scientific & technical backgrounds, including:
    - USCG icebreaker development & operations
    - Naval Sea Systems Command shipbuilding
    - Academic institution researchers
    - Scientific technical managers
    - Research vessel operators
- Science Advisory Subcommittee (SASC)
  - Dr. Bruce Applegate, University of California San Diego (UCSD)/Scripps
  - Ms. Alice Doyle, University-National Oceanographic Laboratory System (UNOLS)
  - Dr. Amy Leventer, Colgate University
  - Dr. Carlos Moffatt, Univ. of Delaware
  - Dr. Patricia Quinn, NOAA/ Pacific Marine Environmental Laboratory (PMEL); AC\*
  - Dr. Clare Reimers, Oregon State University (OSU)
  - Dr. Deborah Steinberg, Virginia Institute of Marine Science (VIMS)

Communications to the broader community is being ramped up through the establishment of dedicated [ARV web pages](#), through engagement with project science advisors, science and technical forums, UNOLS and American Geophysical Union (AGU) meetings.

## *Discussion*

Dr. Marinelli said she appreciates the substantial community interest in the vessel. That enthusiasm will push this to the forefront of where NSF needs to invest its large infrastructure dollars. She discussed a public letter pointing out the need for a moon pool and a helicopter deck. She responded that NSF does not want to design a vessel so grand and costly it can't be built. Cost constraints are different from those of other nations because they have the ability to build ships abroad, which can lower the price by as much as half. In the evaluation of some features, OPP has looked at how frequently the feature has been used relative to the cost of supporting it and carrying it for the lifetime of the vessel. Emerging technologies are making some scientific investigations easier off of the vessel, including unmanned technologies and remote sensing capabilities. The special circumstance of the Antarctic coastline means this vessel will be different from any vessel in the fleet and it must have features other vessels don't. A National Academy of Sciences engineering and medicine consensus study will look at the pressing science drivers in the Southern Ocean and the tools and technologies that are needed, including this vessel and other things to invest in to address these questions in a more forward looking way. The ARV is an evolving vessel that's part of a bigger portfolio of tools NSF is trying to develop. The study is not just a collection of a small group of individuals but will include a broad workshop and other ways for input.

In response to a question from Dr. Bartlett about a reduced carbon footprint, Mr. McGovern said a green ship study identified ways to reduce the environmental impact, including a bank of batteries to make a hybrid-like vessel to help the engines run more efficiently. Also, the tier-four engines emit less carbon. But the ship must work in some of the most hostile regions on the planet for up to 90 days and therefore rely on well-established technologies.

### ARV Presentation, Continued

Dr. Leventer said the ARV Science Advisory Subcommittee report is divided into four sections:

1. Changes in design needed to achieve science mission requirements (Mr. McGovern provided details)
2. General Arrangements / Science Space Arrangements - Main deck, other science spaces, common areas and private space
3. Handling and Scientific Package Deployment, and
4. Workflow for specific activities (safe, easy, and efficient science) including specialized science containers

Drilling down, Dr. Leventer elaborated on each section:

- (1) Extra benefits with longer (365 LOA) and wider (80 ft beam) ship:
  - ship's superstructure reduced in height
  - larger weather deck area – increased working space
  - increased number of single staterooms for science complement
  - movement of stack to port side instead of centrally located

*Community members may ask how increased ship size might impact possibility of including a helicopter deck and hangar in updated design, for example through expansion of UAV deck and hangar.*

*We note ongoing dialogue, via a letter from the community to NSF Polar, and continuing conversation between colleagues and NSF.*

(2) Concerns General Arrangements Science Spaces:

Ease and efficiency of workflow depends on how spaces are connected to one another, and how arrangements facilitate safe and easy movement of heavy, awkward, and messy instruments and samples.

- Concerned about location of many science spaces on main deck, especially their location relative to one another.
- With changes in dimensions of proposed ARV and re-location of stack, specifics of lab space design will change as well.
- Re-emphasize prioritization of aft placement of “wetter” labs and forward locating of “drier” lab spaces.
- Suggest renaming several labs (Bio Lab as Bio-Chem / Analytical Lab; forward dry lab as Science Operations Center), to better reflect activities housed in those spaces, and to alleviate potential confusion about how each lab will be used.
- General Space Arrangements - details of design of individual labs. Some details “hardwired” into ship design (sinks, hoods, sediment traps, floor drains, temperature control), while others relate to interior arrangements and specifics of materials outfitting each lab.
- Details became easier to manage in a Table (lots of details)

General Arrangements Non-Science Spaces: shared spaces - lounges and libraries, hospital, gym, and laundry facilities private non-science spaces - offices and berthing  
0-4 Deck crew lounge and crew library—crew-only common spaces provide much-needed spaces for ship’s crew to relax and to work.

0-3 Deck Science Conference Room-science presentations, common quiet work area, primary muster space for science party.

0-2 Deck Science Library & 0-2 Deck Science Lounge - suggest combining into single, comfortable, space for quiet activities.

0-1 Deck Lounge/ Conference Room - quiet and more social activities; inviting location directly across from mess; promote mingling among crew, science, and staff.

0-2 Deck Hospital - aft and isolated from other berthing, allowing quarantine; easy access to accommodate moving heavy patient on stretcher. *Unclear how many individuals can be accommodated.*

0-1 Deck Gym - Aft of conference room/lounge & includes spa, sauna, 4 showers, Americans with Disabilities Act (ADA) shower with a WC. Showers should provide privacy - fully enclosed with lockable doors. *Suggest fewer showers, extra space used for larger gym.*

Laundry Facilities - Science 0-2 Deck and Crew 0-4 Deck. *Adequate laundry facilities? Some facilities shared between science and crew?*

- Private “office” spaces necessary for both Chief Scientist and Marine Projects Coordinator (MPC); staterooms more private.

- Separate MPC office recommended to accommodate voluminous day-to-day work of MPC; main deck or 0-1 deck.
  - Reception office: close to gangway to monitor personnel access to ship while in port.
  - Staterooms: Suggest more single-occupancy staterooms, allocated to Marine Technicians and to co-chief scientist on interdisciplinary cruises -duties likely to be shared.
- (3) Handling and Scientific Package Deployment - safe and efficient science
- Handling and Scientific Package Deployment
  - Winches, wires
  - Cranes and A-frames

*Are we equipped to handle range of over-the-side deployments we anticipate?*

*Adequate redundancy w/ winches and wires? Compliant with regulations (UNOLS Research Vessel Safety Standards (RVSS) Appendix B)? Can we keep them working well and cleanly?*

*How about cranes and A-frames? Can they reach all areas of deck, are they person-lift certified? Compliant with regulations?*

No detail was too small to examine.

(4) Workflow—goal of maximizing safe and efficient use of space

- Batteries - science missions: benefits in addition to managing energy use. (a) continuity of clean atmospheric sampling, and (b) passive acoustic sensing Acoustic Doppler Current Profiler (ADCP) measurements in >1000 m water depth improved under acoustically quiet conditions
- Marine Mammal Observation Space: Marine Mammal Observers (MMO) required for seismic operations, require 360° observation; possible to achieve on bridge. *Dedicated space preferred to ensure quiet and private working conditions for scientists and bridge crew*
- Science Small Boat Use: Safe and efficient use of zodiacs and small workboats requires easy loading and unloading of scientists, science gear and samples. *Small boat operations from ARV must be simplified and made nimbler as compared to operations on NBP*
- Working from the sea ice: With > access to areas of heavier sea ice concentrations, anticipate science missions from sea ice. *Diverse options for sea ice access*
- Back Deck Workflow:
  - (1) Back deck staging bay—heated, large, garage-door style access with lift machinery in the overhead
  - (2) 50-meter Jumbo Piston Core (JPC)-handling equipment strong enough to withstand increased pullout tensions of longer cores
  - (3) Vans—re-emphasis, science needs for specialized vans; details in Table 3
- UAV deck and hangar - anticipate heavy use of UAVs on many cruises but *suggest designing in flexibility so space can be used for other science activities when UAVs are not in use, reconsideration of the trade-offs of adequate sizing and use of this space for helicopter support.*
- Mast: ease and safety of access for sensor installation, *sturdy to withstand icebreaking conditions and needs not to be an obstruction during takeoff/ landing UAVs.*
- Incubation deck space: Deck space main deck. *0-1 deck if convenient elevators*
- Science seawater systems: continued attention to details
- Freeboard height: Instrument deployment and recovery and small boat operations become increasingly difficult as freeboard height increases. *Minimize freeboard height.*

Dr. Leventer concluded with next steps:

IDR #3 Deliverables Sept 29, IDR #3 Meeting Oct 20-21

- Looking forward to next set of design document, especially P3 General Arrangements
- Timetable to delivery of DR #3 to Advisory Committee?

IDR #4 Deliverables Nov 14, IDR #4 Meeting Dec 6

### *Discussion*

In response to a written question, Dr. McGovern said comments can be submitted at <https://future.usap.gov>, where there is an ARV feedback form. Dr. Nettles said questions can be submitted to subcommittee members and there will be other venues for community consideration.

Dr. Bart asked about the two-boat model versus the newer vessel. Mr. McGovern said the ARV is designed to replace the NBP, which is at its 30-year lifespan, and will be 40 when the ARV is fully active. Operating two leased vessels is extraordinarily expensive, which is part of the reason for the shift to an NSF-owned model. Commercial opportunities for resupplying Palmer station have grown and NSF is exploring commercial support. With a single ship model, OPP is looking at other ways to support science in the peninsula region, while the ARV is, for example, in the Ross. Sikuliaq is an option and there is a growing number of international icebreaking research vessels working in theatre, many of them looking for opportunities to collaborate. No decisions have been made.

Dr. Loose asked about community input re the ship operator and if an objective is operating in a year-round capacity. Mr. McGovern said the goal is providing a vessel more capable of operating in the shoulder seasons and the winter. He said input is welcome regarding the operator determination, which is years away. It has not been determined how it will be structured. Dr. Leventer added that questions can be emailed to her.

Dr. Schmidt asked if the National Academies of Sciences (NAS) committee will address vehicle capability. She said the success story from last season was the helicopter, which was incredibly enabling for observations. She added that the moon pool question is more about deep coring, which can't be replaced by UAVs or remote sensing.

Mr. McGovern said rather than a single helicopter with a handful of people, the goal is to get the entire ship there with the full complement of the science party. But some small helicopter capability is being explored. Dr. Schmidt said getting close is one thing, but entire types of science need some mobility. Dr. McGovern said the moon pool has a significant footprint; the ship has to be designed around it. He said there are ways improve the ability to support those operations without a moon pool. The ship is designed with Z-drives for enhanced ice clearing. If there are gaps in capabilities for a project that needs heavy drilling, there would probably be pairing with a drilling capable ship.

Dr. Nettles added that Dr. Schmidt's questions are appropriate here and in the NAS discussion; it is an interlinked set of discussions around all kinds of questions.

Dr. Marinelli said the Academy's workshop and study is to ferret out capabilities and options. There are many options for obtaining sediment samples over the side of a ship, or many potential pairings. An exhaustive review would shed light on how best to design a ship, particularly if you're not drilling all the time. The intent is to get a sense of what the companion capabilities are and how available they could be to do the science.

Dr. Bart said the United States Coast Guard Cutter (USCGC) Polar Star used the Meeresboden-Bohrgerät (MeBo), a seafloor mounted drill and asked if the ARV would be able to deploy that type of system. Dr. McGovern said designers are making sure it is one of the types of systems the new ship will support.

Dr. Leventer said there are a lot of ways to not core but drill. It will be important to ferret out how to accomplish everything with different kinds of technology besides topside drilling, without a moon pool, which requires designing the ship around the drilling capability.

Dr. Nettles said AC members may submit nominations for the NAS committee.

The AC voted unanimously to accept report number two of the interim design review subcommittee and to transmit the report to NSF.

In response to a question from Dr. Loose about dynamic positioning, Mr. McGovern said there would be circumstances where the ship would not be able to maintain position in extremely heavy ice. A more advanced dynamic positioning capability is being planned for the ARV than is on the NBP.

Dr. Bart asked about accurate readings for precision coring. Mr. Prince said there will be that capability.

Dr. Nettles said the only thing that would get her onto a ship would be the opportunity to use a helicopter to get to an otherwise inaccessible ice margin. She asked about the discussion of one small helicopter in light of her understanding that two helicopters would be needed for safety reasons. Mr. McGovern said normally the ship needs two for self-rescue. The added length of the ARV opens the possibility of supporting a single helicopter, but without a hanger and a second helicopter. The subcommittee is thinking about the ability to land a small helicopter on the ARV as it is partnering with another vessel or with a shoreside facility. Alternatively, with that partnership mindset, larger helicopters could be used to lift or land equipment on the ARV as part of a joint mission.

Dr. Nettles said it is a challenge to figure out whether the reason some facilities have been used a lot and some haven't, is that they're not useful, or whether something else is going on. She said she looked forward to tomorrow's discussion about the Academies report and putting these pieces together, which is a major challenge. There is a lot of excitement starting in the community about the possibilities the ship opens up. And there's the balance of trying to design

a ship that can actually get built, because the price tag could make it, so you have no ship. Mr. McGovern added it is not only the construction, but the affordability of operating it for 40 years.

### South Pole Planning

Dr. Marinelli; Dr. Iselin

Dr. Marinelli said there is high demand at the South Pole from different areas of science and different agencies, some of which have different requirements than NSF, creating a quagmire. Therefore, a prioritization committee was established with the South Pole as a target, but applicable to many circumstances.

NSF is charged with fostering and implementing the US Antarctic Program (USAP):

- U.S. presence underpinned by Antarctic Treaty (1959)
- Reserved for peaceful uses, environmental protection, and scientific research
- USAP is a national program that is operated by NSF in close collaboration with the NSB
- USAP supports research within NSF, across Federal agencies, internationally

She said the criteria for Antarctic research projects should be that they are best done or only done in Antarctica, because it's so difficult to get there and expensive to support projects. She listed the NSF criteria for Antarctic research projects:

- Improve understanding of interactions between the Antarctic region and global earth systems
- Expand fundamental knowledge of Antarctic systems, biota, and processes
- Utilize unique characteristics of the Antarctic region as an observing platform

A 2015 Academy [study](#) provided three priorities for Antarctic research:

Priority 1 Changing ice sheets

Priority 2 Biological adaptation and response

Priority 3 Next generation cosmic microwave background research

She said South Pole Station is probably the highest demand asset. It is a unique atmospheric observatory and serves as a hub and a base for Earth and climate science fieldwork. The station is also constrained by:

- The amount of fuel and cargo that can be moved by the traverse and aircraft fleet
- The beds available in the Station's living quarters
- The power that can be produced on-site

For most all projects, priorities can be established in very different ways by different agencies:

- Panel Review
- Cross directorate (NSF) landscape
- Interagency landscape
  - Questions arise –
  - Readiness?
  - Co-funding?
  - Administration priorities?

- Urgency?

A committee was formed for advice from different perspectives:

Fleming Crim (Chair) – NSF (former)

Michele Buchanan – Department of Energy (DOE)

Jean Allen Cottam – NSF Physics

Steve Iselin – OPP AC

Michael New – NASA

Alan Tompkins – NSF Directorate for Social, Behavioral, and Economic (SBE) Sciences

Francisco Werner – NOAA Oceanic and Atmospheric Research (OAR)

Charge to Committee:

Develop a framework and decision rules for prioritizing projects given:

Diversity of disciplines

- Capacity for world class science
- Scientific priorities established in different fields

Consider:

- Current assets at South Pole Station (SPS)
- Potential future investments

She said that in a zeal to support science, NSF sometimes fills up stations and assets several years out, resulting in an inability to keep space open and plan for the long term. Critical assets, spatial scales and timescales have to be reconciled to fuel the full range of science and the highest priority science for the South Pole and other assets. This is viewed as a pilot and these principles may be applied to other stations as the process matures. Dr. Fleming is keeping everyone on task. Ideas for the committee are welcome. Dr. Marinelli added that the goal is to create a report by December.

Dr. Iselin said there have been three meetings. The last meeting discussed a gate-like construct where the first gate is whether the South Pole is the best or only place. If it didn't pass that gate, it would not go forward. Other gates could be science priority balanced among different science communities, duration, cost, and consumption of scarce resources. Also, to be considered are opportunity costs and interagency priorities. There was also discussion about how to handle opportunities, where if an ongoing project could stay another six months, or add one more person, it can do additional things.

### *Discussion*

Dr. O'Reilly asked about the prioritization process and IceCube. Dr. Marinelli said she didn't want to highlight any one project but there's a need to understand lifecycle and not just operation and management costs and make sure things don't go on forever without a reason. The NSB now insists on understanding the full lifecycle operation costs as well as the divestment cost. IceCube is undergoing another project expansion that is being heavily reviewed.

Dr. Iselin said the committee discussed a taxonomy for how to do prioritization and the first item was divestment to figure out how NSF reviews ongoing research at the South Pole to ask if there



are competing things that suggest the need to shrink the footprint of a project as it gets toward the end of its life.

Dr. Nettles read a question from an attendee about who the committee has heard from regarding how South Pole planning has been conducted in the past. Dr. Marinelli said that at the moment the committee is not hearing from the community in terms of particular interests because it's not about specific projects. It's about a process.

Dr. Nettles said that was a good distinction, looking at a high-level way to do planning as opposed to individual awards. She read another question about the allocation of gender demarcated sleeping arrangements and the impact on the selection of awards and whether, with fewer allocations of living space for women, there are plans to create gender neutral living spaces. Dr. Marinelli said that is not something the committee is currently considering. It may impact how one allocates resources, but this is at a more granular planning level once a project has been decided. Dr. Nettles asked if it was safe to say NSF would not want award selection to be strongly influenced by the number of beds allocated to people of different genders. Dr. Marinelli said that is true — it is not one of the review criteria.

Dr. Nettles read another question about whether the committee considered how problems have been solved previously—whether it is reinventing the wheel or taking into consideration strategies used previously. Dr. Marinelli said NSF would not be convening the committee if it didn't feel it was necessary. Projects have grown in scope and scale and complexity and there are questions around support for one project potentially excluding other significant projects. What is the basis for making the decision to do that? The frustration within the community is significant. Also, there are bigger, more integrated projects where people want to ask bigger questions and need more complex arrangements. It's part of the interdisciplinarity and globalization of science.

Dr. Nettles noted another attendee comment pointing out that all the living spaces at South Pole, as opposed to field sites, are gender neutral, though bathrooms are gender specific.

Dr. Iselin said he solved prioritization issues in his prior career, deciding which infrastructure projects to invest in across the portfolio of naval activities. But the circumstances at the South Pole are unique. Hopefully, the recommendations have credibility and withstand scrutiny from agencies and constituents who believe they deserve priority.

Dr. Nettles said the word “prioritization” can sound scary for folks wanting to utilize resources. That comes from worrying that we don't become the priority. But this effort is important in the sense that it should result in a set of public prioritization criteria. We're not always aware of all the other challenges and putting the pieces together. What makes it a big benefit for the community in the long run is understanding and having transparency, so folks need not be worried they're being excluded for some reason that isn't based on a published set of criteria. In addition to providing a framework that eases some of the decision making at NSF, it could benefit the broader community.

Dr. Nettles read a question asking if the committee will visit South Pole to experience the unique difficulties that must be considered. Dr. Marinelli said it will not but is aware of the constraints.

Dr. Nettles read another question asking if the committee's creation was the fault of larger projects or the inability to effectively plan coming out of the pandemic. Dr. Marinelli said it's not a fault; project sizes are what they are. The pandemic created an urgency across projects and presents a near-term problem. NSF needs to be more mindful of other agencies and other priorities and leaving the space and flexibility to accommodate large projects that are evolving. Some of that requires more dialogue and understanding where the community is and their priorities to create the spaces for a large and grand project with a grand vision or a small project with a grand vision.

Dr. Nettles read another question about whether a South Pole master plan similar to McMurdo and Palmer could come out of this process. Dr. Marinelli said the process will relate to a South Pole master plan. The master planning activity for the South Pole should be a community outreach activity. The prioritization is not specific to any one project. It's based on existing capacities. Any future whole of government discussion to significantly expand South Pole would take some time.

#### Wrap-up

Dr. Nettles; Dr. Marinelli

Dr. Nettles highlighted tomorrow's AC meeting with NSF's Chief Operating Officer. Dr. Nettles asked AC members think about what they would like to discuss with her. Dr. Marinelli provided guidance for developing questions. She suggested refraining from asking about the sexual harassment report as it is on the agenda for later in the day and it would be better to refrain from questions to the COO until hearing what OPP has to say, which is not to suggest members may not, just that they will have a better sense of where OPP is going by the end of tomorrow.

Dr. Nettles said that although the AC may not want to ask the COO to comment on specific aspects, it can express its concern and the importance the committee places on dealing with this.

Dr. Marinelli encouraged members to ask or provide ideas about the program's diverse areas of research in OPP intersecting with the new Technology, Innovation and Partnerships (TIP) Directorate. She encouraged questions about how best to interact with TIP or what they see for the future of the directorate. The new directorate is a big deal and potentially a real opportunity. The addition of this large program brings resources to NSF, it doesn't take resources away.

#### **Friday, September 16**

Dr. Nettles and Dr. Marinelli recognized members rotating off the committee and thanked them for their service, including an extra year because of the COVID crisis.

#### Policy and International Engagement Update

Dr. Sung; Dr. Loose; Dr. O'Reilly

Dr. Sung started with US Arctic research policy and NSF's key role. NSF is required by law to engage in national Arctic policy. The Arctic Research and Policy Act (ARPA) called for a comprehensive national research agenda in the Arctic and set in motion the Arctic Research Commission (USARC), representing non-governmental interests and making recommendations to the US government on research gaps and priorities; and the Interagency Arctic Research Policy Committee (IARPC) in the Office of Science and Technology Policy (OSTP), which coordinates US government research and codifies national Arctic research policy and priorities into five year action plans.

Several OPP program officers in the Arctic section were on the interagency team that wrote the current five-year plan, released last fall. The plan has four priority areas:

- Community Resilience and Health
- Arctic Systems Interactions
- Sustainable Economies and Livelihoods
- Risk Management and Hazard Mitigation

The four priority areas are infused with five foundational areas:

- Data Management
- Education, Training and Capacity Building
- Monitoring, Observing, Modeling and Prediction
- Participatory Research and Indigenous Leadership in Research
- Technology Innovation and Application

She said the Arctic Executive Steering Committee (AESC) in OSTP coordinates broad Arctic efforts. It was established in 2015 and reconstituted in 2021. NSF is a member agency.

The National Strategy for the Arctic Region, first released in 2013 with an update coming this fall to reflect the different geopolitical environment and the changing needs of the Arctic.

Dr. Sung said the US is to name an ambassador-at-large for the Arctic. This position was previously the State Department-based Arctic Coordinator. She also discussed the Arctic Commitment Act introduced a few weeks ago. It focuses on:

- National Security
- Shipping
- Research
- Trade

It reflects the growing importance of research on climate change and directs the Office of Management and Budget (OMB) to compile an interagency budget crosscut to get a clearer look at the Arctic research funding landscape across all federal agencies.

The House Science Committee will have a hearing next week focusing on strengthening Arctic science. NSF is providing input to those testifying. The hearing is designed to build a case for an increased focus on Arctic research.

The House Appropriations Committee has requested a report on the need to establish and maintain a Sustained Arctic Observing Network. It will be submitted to Congress by the end of the year.

She said these developments show an increasing attention to the Arctic and OPP has a leading role in the development of these activities.

Turning to international engagement, the White House released official guidance in June; not much has changed. It does not allow direct engagement and funds can't be transferred. Travel is severely restricted. The policy directs an orderly unwinding of existing activities. PIs have been encouraged to seek alternate locations for fieldwork and work arounds. It's ever more important to establish strong research ties with other nations with capabilities in the Arctic.

She described international collaboration from fiscal '18 through '22 in Arctic research. There has been bilateral cooperation on Section for Arctic Sciences (ARC) projects with about 23 other countries; the most important bilateral partners have been Canada, Greenland, Norway, Austria and Russia. For ARC multilateral cooperation the partners, in order of how many projects they appear on, are: Norway, Russia, Canada, Greenland and Iceland.

Under NNA bilateral, the most important partners have been Canada, Russia, Greenland, Iceland, and Norway. For NNA multilateral the ranking is: Norway, Finland, Canada, Russia, and Japan.

She noted that Canada, Norway, and Russia appear on all four lists. There already is a wide international reach, but members should be thinking about ways these ties can be strengthened.

Turning to Antarctica, there have been (FY 18-22) bilateral projects with 13 countries and multilateral projects with 19. The three most important bilateral partners are the UK, New Zealand, and Chile. The top countries/projects for multilateral projects have been IceCube, South Pole Telescope and Thwaites.

She emphasized that world class science is the primary expression of the US presence in Antarctica. She framed three kinds of science:

- Best done in Antarctica
- Climate change
- Intl: Science for conservation

Regarding the last, she said a good bit of the science the US does contributes to broader international efforts and science priorities necessary for decision making about conservation; for example, marine protected areas under the Antarctic Treaty System.

Dr. O'Reilly listed the science policy topics she said are getting a lot of attention in the Antarctic Treaty System:

- Protected and Managed Areas
- Marine Protected Areas
- Protected Species

- Tourism
- Climate

She also listed concerns and ways the science policy interface is negotiated at Antarctic Treaty Consultative Meetings (ATCM):

- Science is the lens through which all Antarctic policy is framed
- Precautionary principal: uneven application
- Bilateral relationships: scientific and diplomatic
- Industry science: partnerships and protectionism
- ATCM/Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR), other fora (i.e., The United Nations Framework Convention on Climate Change (UNFCCC))

Making decisions through science has worked for protected and managed areas, which are managed with cooperation and scientific expertise, probably because there's usually one or two parties responsible.

Marine protected areas (MPA) occur at CCAMLR. The Ross Sea region MPA is the world's largest protected area and was a major win for environmental protection. But it's been very difficult to get the rest of the strategic array of marine protected areas in representative zones in ecosystems of the Southern Ocean. Bilateral and multilateral projects can strengthen diplomatic relationships and make a stronger case in political arenas.

Protected species is a topic that is usually not very contentious, but it was this year at the Antarctic Treaty meetings, which failed to protect the emperor penguin, even with robust scientific evidence that this emblematic species of the Antarctic is threatened under observed climate changes. Tensions between science and diplomacy can hold back conservation measures.

Tourism is the only industry in the Antarctic. Many of the tour operators and vessels have helped support scientists, getting them to the ice and providing researchers with access. The International Association of Antarctica Tour Operators (IAATO) put forward best practices for visiting bird colonies, created in consultation with national Antarctic programs and researchers

There's incredible and highly impactful research coming in terms of climate, but it is not showing up in the Antarctic Treaty System. It is the domain of the UN Framework Convention on Climate Change. A lot of climate policy and the research that interfaces with that is in another fora. Among some parties there is reluctance to engage on basic monitoring, coordination, and emissions reductions in the Antarctic. The research is incredible and powerful, but that work is not particularly effectively in the Antarctic Treaty System.

Dr. Sung added that international collaboration requires alignment on multiple levels, including between PIs from different countries. Maybe the PI comes to a point where they need a bridge to get to the next step, so it helps if the funding agencies have already built a bridge. That requires a higher level of alignment, persistence, and good timing. It usually takes the form of a memorandum of understanding (MOU), DCL or joint solicitation. In some cases, these bridges

may be in place. In other cases, old bridges are in need of repair. For example, there may be an MOU to work with the country, but nothing has been done about it and maybe it's time to refresh it.

Dr. Loose said infrastructure is often a galvanizing motivation behind scientists or science agencies coming together to cooperate and create access to a resource identified as a key point for studying a science topic. He referenced a 2022 [paper in Polar Record](#), which was the result of a discussion at the 2021 Arctic Science Summit Week that addresses international science collaborations, focusing on infrastructure as a key potential barrier to collaboration and opportunities. The paper discusses how reducing barriers to infrastructure can help fuel research, which is the underlying motivation for sharing infrastructure resources internationally. It was recommended that a way to facilitate these collaborations and create a more international framework for scientific research is to synchronize scientific themes across science agencies. He mentioned the Multidisciplinary drifting Observatory for the Study of Arctic Climate (MOSAIC) that was spearheaded by Germany with NSF having a large role in placing PIs and funding research and making the logistics a success. There are great examples of how when you create a science theme, many great proposals feed into that topic. The article also identified gaps between short- and long-term funding. That's an issue for creating long-term monitoring situations or supporting long-term datasets that reveal climate change in a regional basis and drive the models in the large scale.

### *Discussion*

Dr. Schmidt discussed working with New Zealand and the British and the timing of awards; someone finds out they can go and there's no opportunity to get a review cycle done, or there are very short-term reviews. She mentioned the review process and opportunities outside the Natural Environment Research Council (NERC) process and said there's other collaborations with a different frequency than the NSF proposal review process. They have different objectives, which leads to figuring out a process by which we can think about how to allow different kinds of agreements between international agencies. Similar things happen in collaborations in NASA and NSF partnerships, where there's a strong technology presence on one side and a strong science presence on the other. It's important it's the right technologies for the right problem. Because there can be relatively little collaboration, you end up with a technology that could work but isn't very helpful to the polar community, versus the desire to get to an environment that's useful for another NASA project. There might be ways to come at shared goals and look at the strengths of each agency to figure that out. It would help if proposers did not always have to figure out multinational collaborations or multi-agency collaborations themselves from the ground up and have it be a one-off every time, which is a high barrier to entry and few people are willing or able to do that.

Dr. Loose said he's had that experience, and somebody had to think through how proposals in the two countries could be reviewed and coordinated. He didn't know if it's always necessary for things to be that thought out from the get-go or if more agility is possible.

Dr. Marinelli said MOUs are in place with many other nations that specify potential collaboration, many times involving some form of parallel play, which may not be as much of an

advance as you would like. However, there has been an NSF-wide relaxation of deadlines for submissions. The Antarctic program is going back to a hybrid approach where if you are not requiring field work, you can submit anytime. If you are, there's a deadline. There might be some gray area if you want to go to the field, but you're requesting collaboration with somebody else, then perhaps you could use a no-field-work opportunity to have a proposal reviewed. She said she does not remember if that is allowed. But it might be enabled if you have a conversation with your program officer, which would get around the deadline issue.

Dr. Schmidt said deadlines are not the issue, it's the pacing of reviews; if you find out about an opportunity in January of this year, or it's funded in May, it's already too late to get reviewed to go to the field the next year. There are multiple angles at which it's confusing and it is a barrier to entry.

Dr. Marinelli said Antarctica tends to take a longer time because we're working through the logistics of our own field system. But if we're not working through that, the review shouldn't take that long. And most of the rest of the foundation has a review cycle of six months. It's possible; we just have to create the mechanism for it. And a PI has to submit it in time to get it reviewed.

Dr. Mack referenced sharing infrastructure and US researcher access to international infrastructure, particularly in the terrestrial Arctic. NSF program officers are probably well aware of the EU-funded International Network for Terrestrial Research and Monitoring in the Arctic (INTERACT), which facilitates the entry of new Arctic researchers into the international terrestrial environment. One barrier is they're not enthused about funding US researchers. If NSF could have a specific on-ramp for getting US researchers into the program by providing funding, we could capitalize on a well thought out and transparent way for people starting work in the terrestrial Arctic. Also, we have to plan for reengagement in Russia, rather than just moving elsewhere. We don't want to lose the US capacity for work there through retirements, in Russia and here. We don't want to lose our knowledge about travel and export logistics; there's also equipment purchased and left there and infrastructure we built. There needs to be a mechanism to maintain institutional knowledge about collaboration in Russia.

Dr. O'Brien said she had a collaboration with Chile that was enormously educational. It is very difficult to ship equipment and even more difficult to ship chemicals internationally. It would be helpful to have a point person at NSF to provide guidance on how to do that. The assumption is that the PI's institution has the support to do that, but that's not always the case.

Dr. Nettles said some of the last points have been touched on before and it would be good to come back to facilitating international collaboration.

*Discussion (Continued, Polar Sub-Committee on Diversity and Inclusion)*

Dr. Nettles asked for a vote on accepting and transmitting to NSF the report presented by the Polar Sub-Committee on Diversity and Inclusion to close out the work of the subcommittee and support NSF moving forward with additional activities to improve diversity, equity, and inclusion in polar science. She said this is a first step in an ongoing dialogue between the AC-

OPP and the larger community. The report will help OPP develop increasing leadership within NSF in this arena, which is a high priority for the director's office. She asked for any comments or discussion.

Dr. Loose asked if the AC's role in this dialogue will come to a close. Dr. Nettles said she hoped not. Once the committee accepts the report and forwards it to NSF, the foundation will likely provide a response. They're already doing some things that are in alignment with the committee recommendations. There are several key recommendations OPP will want to consider and figure out how to act on. There may be things NSF is not allowed to do and having them assess the report carefully and come back to the AC would maintain the dialogue with the AC. There are other things the AC wants to do, such as a joint meeting with CEOSE. So, it will not close out discussion between the AC and OPP on this topic; rather it will be a steppingstone to move forward in an active way over the coming months and years.

Dr. Marinelli said she wanted the general counsel to look at parts of the report because there may be things OPP cannot do. But OPP needs the AC's engagement and feedback. There is a huge question about the places where OPP can invest most profitably to have the biggest impact. Using the AC to foster that discussion is important. She suggested OPP will issue a general response and have a very specific discussion at the next meeting about things that are valuable from the report and next steps.

Dr. Crowell asked if the report will be publicly released. Dr. Nettles said it cannot be publicly released until it is accepted by the AC. Once accepted, it will be posted on the AC website. The DEI report would be made publicly available as soon as the AC accepts it and forwards it to NSF.

Dr. Steig emphasized idea in the report of having a DEI staff person at NSF. This person's job is not to police PIs, it is to help PIs. There's a risk of asking more of young scientists to have one more thing they have to do and show they're the best in the world at. People need support from NSF to do that.

Dr. Marinelli said she clapped at Dr. Steig's comment because, having just come from the other side and watching PIs struggle to figure out what broader impacts are and how to engage people. It's NSF's responsibility to be clear about broader impacts in general; we have been about as clear as mud. If we can't be clear, we have to be generous. With respect to broadening participation and increasing diversity, it's NSF's responsibility to provide impactful mechanisms, so people aren't guessing, not nibble around the edges with a one-off. We need a pipeline in which people can have continuity, support, and build relationships. She suggested people on the call are where they are, in part because they had support and built relationships.

The AC voted unanimously to accept the subcommittee report and forward it to NSF.

Dr. Nettles thanked the committee and wants the AC to work closely with OPP to build on the report.

Prepare for meeting with the NSF Chief Operating Officer



Dr. Nettles; Dr. Marinelli

Dr. Nettles and Dr. Marinelli led the AC through the process of developing a list of questions and talking points to use at the committee's upcoming meeting with the Chief Operating Officer.

#### Meeting With NSF Chief Operating Officer

Dr. Marrongelle; Dr. Nettles; Dr. Marinelli; Mr. Stone

Dr. Nettles welcomed Dr. Marrongelle, who expressed enthusiasm for the upcoming field season and interest in hearing about the AC's subcommittee on diversity and inclusion and its deliberations on the ARV. She added that South Pole prioritization is a tough nut NSF continues to work through, with the AC's advice. She added that the Sexual Assault/Harassment Prevention and Response (SAHPR) report has been engaging a lot of NSF attention and her office is working with colleagues in OPP and in the Office of Equity and Civil Rights.

Dr. Nettles said the AC is also excited about resuming field activities in the Antarctic and the Arctic and appreciates NSF's continued support and flexibility and effort to get things ramped back up. She said everyone appreciates the continued support getting through the long tail of the COVID response. For herself, she said she appreciated the clear guidance from NSF on how the COVID response and field season will be handled, for ourselves and our home institutions.

Dr. Crowell summarized the work of the Subcommittee on Diversity, Equity and Inclusion and expressed the hope that the report will be well received and that it will be possible to make investments in the in the report's recommendations. Dr. Nettles followed up by asking Dr. Marrongelle to comment on ways OPP's work might help inform agency-wide activities and, conversely, ways agency activities might help support efforts needed within OPP.

Dr. Marrongelle said diversity, equity, inclusion access is a huge priority for the director, the agency, and the administration. She mentioned the accessibility part of DEA regarding work in polar regions, noting there are interesting complexities and challenges, but also opportunities to make what happens in these remote locations assessable to a broad population of current and future scientists. The poles attract a lot of inquisitiveness and curiosity in younger generations, and everyone interested in climate and the environment. There are unique opportunities to capture people's attention about being in these places, what it tells us about the past and what the data predict for the future. She encouraged the AC to keep thinking how to make the science more accessible to people who will never be able to physically travel to either of the polls, but who could be inspired by the work that's happening there.

Dr. Nettles said that resonates with some of the AC discussions and is something the committee will want to think about more. She said the committee's vote to accept the DEI report so shortly after release of the sexual assault and harassment needs assessment and announcement emphasized the interconnection between those topics and the fundamental need of humans to be to be safe and supported in their work and their lives as they do that work. The latter report and the plan that's associated with it have influenced a number of AC discussions. The results of that assessment provide a stark example of something that happens in many other locations, not just the Antarctic, that reflects a culture and climate that that needs to be addressed. The question is

how the director's office envisions providing the necessary and critical high-level leadership that will address this challenge agency-wide and within polar programs so we can achieve a future where all people can expect a safe and secure work environment. Also, how it will address the specific issues of sexual assault and harassment critical for making progress on diversity, equity, inclusion, and accessibility.

Dr. Marrongelle said it took strong leadership at OPP to acknowledge it has a serious issue that it needs to learn more about. Though the report, which is a call to action for NSF, focuses on what happens in the Antarctic, field work across the globe confronts these issues and it behooves NSF to be a leader in how it responds and to work on changing environments, so this behavior is no longer tolerated. NSF is working hard on what those leadership level next steps are. There have been many conversations about the immediate term to address what we've heard and our longer-term outlook for changing the culture. There are things we have to do now and that we will need to continue to do. Stay tuned because we are working hard on getting out those next steps. This is not just an issue in the Antarctic; we have research vessels, we support research that takes place in very remote locations, and we have a lot to learn from how we respond to this specific situation and this specific environment.

Dr. Nettles said she would extend it also to the labs and offices.

For the next question, Dr. O'Brien reviewed the committee's discussions about the ARV and noted widespread enthusiasm and support for the new research vessel. She asked what other future priorities for infrastructure are foreseen in Antarctica.

Mr. Stone responded that the director's office welcomed the input it received in a letter about the possible ARV helicopter pad and moon pool. It comes down to money. He said the director saw the letter and said we'll think about that. Regarding other long-term priorities, he mentioned discussions about improving connectivity to Antarctica and possible subsea cables. His office was excited about the Starlink results tweeted out recently and said it could be transformational. Regarding other long-term infrastructure, he said his office was expecting developments in the communications area.

Dr. Marrongelle said NSF is constantly planning larger scale upgrades or new construction projects. The agency is still trying to understand and unpack the implications of the Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act, working through scenarios about what it might mean for the major research infrastructure account. Antarctic Infrastructure Modernization for Science (AIMS) and [?] have been a big part of the discussions as NSF thinks about staging out what's in the queue over the next few years and trying to understand what should receive a higher level of funding through CHIPS and Science.

Mr. Stone said the regional innovation engines work that TIP is doing has potential to bring infrastructure to parts of the country that will enable more polar research. We want to use science to raise the economic status of all parts of the country. There's opportunity for OPP to think about the infrastructure and tools you need as a science community, not just in the field, but at your institutions, and how to use things like place-based innovation, like thinking about using the geography or the things that matter to people in a particular area. The director is talking about

engaging parts of the country that may not be participating at the level they could. On DEI, Mr. Stone said he resonated with the comments about the need to create environments in which this can be fostered. He was in Hawaii recently for the commissioning of the Daniel K. Inouye Solar Telescope (DKIST). There are opinions on both sides about telescopes in Hawaii and we saw there are very serious attempts to incorporate culture and create welcoming environments where you have people incorporating traditional knowledge and the local culture into the facilities. The White House is going to be putting out new guidance about traditional and indigenous knowledge and incorporating that into scientific research.

Dr. Nettles said discussion around the ARV and facilities reflect excitement about the important science that supports top administration priorities on. The ARV is a crucial part of that. It is important not to lose sight of the fact that there are many other pieces of infrastructure needed to support science.

Dr. Bartlett asked about how the Arctic and the Antarctic community can best engage and interface with TIP.

Dr. Marrongelle said the regional innovation engines is a signature program out of the new directorate and is meant to supercharge the pace of innovation throughout the United States. NSF is not saying it should happen in this area or that; the foundation wants to hear from communities. NSF has the ability to connect with international partners on these and much of the work in polar is enhanced through international partnerships. She emphasized taking what is learned from research in the polar regions and accelerating the pace of improving the lives of people everywhere. She encouraged thinking about emerging technologies or solutions that emerge in extreme environments that can be adapted and used as other environments throughout the country become more extreme. Also, the TIP convergence accelerator routinely looks for new topical areas. It is meant to bring together diverse groups of researchers and translational scientists to think about furthering scientific work along the translational timeline. The convergence accelerators are applicable to a regional approach.

Dr. Nettles said the AC has started conversations with Cyber Infrastructure focused on use cases of the type described for extreme environments and looks forward to engaging with that.

Dr. O'Reilly asked how Dr. Marrongelle views support for polar social sciences as a critical component of scientific research.

Dr. Marrongelle said the doors are open to thinking about integrating social science into polar research. The director has been saying science can't happen without the social, behavioral and economic sciences. There's a lot of room for innovation in thinking about how to incorporate social sciences into generating research questions. NSF is 100 percent behind fanning out social science research to all corners of NSF and there's exciting opportunities ahead.

Polar Research Board/the U.S. National Academy of Sciences, Engineering and Medicine (NASEM)

DR. Sung; Dr. Steig

Dr. Sung described NASEM as advisors to the nation on science, engineering, and medicine, with the ability to access the nation's top experts and provide "pro bono" committee service and maintain independence, scientific objectivity, and balance. They have seven major program areas, including a Division on Earth and Life Studies. The activities in these divisions are overseen by boards with experts from the community. OPP works with the Polar Research Board (PRB), which was established in 1958, promotes excellence in polar science and provides independent scientific guidance on issues related to the Arctic, Antarctic, and cold regions in general.

The PRB includes US participation in the International Arctic Science Committee (IASC) and the Scientific Committee on Antarctic Research (SCAR), non-governmental organizations with international advisory roles to ministerial level organizations.

The PRB's new members will be announced soon and will more broadly represent the full breadth of polar science. The Board is extending interdisciplinary discussions beyond the current scope, cultivating relationships and connecting researchers across disciplines and engaging a broader, targeted range of agencies.

The Board is instituting what it calls Convergence Dialogues, which involve:

- Holding conversations with PRB sponsors (NSF, NASA); to date, three discussions held with NSF Program Officers
- Establishing partnerships with other NASEM Boards; two to three dialogues per year
- Possibly resulting in workshops to highlight emerging areas

Such conversations will happen regularly so the activities pursued by the PRB will be informed by discussion with NSF program staff, who have insight into where fields are moving and where OPP would like to see more proposals.

There is a new consensus study on the science drivers for why we need an ARV. This will provide critical community input into the final design phases. The study is called Future Directions for Southern Ocean and Antarctic Nearshore and Coastal Research. The statement of task is:

- Identify the highest priority science drivers based on prior studies and reports
- Determine capabilities that are essential to support these drivers
  - In a resource constrained environment, what are the potential tradeoffs among
    - Highly specialized vs general capabilities
    - Costly vs. less expensive capabilities
  - Consider capabilities needed for proposed Antarctic Research Vessel
  - Consider other US fleet capabilities and international partnerships
  - Assess current and emerging tools, technologies and approaches that support science drivers and extend ship capabilities in support of science drivers.
- Note any gaps between science drivers and proposed portfolio of capabilities, discuss how NSF might address them

There will be two focal areas of activity:

- Community Workshop (January)
  - Gather input on tasks
  - Provide OPP with community perspectives that:
    - Inform vessel design
    - Develop the portfolio of technologies that expand capability beyond ship-based assets
- Consensus Study

### *Discussion*

Dr. Steig said the US does not make as good use of SCAR as Europe and his own attempts to be involved made him feel it's not worth the time. The ice core research community is well organized and connected internationally. It didn't seem SCAR was going to help; we were already doing fine without it; it didn't seem necessary.

Dr. Marinelli said SCAR can move ahead in innovative ways the US should be connected with. The ice core community may not be one, but there are others.

Dr. O'Reilly said that has also been her experience with the Humanities and Social Science Group. Some of the coordination SCAR does is valuable, but for more emerging programs of research. It is useful, though, to maintain a low-level relationship with SCAR. In the Antarctic treaties system, they're often asked to write short policy papers to advise decision makers. Being part of SCAR at a low-level shows availability for providing that sort of expert advice. She encouraged researchers interested in making connections with international policy to receive SCAR newsletters and to put yourself forward as an expert for writing papers or giving presentations.

Dr. Steig said that answer was, don't ask what SCAR can do for you, ask what you could do for SCAR. There is a responsibility in that direction, which he may have overlooked, he said.

Dr. O'Reilly said there's multiple ways researchers have organized themselves and SCAR can be useful at that.

Dr. Penhale asked about involvement in the revitalization of the US SCAR group under Deneb Karentz, SCAR Vice President for Science, who was awarded an NSF grant to coordinate activities. She suggested Dr. Steig would find a day and night difference.

Dr. Cutler said SCAR is good at the origination of ideas and getting the community organized around ideas, but funders are needed to implement projects. Hearing what's going on internationally opens people's minds to how to leverage internationally on things of mutual interest in the Southern Ocean and on the boundaries of Antarctica.

Dr. Bart said the community studying things offshore has benefited from SCAR. He mentioned the Antarctic Climate Evolution (ACE) group and Past Antarctic Icesheet Dynamics.

Dr. Marinelli said the last Antarctic Treaty meeting, which she attended, was illuminating, including discussion about the national programs uniting around an oceanographic theme in honor of the UN Decade of the Ocean activity. SCAR is trying to show leadership and she hopes it is something that can be talked about in more depth later and that OPP can become more embedded in that activity through the participation of US scientists.

Dr. Marinelli said the convergence dialogues were a good way to broaden the reach of polar science within the academy, diversify intellectual perspectives and diversify the community, which is another way to bring in more people.

Dr. Nettles asked if someone could provide a better understanding of what a convergence dialog might mean or look like. Dr. Sung said there were three groups of program officers. One was focused on glaciology, sea ice, oceanography, and a broad range of fields. The group was asked to identify the areas where interaction with other disciplines would be fruitful and to explore questions not being addressed. These are areas where OPP would like to get proposals. With a deeper dialogue with other boards within the National Academies and with other agencies, OPP might be able to highlight emerging new areas of science that might be of great interest to those in other areas. It would fertilize those fields with the polar perspective. It's starting with our program officers giving them ideas about areas that are fruitful and seeing if there may be a couple that rise to the top. That would be good conversation to have with another NASEM Board, like the AC's meetings with other advisory committees. Out of that there would presumably be emergent ideas that wouldn't have occurred to anyone separately. That would lead possibly to a workshop to spin up new ideas and new solicitations.

#### Geoscience Directorate Updates

Dr. Patten; Dr. Marinelli

Dr. Marinelli introduced Dr. Patten who began with a GEO staff update. There are two new division directors in the Division of Atmospheric and Geospace Sciences (AGS). The new AGS director is Dr. Anne Johansen. In the Division of Ocean Sciences (OCE), the new director is Dr. Jim McManus. There is a search ongoing for a division director for the Division of Earth Sciences (EAR).

Next, he presented the [NSF strategic plan for FY 2022-2026](#):

- Vision: A nation that leads the world in science and engineering research and innovation, to the benefit of all, without barriers to participation.
- Mission: To promote the progress of science, to advance the national health, prosperity, and welfare, to secure the national defense.
- Core Values Scientific leadership - Diversity and inclusion - Integrity and excellence - Public service - Innovation and collaboration

The plan has four strategic goals:

1. Empower STEM talent to fully participate in science & engineering
2. Create new knowledge about our universe, our world & ourselves

3. Benefit society by translating knowledge into solutions
4. Excel at NSF operations and management

Dr. Patten said the plan describes how the science enterprise is at a critical juncture:

- Pace of discovery accelerated by data, emerging technologies
- Demand for societal and economic impact, equity, and justice
- Use inspired research, innovation, and partnerships

He turned next to the NSF FY 2023 budget request:

- Released March 2022
- Request to increase budget to \$10.492 billion
- Climate and Clean Energy emphasis
- NSF-wide goal to support 10,000 Fellowships
- Increased support for facilities and infrastructure

The vision for this budget request is expressed in three pillars:

- Strengthening established NSF to accelerate discovery and enhance the state of research capabilities
- Bringing the Missing Millions into the STEM workforce
- Accelerating partnerships with other agencies, industry, philanthropy, and other countries

These pillars support cross-NSF themes:

- Climate and clean energy research
- Equity for underserved communities
- Discovery Engine: NSF's research portfolio
- Emerging industries
- Research infrastructure
- Organizational Excellence: Agency Operations and Award Management (AOAM)

Dr. Patten also discussed GEO in the FY budget request:

- NSF-Wide Climate Activities
- Large Scale Interdisciplinary Work on Climate Change
- Develop Data Infrastructure Needed to Address Critical Geoscience Questions
- Education, Diversity and Equity Emphasizing Climate Equity and Reaching the “Missing Millions”

Under GEO investment updates, Dr. Patten discussed:

GEO Diversity, Equity, and Inclusion Programs:

- Fostering Career Development
  - Pathways into the Earth, Ocean, Polar and Atmospheric & Geospace Sciences (GEOPATHs)
  - Non-Academic Research Internships for Graduate Students (INTERN)

- Supporting Positive Cultural Change
  - Cultural Transformation in the Geoscience Community, NSF 22-562
- Offering Leadership Opportunities
  - Geoscience Opportunities for Leadership in Diversity – Expanding the Network (GOLD-EN)

He also discussed some larger NSF and GEO interdisciplinary investments that have occurred since the last meeting:

- Science and Technology Centers
- NNA
- Coastlines and People (CoPe)
- Ongoing Investments in Major Facilities

Dr. Patten highlighted some of the new hubs funded through CoPe:

- FY22 CoPe Solicitation
- Interdisciplinary projects to synthesize coastal research results into actionable solutions
- Stakeholder involvement
- Foster inclusive diversity and to broaden participation in STEM.

This past year two large-scale hubs were awarded, at the University of Delaware and the University of South Florida, to look into hurricane hazards along the southeastern coast of the US in the Gulf Coast and nature-based solutions to reducing climate risks in the Caribbean and South Florida areas. Three of the focus hubs were funded, based in Southern California, the Great Lakes area, and the Mid-Atlantic coasts, for research topics related to extreme heat events, gateways, strengthening resilience in coastal wetlands and co-designing GreenStar Water interventions.

Fiscal '22 was the first year for TIP, with two new programs:

- POSE – Pathways to Enable Open-Source Ecosystems (OSE) (NSF 22-572): A program to harness the power of open-source development for the creation of new technology solutions to problems of national and societal importance.
  - Fund new managing organizations that catalyze community-driven development and growth of the subject OSEs
  - OSEs can stem from any areas of research supported by NSF
  - Enable pathways for the development of collaborative OSEs
- RIEs - Regional Innovation Engines (Broad Agency Announcement): seeking regional teams rooted within industry, academia, government, nonprofits, civil society, and communities of practice to catalyze and foster innovation ecosystems across the US to:
  - Advance critical technologies
  - Address national and societal challenges
  - Promote and stimulate economic growth and job creation
  - Spur sustainable, regional innovation and nurture diverse talent



As TIP grows, more funding opportunities will be announced. The areas with the potential for translation and innovation include:

- Environmental impacts on Human Health
- Climate Interventions
- Oceans: energy, carbon capture, mineral resources
- Solutions and community-driven, place-based science
- Geo-impacts, mitigation of nanoparticles, microplastics
- Critical Minerals, Strategic Elements
- Accelerating to Net Zero: Geologic Carbon Capture

In conclusion, Dr. Patten previewed the upcoming November AC/GEO meeting:

- Agenda Topics:
  - Discussion of Broader Impacts with GEO Program Officers
  - Learning Agenda: Climate Equity Subcommittee
  - Discussion of AC GEO Report on 21st Century Geosciences
- Special Sessions on Economic Impacts on Research
  - 1-2:30 pm Thursday, October 20th, Researchers in the Field
  - 1-2:30 pm Friday, October 21st, NSF Program Officer Experiences

### *Discussion*

Dr. Nettles said the session on economic impacts on research sounds interesting and timely.

Dr. Kuklina emphasized that Alaska communities are disproportionately impacted by climate change and COVID and discussed the lack of infrastructure for communication. She asked if NSF is developing different forms of communication infrastructure.

Dr. Patten said the Computer and Information Science and Engineering (CISE) does fundamental research and communications infrastructure, but he was not sufficiently familiar with their programming to answer the question.

Dr. Nettles elaborated on Dr. Kuklina's question and raised the challenges of working in a meaningful and engaged way with remote communities, including indigenous communities, where communications technology limits the capability of researchers to engage and work with communities. She said there might be a mixture between collaborations with directorates where there's fundamental research in communication technologies, but also engagement with infrastructure built for polar work. She asked about potential ways to leverage engagement with other directorates. She suggested a buildout of infrastructure in northern Alaska to support a variety of research priorities would make possible the kind of engagement Dr. Kuklina referred to and asked if that is being considered.

Dr. Patten said those conversations usually happen at the program level. Those types of issues get identified and either develop into solicitations or programs or filter up and some cross-directorate programming happens.

Dr. Crain mentioned an award for the study of environmental Arctic change engaging hunters in rural Alaska. Part of the funding was for iPads and calling cards and to pay young people in their communities to help them get connected. There are regular virtual meetings to keep the project moving. A lot of people are aware of these issues and are finding unique ways to solve them. With Starlink and other things, there are more options. Even a simple iPad, a calling card and a little local IT support can help communities be engaged in projects and not let the lack of IT infrastructure be a total impediment to engagement.

Dr. Nettles asked Dr. Patten to speak to the broader DEI GEO initiatives OPP could work on connecting with and providing a polar perspective.

Dr. Patten said there is a working group with representation from all the divisions and OPP. He said GEO could use AC-OPP's DEI subcommittee report to inform current programming or develop new programming.

### Status of the Polar Community

Dr. Marinelli; Dr. Nettles

Dr. Marinelli said the [Sexual Assault and Harassment Prevention/Response Report](#) was commissioned by Ms. Short in her role as the head of Antarctic Infrastructure and Logistics in response to information she received about conditions in the US Antarctic Program to learn more and develop a plan for approaching a very difficult problem in the US Antarctic program and in many other programs.

Information was gathered using:

- 23 stakeholder interviews (NSF, Leidos, USM, grantees)
- 11 focus groups across USAP
- 880 online survey responses to participants in last three years
- 11 emails from current and former USAP members

The report found that

- Harassment and assault are ongoing and pervasive
- Different jurisdictions (NSF, grantee, contractor, military) complicate the navigation of reporting
- Significant fears of retaliation
- No sense that perpetrators are punished

She said immediate steps are being taken as part of an implementation plan:

- Immediate Steps
  - Set the “Tone at the Top” regarding unacceptable behavior
  - Revise training for all deployers, to include:
    - bystander intervention training
    - ‘know your rights’ training

- Hold additional listening sessions ‘on ice’
- Increase support for impacted individuals
- Provide more protections for individuals in field camps and on station

She also described the next steps to be taken:

- Recruit ombudsperson to handle reports, navigate multijurisdictional complexities
- Work with contractors and others to strengthen screening and hiring practices
- Emphasize a positive climate and culture as keys to prevention

The report also includes a longer-term plan:

- Annual climate surveys
  - Benchmark
  - Assess extent of change
- Oversight Board – High level NSF personnel
- Collaborative Action Team – Consultative team of community members

Dr. Marinelli said the report does not contain the findings of investigations; these are experiences people have reported. That is not to suggest the information is not true or that there’s any doubt what people experienced. Cultures that promote harassment tend to be male dominated environments where there are significant power differentials in which people are fearful of consequences where bad behavior is tolerated and not acted upon. There have been suggestions to ban men from the ice. I don’t think we can do that, she said; I don’t think that’s fair to men.

But OPP needs to make sure the people it brings to the ice don’t engage in inappropriate behaviors; be accessible to people who feel they’re poorly treated by anyone in their system; and erase people’s fear something will come back to harm them if there’s a power differential. This is not an easy problem and will take a long time to solve. It is a significant national problem. The hope is that what OPP does moving forward brings every practice to bear on changing the culture and making people feel safe when they come to Antarctica.

### *Discussion*

Dr. Nettles said an important part of the leadership NSF needs to take is acknowledgement of a problem. She commended the Antarctic program for having the guts to do a third-party, independent assessment that has put this on the table for action. It’s correct it’s not just the Antarctic Program. What’s on the table now is there because someone put it out there in black and white in an official report, which is our starting point.

Dr. Schmidt said this is a really important problem addressing one aspect of a much-needed cultural shift in in fieldwork for the protection of everyone. She said she was glad to hear about the ombuds person. It is the kind of suggestion many have made for years, that there needs to be a person for various kinds of conflict resolution who is not involved in management and isn’t anyone’s boss. She said she wrote her points in the Zoom Chat. She recognized the people who came forward and said the [article](#) in Science two days ago is important to read. At least there’s a discussion about change. We need to be careful it’s not just punishment based. There is a culture

of threatening rather than a culture of fixing. She said she looks forward to finding ways every person who's down there feels valued, from long-term staff to part-time staff, because everyone feels isolated from each other, which keeps them from coming together to fix it. If there's even perceived haves and have nots, that causes a lot of trouble. She said she was glad to see public accountability and the ideas for moving forward and she supports every effort to do so.

Dr. Marinelli also thanked Ms. Short, who she said was courageous. Her effort to take the lid off is not an easy thing to do. It's easy to feel caught in the crossfire with people all around screaming. OPP needs the AC's help and cooperation to be part of the community that's working to create a more equitable environment and understand when people feel marginalized or don't feel safe. This is everyone's problem, but we are in a unique position to implement actions to change a situation that's very difficult.

Dr. Crowell said the report is amazing and shocking. It's very good it has so many direct quotes and so much information from victims. This is a very severe problem. He said he was glad it's on the top of the priority list for NSF. He asked about what has been tried in the past and whether people who commit these offenses have been allowed to come back and whether there has been systematic exclusion of people who caused this problem.

Dr. Marinelli said people are escorted off the ice for bad behavior, if it's known they are behaving badly.

Ms. Short said the many multi-jurisdictional complexities allow things to fall through the cracks, not get reported properly, or not get reported at all. One of the report's most concerning conclusions is that the Code of Conduct Board, intended to make sure we're not having folks who have perpetrated these issues back again, isn't working as intended and needs to be reconsidered and strengthened. The implementation includes thinking about reporting avenues, strengthening the Code of Conduct Board and what mandatory reports need to be strengthened in the terms and conditions for contracts and grants.

Dr. Nettles read a question submitted in writing about how NSF plans to address the finding that there is a problem among those who have power and are paid better who were unaware there was a problem.

Ms. Short said the report highlights the way OPP is getting information and how reporting avenues aren't working as intended. It is challenging to address problems you're not seeing. A listening session maybe doesn't sound active enough, but our team of experts in this field wanted to give the community an opportunity to talk to NSF leadership directly and start that dialogue to get the information needed to create the kind of program that will keep them safe.

Dr. Marinelli said every time we talk to a different audience, we bring more understanding and continue to break down barriers. We are open to hearing what people are feeling. It's this kind of dialogue that will make people understand we're serious. The work has already started, and she asked AC members to convey to their communities that OPP is here to listen to their concerns.

Dr. O'Reilly said for the victims of harassment and other activities, there's a hidden set of practices that are informally passed around in Antarctic communities about who to avoid. If that can be brought to light and shared by the broader community, and that's already in progress, that will be a wonderful thing. She also discussed sharing this with the international communities. Research stations sometimes neighbor other stations and there's an understanding not to go to X research station because there's their little protective practices there. She mentioned SCAR, the Antarctic Treaty System, and the Council of Managers of National Antarctic programs (COMNAP) and said an international effort is required to make the ice a safer place for everyone.

Ms. Short agreed about sharing the report and said it has been shared with the New Zealanders to talk about how what happens at our base significantly affects theirs and vice versa. It's early, but there was a recognition at the last COMNAP meeting that this is an area ripe for discussion and improvement across national programs.

Dr. Nettles said it is important the report was conducted by an external independent investigator, and she noted NSF needs to work with many other institutions. She asked about the implementation plan and what it is for. There's a need, she said, for continued external evaluation and support to keep the process moving forward. It could both support NSF's efforts and the integrity of the process and forward progress if there were a mechanism for continued independent review and investigation.

Ms. Short agreed that external expertise has been invaluable. A mechanism has been put in place to extend that expertise for the next year as OPP moves through the implementation plan, which is comprehensive and robust. OPP will continue to use Leading and Dynamic Services and Solutions (LDSS) in the near term. The climate survey rolling out in November will be a more robust quantitative assessment of prevalence and incidence and a baseline from which to measure effectiveness moving forward. The survey is being done by an expert in this kind of work, not LDSS. OPP intends to include external expertise going forward and hold itself accountable.

In response to a question from Dr. Bartlett about confidentiality, Dr. Marinelli said complaints received from individuals who did not want to be exposed were investigated as anonymous complaints. By being careful and discreet, one can conduct an investigation without revealing who reported it, even in small groups. Ms. Short added that this is why the ombuds person is important, to help a survivor understand the options. Not all those options include reporting. LDSS has brought a survivor centered outlook. Reporting isn't always what the survivor wants. OPP needs to support that individual and help folks understand options and who can take confidential reports and who has a duty to report further. One of the next training programs that will be rolled out is know your rights, or know your options training, so people know where they can go if they choose to report and the obligations for that party to report onward or not.

Dr. Marinelli discussed responsible party obligations in universities. She said if supervisors see something they are required to say something. OPP will be looking at strengthening that as well so one can report incidents of harassment without being the target of the harassment.

Dr. Steig said no one in the Antarctic Program has jurisdiction. By the time they get back to the university, the university will say it does not have jurisdiction because that didn't happen on campus and the university does not have information about it. He asked if NSF could work with universities to have high-level communication, so things don't get lost because of jurisdiction issues.

Dr. Marinelli said the university does have jurisdiction, especially if the individual is traveling on grantee funds. The institution is the awardee and has liability. Dr. Steig responded that those who have jurisdiction don't have the information. Dr. Marinelli said it then becomes their prerogative to do an investigation. There's nothing to prevent them from contacting anyone in the Antarctic Program as part of an investigation.

Dr. Nettles added that this is a case where some back-and-forth education between the universities and NSF can be valuable. She is required to report if she hears anything that happened to anyone who works at or is a student at the university, regardless of where it happened or how she heard about it. The report has to be filed and they can follow up; whether they do significantly relies on the university's level of knowledge. So, there is an opportunity for engagement between the universities and NSF.

Dr. Nettles read a question from the Zoom Chat pointing out that other identities and groups are being targeted as well, including Lesbian, Gay, Bisexual, Transgender and Queer (LGBTQ), Black, indigenous and people of color (BIPOC) and persons with disabilities. In what ways can NSF use this report address the broader problem of harassment and bullying across identities?

Dr. Marinelli said that while the report speaks considerably to women, harassment is not unique to women. Nothing in the report says they can't report and wouldn't be included in the same umbrella of care and cultural change OPP is trying to affect.

Ms. Short said the upcoming climate survey will include data on other forms of bullying and harassment, not just gender-based harassment. The intent is to craft an implementation plan and metrics to hold OPP accountable for real cultural change that will add more on the prevention side that will help the entire population.

Dr. Nettles said this is a place where NSF can be a leader. One challenge in the universities is that there are clearer pathways for dealing with something that's covered under Title IX than broader issues and many places don't have legal language that covers bullying. If it's not harassment associated with a protected class that's difficult to deal with, which means equal opportunity bullies get away with a lot and that has got to be changed. She asked how to leverage the report to improve the climate across other environments, like ships and the Arctic. How do we use this report for a broader non-Antarctic-specific culture change?

Dr. Marinelli said OPP is working on it. The director's office feels passionately that this problem is not unique to the Antarctic. The director's office will be working with OPP and looking at the lessons learned and how we can strengthen our reach into other communities and the policies and practices that can lead to better cultures and climates so our efforts will be translated to all of those areas where NSF grant money goes.

Dr. Nettles asked for thoughts on how the AC can take action to help NSF move this forward. In addition to taking the message back to the communities with which we intersect, we have other things we can do as an AC. She asked for ideas about what it would be useful for the AC to do.

Dr. Crowell suggested the same kind of reporting and investigation for Arctic fieldwork. He said there is a structural misogyny and power differential that leads to bad outcomes, made worse when alcohol is consumed. It can be viewed as a workplace safety issue for all field work.

Dr. Marinelli said OPP is thinking about an OPP-wide approach. Ms. Short said one hopeful aspect of the report is that the community expressed an interest in engaging with OPP and a belief it could change the culture. But we're thinking polar, not just Antarctic, and the agency is thinking even more broadly. A robust set of steps are underway, including more community engagement with the USAP community and with polar. OPP wants to understand how it can tackle the problem as a community and as an agency.

Dr. Marinelli said there are innovative hiring practices being considered by universities that would eliminate the ability to "pass the trash." She asked anyone who knows of good trainings in field situations to let OPP know. Also, there is a collaborative action team that's going to be formed in Antarctica. Anyone interested in participating can contact OPP.

Dr. Renee Crain discussed changes to the proposal guide NSF is working toward introducing that has a place in grant proposals for proposers to describe the field environment where they work and the ways they will provide things needed to make a safe and inclusive environment. This would be for all field proposals across NSF. An important part is making sure the facilities that NSF funds and the big contracts have a lot of things in place that people can point to in their proposals that address safe and inclusive field environments. In the Arctic side, there are similar cross jurisdictional issues highlighted in the report. Even if there isn't a stark problem to solve, there's an undercurrent of harassment that happens constantly. It's something that has to be culturally addressed across society and on campuses and laboratories. As the purveyors of these field and vessel settings, OPP includes safe and inclusive aspects to field safety training. That's optional for researchers and other field team members. We will be reinforcing those messages and providing more online training, including for bystanders. OPP will be working with colleagues on the Antarctic side to implement anything and everything that makes sense and will improve the environment for contractors and researchers. Arctic has been doing office hours with program officers on a regular basis. We could schedule more dialogue with our community in different ways, including in-person town halls at some big conferences and virtual office hour type engagements.

Dr. Nettles said this highlights the importance of addressing harassment and bullying from a safety perspective. Having this type of discussion as part of the safety briefings done before going into the field is critical. It's been done by some research teams for a long time but hasn't necessarily been taken up as a good practice by all teams. She highlighted the potential for a positive feedback loop as the importance of the issue starts to be appreciated and people are rewarded for acting in a positive way and there is an acceleration of progress. She said she was recently the beneficiary of good support from the logistics contractor who helped with a tricky

situation effectively and quickly. We want to recognize those kinds of actions on the positive side so that it becomes a thing to strive for and recognize within the programs. We want to think about venues for the AC to engage with this.

Dr. Marinelli said a Zoom Chat comment states that instead of the term bad behavior, the term illegal is better. Dr. Marinelli said it is important to blow the whistle on illegal behavior but there's a lot of behavior that's misogynistic and uncomfortable that is not illegal and is still very impacting.

Dr. Bart said that at the station or on the on the vessel, it is not possible to get off, and asked about how to separate bad actors from those they're impacting in those environments. Dr. Marinelli said finding a way to separate them, is critical. She cited a case where the offending individual was the captain on a vessel and the individual was removed.

### Polar Partnerships

Dr. Marinelli; Dr. Nettles

Dr. Nettles discussed ways to help facilitate communication between NSF and the larger community and the role the AC can play. It might be worthwhile to hold something like a Town Hall with NSF program officers with one or more members of the AC acting as hosts and helping facilitate discussion to bring a broader part of the community into a more direct dialogue with the AC and NSF. She listed seven possible topics:

- ARV development process
- DEI
- Working with Indigenous communities and knowledge
- Polar partnerships with cyberinfrastructure
- Antarctic Master Planning
- Arctic planning
- Summit station

Dr. Marinelli said OPP is always looking for ways to get input on emerging ideas and specific topics. This has been developed as a potential mechanism. She asked if AC members thought it would be interesting to the community. Four AC members gave a thumbs up. Dr. Nettles said the idea will be pursued in consultation with the committee.

### Wrap-up

Dr. Nettles; Dr. Marinelli

Dr. Marinelli noted items for follow-up: a richer discussion about, and providing a response to, the DEI report; Town Hall meetings done in a complementary way to how OPP is developing convergence dialogues. OPP wants to hear from the community and get people involved in thinking about knotty problems and future research directions.

Dr. Nettles thanked everyone involved in supporting the meeting and thanked AC members for attending and adjourned the meeting.