U.S. National Science Foundation
Directorate for Geosciences

Advisory Committee for Geosciences (AC-GEO)
2024 Fall Meeting (NSF Headquarters)
September 18-19,2024, Meeting Summary

AC-GEO Member Attendance

Dr. Kaatje Kraft, Co-Chair	Dr. Vera Kuklina	Dr. Jessica O'Reilly
Dr. Meredith Nettles, Co-Chair	Dr. Kristin Wilson Grimes	Dr. David Parsons
Dr. Philip Bart	Dr. Francisca Oboh-Ikuenobe	Dr. Tammi Richardson
Dr. Kusali Gamage	Dr. Kristin O'Brien	

Wednesday, September 18, 2024

Housekeeping & Conflicts of Interest and Ethics Briefing

Christopher Street, the Directorate for Geosciences' (GEO) Directorate Administrative Coordinator and AC-GEO Executive Secretary, began the AC-GEO 2024 Fall Meeting by providing housekeeping information, including emergency management plans, and the Conflicts of Interest and Ethics briefing.

Call to Order

Dr. Nettles, Co-chair of the AC-GEO, officially called the Fall 2024 meeting to order at 9:00 a.m. on Wednesday, September 18th, followed by committee member and GEO leadership introductions. Dr. Nettles invited committee members to provide comments or suggest corrections to the meeting summary from the Spring 2024 meeting prior to moving for its approval. During this discussion, the committee raised concerns regarding the decision to shorten the meeting summary. In response, Dr. Nettles highlighted the opportunity for the committee to include recommendations and action items in future summaries for better clarity and record-keeping. Dr. O'Reilly moved to accept the Spring 2024 meeting summary, with Dr. Oboh-Ikuenobe seconding the motion. Dr. Nettles then called for a vote by asking members to raise their hands, and the meeting summary was unanimously approved.

Dr. Nettles and Dr. Kraft shared their reflections about serving on the AC-Geo/OPP over the last 6 years: having that longer-term perspective afforded them both the chance to see the discussions of the AC contributing to directions and priorities within the GEO directorate. The co-chairs thanked committee members for serving on the AC.

During the introductory session, Dr. Isern's planned departure from NSF was discussed. Dr. Nettles informed the committee of an ongoing search, and that Dr. Francisca Oboh-Ikuenobe was a member of the search committee for a new Assistant Director for Geosciences. Dr. Oboh-Ikuenobe noted that the permanent federal position announcement had closed on August 21, 2024, but that nominations were still being accepted for an IPA rotator position. The search committee is expected to make recommendations to NSF within the next month.

GEO Assistant Director Remarks

Dr. Alexandra Isern, GEO's Assistant Director, led a briefing for the committee on significant updates related to leadership, budget, programs, and partnerships. Several new team members were introduced across GEO leadership, including some related to a change in the leadership structure, including Kathryn Jablokow (GEO/RISE Deputy Division Director) and John Hannan (GEO/AGS Deputy Division Director). These changes reflect ongoing efforts to strengthen the organization.

Budget updates highlighted the appropriation for FY24 and the request for FY25, with an overall budget request of $1.56 billion. The GEO Road Mapping initiative will introduce new tools like the GEO Ideas Repository, along with virtual and in-person events aimed at gathering insights and broadening future project directions.

Several new programs were launched, including the Focus On Recruiting Emerging Climate and Adaptation Scientists and Transformers (FORECAST) program, which focuses on recruiting emerging climate scientists, and the Regional Resilience Innovation Incubators (R2I2) initiative, which supports community-engaged science aimed at solving climate-related societal challenges. Additionally, nearly $5 million was awarded for climate and health-related projects, and over $20 million for artificial intelligence-geoscience collaborations. Further funding was dedicated to projects aimed at improving resilience in the context of societal challenges posed by climate change.

Facility updates included ongoing efforts related to Antarctic research vessels and the modernization of Summit Station, which is part of a larger effort to improve infrastructure and connectivity in Antarctica and the Arctic. This discussion included the potential development of a subsea cable project to enhance communication and research capabilities at McMurdo Station and observations and measurements of the Southern Ocean.

Key partnerships with National Oceanic and Atmospheric Administration (NOAA), National Institutes of Health (NIH), and the Department of Energy (DOE) were also highlighted, focusing on areas such as climate research, health impacts, and geological hydrogen. A notable NIH-NSF partnership involving a contribution of $2 million from NIH will focus on natural hazards research, further integrating health and climate studies. It was also noted that there will be a NSF-NIH townhall focused on climate science at the upcoming American Geophysical Union international conference to be held this December in Washington, D.C.

Outreach efforts included public engagement around the 2024 Solar Eclipse and the upcoming celebration of NSF's 75th anniversary in May with Game Maker Awards, which encourage K-12 students to engage with STEM fields. Dr. Isern also emphasized the need for continued workforce development, strategic management of research facilities, and a concerted focus on addressing the climate crisis through innovative programs.

Dr. Isern also addressed challenges associated with budget restrictions in the latter half of the current fiscal year. GEO had been able to manage this challenge relatively well, partly through close coordination across divisions and offices within the directorate, and through clear articulation of needs and priorities. Dr. Kraft asked about the negative impacts of reduced budgets, and ways in which the impact of reduced budgets could be articulated. The AC discussed the need for proactive planning and agility in responding

to fluctuating budgets, and noted the tendency for contractions to lead to more conservative decision making. A short general discussion noted the need to have clear priorities in advance in order to support potentially higher-risk, but transformative, science and to continue support for broadening-participation goals, even in times of budget contraction.

Follow-up from Fall AC-GEO Meeting:

GRANTED Update

Dr. Alicia Knoedler, Office Head for the Office of Integrative Activities (OIA) within the Office of the Director (OD), was invited to the AC-GEO meeting to provide an update on the progress and initiatives under the **G**rowing **R**esearch **A**ccess for **N**ationally **T**ransformative **E**quity and **D**iversity (GRANTED) program. Dr. Knoedler led with the objective of GRANTED, which aims to enhance the nation's research enterprise by addressing systemic barriers faced by institutions of higher education (IHEs), particularly those that no single institution can solve on its own. GRANTED emphasizes greater access to funding and resources from the National Science Foundation, aiming to support various sectors of research infrastructure, including research development, administration, broader impacts, and technology transfer.

Key accomplishments highlighted include significant funding awards to Historically Black Colleges and Universities (HBCUs), Minority Serving Institutions (MSIs), and Emerging Research Institutions (ERIs). These awards are designed to reduce systemic barriers and build capacity for research and training. Other exciting outcomes include collaborations with professional societies and non-profits, as well as targeted investments in research security and post-award administration improvements. GRANTED continues to explore innovative ideas to expand its reach and impact across diverse research institutions.

Climate Equity Task Force Update

Dr. Lina Patino, Supervisory Program Director in GEO/RISE and GEO POC for the Climate Equity Task Force, along with Dr. Greg Anderson, Senior Advisor in OD/OIA, presented a summary of the task force's results. The task force was established in response to NSF's requirement to provide a learning agenda to the OMB and GEO's interest in building an equitable climate portfolio. Drs. Gamage and Parsons served as representatives from the AC on this task force.

Dr. Anderson summarized findings from the analysis of proposals submitted between 2017 and 2022, focusing on climate change and equity. The study examined characteristics of principal investigators, research teams, and the institutions submitting proposals, with attention to factors such as race/ethnicity, gender, degree attainment, and institutional characteristics (e.g., HBCUs and MSIs). The results showed that proposals in the climate and equity quadrant had lower representation of Asian individuals, higher representation of women, and more researchers without doctoral degrees; and that such proposals were more likely to come from MSIs, including HBCUs and tribal colleges.

The task force identified opportunities for NSF and GEO to advance equity outcomes by addressing these disparities. Dr. Patino emphasized the importance of intentionality in integrating equity into climate change programs.

During the discussion, several themes emerged around data analysis, research funding, and the need for continued investigation into equity in climate-related proposals.

Dr. Gamage inquired whether NSF had analyzed the funding outcomes of the categorized proposals, with Dr. Anderson noting that further data analysis could explore this. Dr. Kuklina raised questions about funding for social and behavioral research related to climate change, and Dr. Patino pointed to the Confronting Hazards, Impacts and Risks for a Resilient Planet Program (CHIRRP) as a relevant funding opportunity, highlighting the possibility of collaboration with the Centers for Research and Innovation in Science, the Environment and Society (CRISES) program to support research integrity. Dr. Wilson Grimes asked about shifts in trends over the 2017-2022 study period, but Dr. Anderson explained that the analysis did not examine trends over time, focusing instead on aggregate data. Dr. O'Reilly, Dr. Parsons, and Dr. Gamage stressed the importance of further studying the demographics and funding rates of the categorized groups to deepen understanding and inform future efforts.

The AC discussed possible intersections between the way proposals from women and other underrepresented PI groups are perceived, and the way proposals addressing equity are perceived. The discussion led to recommendations from the AC that (1) GEO explore further what leads to the higher representation of women and MSI proposers in proposals addressing both climate and equity; and (2) GEO track changes over time in these metrics, especially if/when changes to solicitations are made in response to the findings of the Task Force.

GEO Division/Office Highlights

During the GEO Division/Office highlights session, GEO Division Directors showcased organizational achievements, which included reorganizations, updates in leadership structure, staffing changes, novel funding opportunities, and other significant programmatic endeavors. The session featured presentations by Dr. Jean Cottam Allen representing the Office of Polar Programs (OPP), Dr. Anne Johansen representing the Division of Atmospheric and Geospace Sciences (AGS), Dr. Dena Smith-Nufio representing the Division of Earth Sciences (EAR), Dr. Jim McManus representing the Division of Ocean Sciences (OCE), and Dr. Wendy Graham representing the Division of Research, Innovation, Synergies, and Education (RISE).

Dr. O'Reilly praised NSF's work at the Antarctic Treaty Meeting, noting the geopolitical significance of the region and emphasizing the expertise within OPP, and Dr. Kuklina inquired about future plans for Arctic research. Dr. Cottam Allen confirmed OPP's ongoing engagement in these efforts. Dr. O'Brien referenced the 2022 OPP subcommittee addressing DEI issues and asked whether its recommendations had been incorporated into the post-doctoral program. Dr. Smith-Nufio confirmed that EAR had considered these recommendations in revising its post-doctoral program. Dr. Parsons raised concerns about potential tensions between budgetary priorities and core programs due to budget uncertainties. Dr. Isern acknowledged that budgetary priorities do impact core programs, pointing out a decline in proposal submissions and the complexity of managing GEO's discretionary budget, especially with the financial demands of GEO facilities.

Update: Advisory Subcommittee for a New Scientific Ocean Drilling Vessel

Dr. Jim McManus briefed the committee on key developments in the ongoing planning for a scientific ocean drilling platform. The JOIDES Resolution (JR), which has been a critical asset for the International Ocean Discovery Program (IODP), is nearing the end of its operational life, with its environmental impact statement expiring in FY 2028. Despite continued U.S. funding, international partner contributions have declined, leading to financial challenges. The NSF, which has provided primary funding for the JR, has begun planning for a new, more sustainable scientific ocean drilling model, aiming to maintain long-standing partnerships with international contributors.

Dr. McManus noted that NSF has chartered the AC-GEO Subcommittee for a New Scientific Ocean Drilling Platform to provide recommendations on a new drilling vessel based on community-authored Science Mission Requirements (SMRs). The subcommittee is tasked with working alongside the Institute for Defense Analyses to develop cost estimates and is expected to deliver a preliminary report by December 2024 and a final report by March 2025. Key vessel requirements include the need for an ice-strengthened hull and deep-drilling capabilities, both significant cost drivers.

In the near term, NSF will continue to support sub-sea-floor sampling research using legacy samples and data while exploring options for short-term, mission-specific expeditions. Additionally, the establishment of a Scientific Ocean Drilling Coordinating Office (SODCO) is in progress, which will manage future scientific ocean drilling activities and help plan new deep-sea drilling missions.

During the meeting, several key themes emerged surrounding geoscience research needs, the capabilities of drilling vessels, and international collaboration.

Dr. Gamage, AC-GEO representative on the Subcommittee for a New Scientific Ocean Drilling Platform, described details of the SMR report, which outlines foundational needs for future geoscience research. Dr. Gamage emphasized the importance of a drill pipe with a depth of at least 7,000 meters for the ability to drill in water depths ranging from 70 to 6,000 meters. These capabilities are critical to addressing the objectives in the "2050 Science Framework," including studies on habitability, climate system tipping points, and earthquake fault zones. Dr. Gamage noted that high-quality core samples are needed from challenging environments like high-pressure, high-temperature zones, and high-latitude regions. The committee is evaluating different drill ship models to balance ideal scientific requirements with practical constraints, pending cost estimates. She encouraged further community engagement on this issue.

Dr. O'Brien asked about the drilling capabilities of the future Antarctic Research Vessel (ARV). Dr. McManus responded that while the ARV is designed to have limited coring capabilities, it will not have the capability to carry out more complicated or deeper drilling operations. Dr. Richardson followed with a question about the JR's location, to which Dr. McManus explained that the vessel is offloading equipment and will be in Amsterdam for about six months as decisions are made about its next use.

The conversation also touched on international partnerships. Dr. Kraft pointed out the decline in recent success with such partnerships upon which the funding model had relied. Dr. McManus responded, noting that while one advantage of NSF constructing its own vessel is the avoidance of capitalization costs, NSF remains actively engaged in discussions with international partners for potential collaboration.

Dr. Nettles inquired about other nations building similar vessels, and Dr. McManus noted that China has built a vessel for hydrate research, with potential interest in scientific partnerships.

Finally, Dr. O'Reilly asked about the potential gap between decommissioning the current vessel and introducing a new drilling vessel. Dr. McManus clarified that while the construction timeline for a drilling vessel could extend into the 2030s, the aim is to ensure a smooth transition for scientific activities, possibly through collaborations or solo U.S. expeditions, with regular programs expected within five years. Dr. McManus also noted that input can be provided at iodp@nsf.gov.

Sexual Assault and Harassment Prevention and Response (SAHPR) Update

Ms. Renee Ferranti, SAHPR Program Manager in the Office of the Director (OD), provided an update on the SAHPR program. Ms. Ferranti emphasized the establishment of a dedicated SAHPR Program Office within the OD, as part of ongoing efforts to prevent and respond to sexual misconduct in NSF-funded activities. This office has completed a planning exercise, with new position descriptions and resource allocations in progress.

Ms. Ferranti highlighted recent initiatives that include the launch of a climate survey within the U.S. Antarctic Program (USAP) to assess the environment with respect to sexual misconduct, with results expected in early 2025. The SAHPR program is also working on interagency coordination, partnering with organizations like the Department of Justice's Office of Violence Against Women to promote safer, more inclusive research environments.

Future priorities involve fully implementing the SAHPR program across all NSF activities, supporting victim advocacy in both remote and on-site capacities, and addressing the root causes of sexual violence by fostering equitable and inclusive cultures within research communities.

During the session, Dr. O'Reilly recognized Ms. Ferranti's expertise in navigating the complexities of the USAP and raised two important questions: integrating a survey into the offboarding process to improve response rates, and the progress on hiring an on-ice support person. Ms. Ferranti confirmed that climate surveys would be conducted every two years, and agreed with the desirability of performing exit surveys. She also noted the use of contractors, rather than NSF federal staff, for on-ice support roles across various stations.

Dr. Wilson Grimes highlighted the value of NSF's resources for the broader geoscience community and suggested the development of virtual modules for Principal Investigators (PIs) in collaborative projects. Ms. Ferranti agreed on the importance of codifying standards for fieldwork, with a focus on transparency and ethical considerations.

Budget constraints were also discussed, with Dr. Richardson inquiring about funding sources. Ms. Ferranti explained the complexities of NSF's budgeting process, contrasting it with the mandate-driven structures of other agencies, such as the Marine Corps and NOAA.

Dr. Lisa Clough, GEO/OCE Deputy Division Director, provided an update on the Safe and Inclusive Fieldwork (SAIF) pilot program, noting its ongoing evolution. The program will gather feedback through surveys, for which funding will be allocated in FY 2025. The pilot will expand to include Antarctic science

programs, and discussions are underway to engage additional divisions. Dr. Clough emphasized the importance of climate and equity considerations in proposals and encouraged community collaboration.

Dr. Bart inquired about outreach efforts aboard vessels. Ms. Ferranti indicated that while there are no plans to place dedicated outreach personnel onboard the vessels, investigators will rotate on the ice to ensure communication about rights and reporting procedures. Outreach efforts will expand once new victim service provider positions are filled.

Dr. Parsons emphasized the need to increase the representation of women in fieldwork and address bullying and inappropriate behavior among students. Ms. Ferranti acknowledged these concerns, highlighting the role of academic institutions and the challenges in addressing these issues comprehensively given all of the stakeholders and agencies involved; and she reiterated the importance of providing victim support as a priority.

Dr. Richardson noted variability in institutional support for Title IX training, sharing that some institutions, including her own, are understaffed and unable to meet the growing demand for training.

Dr. Nettles concluded by expressing the strong support of the Advisory Committee for NSF's efforts on SAHPR, both from the SAHPR Program Office and from GEO's leadership. She invited further collaboration between the SAHPR Program Office, the GEO Directorate, and the GEO AC, and reiterated the committee's support for these initiatives.

Discussion: New Normal – Engagement in Geosciences in a Post Covid Era

The session titled "A New Normal – Geosciences Engagement Post-COVID," led by Dr. Smith-Nufio and Dr. Josh Trapani, GEO Data and Analytics Officer, explored trends in proposal submissions, funding, and research engagement within the geosciences in the wake of the COVID-19 pandemic in which there has been a decline in overall proposals. The AC was tasked with considering possible explanations. Dr. Nettles pointed out that there had been an effort to make sure people weren't submitting proposals when they weren't ready, and wondered if perhaps the decline indicated the desired result. The AC discussed whether the decline in proposals was a problem, given that the number and diversity of institutions receiving funding remaining relatively stable. However, it was agreed that institutional capacity, administrative support, and faculty workloads, especially post-COVID and following natural disasters, were potential barriers to proposal submission. The discussion, which included a two-group breakout session, centered on several key themes:

1. **Challenges in Proposal Submission**: Participants noted the rising bar for broader impact assessments; and the difficulty in navigating different programs. Dr. O'Reilly, reporting out for group 1, highlighted that proposal submissions are impacted by perceived success rates, institutional overhead, and additional administrative burdens. Dr. Kraft, reporting out for group 2, noted that interdisciplinary research could lead to proposals being submitted outside traditional geoscience programs.
2. **Institutional Partnerships**: Both groups discussed the importance of partnerships between institutions, particularly in expanding GEO outreach and diversifying funding recipients.

However, the complexity and time-consuming nature of establishing partnerships, particularly with community organizations, were identified as barriers.

3. **Student Support and Needs**: The groups emphasized the growing cost of supporting students financially, particularly with rising costs of tuition, housing, and insurance. Mental health and well-being were also noted as key concerns, with students facing significant challenges in a post-pandemic academic environment.
4. **Shift in Priorities and Work-Life Balance**: Group 2 noted a possible cultural shift among younger faculty and students, who are increasingly prioritizing work-life balance over submitting multiple proposals. This shift has influenced proposal submission patterns, along with disciplinary focus, with growing interest in areas like data science, AI, and environmental science.

Both groups identified the need for more transparency in the proposal review process, clearer guidance for interdisciplinary proposals, and better support for first-time and rejected applicants to encourage resubmissions. The session concluded with a recognition of the importance of workshops and mentoring to guide researchers through the proposal process and support their career development.

After prepping the committee for Day 2 of the AC-GEO meeting, Dr. Nettles and Dr. Kraft adjourned the meeting for Day 1.

Thursday, September 19, 2024

Opening Remarks & Reflections

Dr. Kraft, AC-GEO Co-Chair, convened Day 2 of the AC-GEO meeting and outlined the agenda, which included discussions on public access, GEO facilities, GEO communications, a panel on the perceptions and relevance of STEM degrees and geosciences, as well as a scheduled meeting with NSF Chief Science Officer, Dr. Karen Marrongelle.

Discussion on Public Access

Dr. Raleigh Martin, Program Director in GEO/EAR, and Dr. Dwight Kravitz, Program Director for the Directorate for Social, Behavioral, and Economics' Division of Behavioral and Cognitive Sciences (SBE/BCS), provided an update on NSF's public access initiatives. The presenters outlined NSF's commitment to making federally funded research freely and immediately available to the public, aligning with updated guidance from the White House Office of Science and Technology Policy (OSTP). This effort aims to remove barriers to access, promoting more equitable outcomes across society by ensuring that research, publications, and underlying data are openly available.

Dr. Martin highlighted key milestones including the transition to a zero-embargo policy, meaning that peer-reviewed publications and research data will be accessible immediately upon release. Dr. Martin also highlighted the importance of balancing open access with legal, privacy, and ethical considerations, and outlined the ongoing process of gathering input from various stakeholders to ensure that these policies are implemented equitably. The NSF's broader objective is to streamline the accessibility of

research results, benefiting under-resourced researchers and enabling more impactful use of the research.

Several common themes emerged regarding data sharing, research accessibility, and the challenges faced by the NSF in fostering inclusive research practices.

Dr. Richardson initiated a discussion on the applicability of federal laws regarding the sharing of published papers, with Jean Feldman, Policy Office Head, Division of Institution and Award Support, within the Foundation's Office of Budget, Finance, and Award Management, clarifying that these regulations apply universally, including to international journals. Dr. Bart and Dr. Kuklina then discussed the definitions of "public" versus "open" access and the importance of ensuring NSF-funded research is accessible to the public. This led to further inquiries about access to scholarly research, with Dr. Martin noting that NSF-funded work should be readily available, similar to NIH's practices.

A focus on equity and community involvement in research emerged as Dr. Nettles and Dr. Bart expressed concerns about data ownership and ethical considerations. The importance of including community voices, especially in relation to Indigenous governance, was highlighted, with Dr. Isern and Dr. Martin discussing NSF's ongoing efforts to support diverse perspectives through formal advisory board meetings and workshops.

Funding and resource allocation challenges were also central to the discussion. Dr. O'Brien and Dr. Kraft raised questions about the criteria for exceptions related to intellectual property and the complexities of publishing costs after grant completion. Dr. Martin and Dr. Kravitz discussed the necessity of establishing flexible funding models to facilitate data sharing and address the financial burdens faced by researchers, particularly those from underfunded backgrounds. Dr. O'Reilly noted the concerns of qualitative data collection and participant privacy – Drs. Martin and Kravitz assured the AC that some data would require extra protection to assure privacy and IRB concerns were considered.

Additionally, the discussion emphasized the need for ongoing outreach and training regarding data management practices. Several participants noted that while advances in data management tools and repositories are promising, barriers remain due to the expertise required to utilize them effectively. Dr. Nettles and Dr. Isern underscored the importance of leveraging existing expertise to develop supportive frameworks for both novice and experienced researchers.

Overall, the discussion highlighted NSF's commitment to enhancing data management practices, promoting equitable access to research, and engaging communities to address the complexities of modern scientific inquiry.

Collaborative Exchange: Ideas and Feedback (Facilities)

The Collaborative Exchange session initiated with a discussion of the Antarctic Research Vessel (ARV) and its critical role in fulfilling research needs. Following years of preparation, NSF's Director has approved the ARV's entry into the final design stage, building on the essential science requirements outlined in the committee's 2019 report. Dr. Cottam Allen provided updates on the Request for Information (RFI) for the

new vessel integrator, noting that evaluations of submissions are ongoing and input on potential members for the Science Advisory Subcommittee is encouraged.

Several committee members raised important topics related to long-term planning and collaboration. Dr. O'Brien inquired about leadership transitions, and Dr. McManus assured members that internal expertise is available for support. Dr. Nettles emphasized the need for strategic planning in geosciences, while Dr. Kuklina highlighted the importance of community consultation in human-environmental systems and climate interventions. Dr. Maggie Benoit, GEO/OPP Executive Officer, shared her experience in prioritizing facility needs, urging the geoscience community to consider broader implications in their planning.

Additionally, Dr. Isern and Dr. Richardson discussed the establishment of prioritization principles and the development of a comprehensive list of priorities to guide decision-making. Dr. Shelby Walker, GEO Senior Advisor for Facilities Planning and Management, addressed the challenge of transcending disciplinary boundaries, and Dr. Parsons advocated for interdisciplinary collaboration to tackle Arctic research challenges.

Dr. McManus encouraged formal discussions on prioritization and funding strategies, while Dr. Nettles stressed the importance of proactive communication regarding facility lifecycles. Dr. Gamage underscored the need to convey committee discussions back to the community, ensuring that their expectations are addressed realistically. Overall, the session highlighted the collaborative efforts and strategic considerations necessary for advancing research initiatives at the poles and in the broader geoscience community.

The committee agreed on the need to pursue further discussion related to strategic planning, including approaches to setting priorities for investment and divestment.

Panel Discussion: Perceptions, Opinions, and Value of STEM Degrees and Relevance of Geosciences

This panel discussion, facilitated by Dr. Brandon Jones, Program Director in GEO/RISE, centered around the motivations and experiences of students pursuing STEM degrees, particularly in geosciences, and the impacts of the COVID-19 pandemic on education and career trajectories. Participants, including Adrian Puga (Columbia University), Gabriel Salter (Middle Tennessee State University), Andresa Oliveira Tavares Lima (Northeastern University), Abigail Whittington (Boston University), Marion Alberty (Princeton University), and Marion McKenzie (Colorado School of Mines), shared experiences that highlighted key themes around the importance of societal responsibility, mentorship, and the evolving relevance of STEM fields.

Several contributors emphasized the important motivation of applying their academic pursuits to solve societal problems, particularly in the context of environmental challenges. Marion Alberty and Abigail Whittington discussed how their interest in addressing climate change and environmental chemistry drove them to pursue their respective fields. Similarly, Gabriel Salter shared how growing up with a deep connection to nature inspired him to engage with biology and ecology to inform communities about local ecosystems.

The pandemic's impact on education and career development was a recurring theme. Andresa Oliveira Tavares Lima and Marion McKenzie highlighted how the pandemic shifted their research plans, leading to remote learning and adjustments in research focus. Both emphasized the importance of mentorship and institutional support in navigating these changes. Other participants, like Adrian Puga and Gabriel Salter, described how the pandemic disrupted their personal and educational trajectories but ultimately led them to discover new academic passions and opportunities through community colleges and internships.

Connectivity—both in terms of mentorship and institutional infrastructure—emerged as a critical factor. Participants expressed gratitude for supportive mentors who provided guidance during the pandemic, as well as institutions that adapted to the challenging circumstances. The discussion underscored the necessity of building systems that foster mentor-mentee relationships and provide flexibility, particularly in the face of disruptions like the pandemic.

In conclusion of the facilitated session, the panel reflected on how the evolving landscape of STEM education and career development presents both challenges and opportunities, with a focus on using geosciences and related fields to make a positive societal impact.

The panel also had the opportunity to address questions directly from advisory committee members and Dr. Karen Marrongelle, NSF Chief Science Officer, who also joined the session. Several themes emerged regarding career aspirations, the need for inclusivity in geosciences, and the challenges posed by systemic issues.

When asked about their long-term career visions, the participants shared diverse aspirations, such as combining chemistry with environmental justice (Abigail Whittington), working in national parks and community outreach (Gabriel Salter), and focusing on reusability and sustainability in research (Marion McKenzie). These responses underscored a common desire to bridge scientific inquiry with societal impact, particularly in addressing environmental and community-based challenges. Marion Alberty emphasized the need for broadening participation in science to create equitable solutions for climate change, noting the importance of including diverse voices in scientific spaces.

The participants also highlighted the importance of mentorship and inclusive programs in shaping their careers. Programs like NSF-funded Research Experiences for Undergraduates (REU) and the American Geophysical Union's (AGU) LANDInG initiative were mentioned as transformative experiences that provided exposure to diverse career paths and mentors from various sectors. Several students, including Adrian Puga, emphasized the critical role of outreach in informing students about career opportunities, suggesting that more structured efforts to connect students with mentors and career resources could help demystify potential pathways in geosciences.

Challenges related to equity and inclusion were also raised. Students discussed the need to rethink traditional, extractive approaches to research, especially when working with underrepresented or Indigenous communities. Gabriel Salter shared experiences from a service-learning project in Jamaica, where previous scientific endeavors had not benefitted the local community. He stressed the importance of ensuring that research serves the community and provides value in return. Similarly, Adrian Puga

urged the field to consider diverse ways of knowing, advocating for incorporating oral traditions and non-Western perspectives into scientific practice.

Finally, broader concerns about how NSF could better support diversity, equity, and inclusion (DEI) initiatives were discussed. Marion McKenzie noted that proposals from certain states might face limitations due to local legislation impacting DEI efforts, calling for greater awareness and flexibility in funding decisions to ensure equitable support across regions.

Overall, the discussion underscored the participants' desire for careers that not only advance science but also contribute to social and environmental justice. They highlighted the need for supportive mentorship, inclusive programs, and thoughtful approaches to research that center community engagement and diverse perspectives.

AC-GEO Meeting with NSF's Chief Science Officer Dr. Marrongelle

Advisory committee members engaged in discussion with Dr. Marrongelle, NSF's Chief Science Officer. Dr. Marrongelle expressed gratitude to Dr. Jones for facilitating the interactive session and acknowledged the valuable contributions of participants, emphasizing the importance of their voices and experiences, particularly in light of the ongoing impacts of COVID-19. Dr. Marrongelle highlighted the significant role of mentorship in shaping student trajectories and reinforced the need for intentional community-building and exposure to diverse career pathways within the geosciences.

Dr. O'Brien raised concerns about the time constraints faced by faculty mentors and inquired about additional funding opportunities that support the integration of teaching and research. Dr. Marrongelle responded affirmatively, noting that broader impact statements can include educational integration, which could be promoted more strongly. This discussion transitioned into considerations of equity and the quality of support provided to students. Dr. Nettles underscored the challenge of providing comprehensive support for students navigating complex interdisciplinary research environments.

A recurring theme was the need for continuity in support systems, as expressed by Dr. Wilson Grimes and Dr. Isern, who noted the gaps in NSF programs designed to assist students throughout their academic journeys. They advocated for the creation of more inclusive programs that bridge various stages of education and career transitions. Dr. Marrongelle acknowledged the potential for partnerships with industry and other organizations to facilitate support for these transitions.

The conversation also touched on the changing landscape of research relevance and career opportunities in fields such as energy, with Dr. Bart highlighting the potential disconnect between academic training and sector needs. Dr. Marrongelle concluded the meeting by recognizing Dr. Isern for her exceptional contributions to NSF and the scientific community, emphasizing the importance of her leadership and vision.

GEO Communications Update

The GEO Communications Update presentation, led by Ms. Elizabeth Jeffers, GEO Communications Specialist, provided key updates on communication strategies and initiatives. The presentation

introduced the GEO communications team, including its coordination with various NSF offices such as the Office of Legislative and Public Affairs (OLPA) and GEO division outreach teams.

The presentation emphasized the importance of impactful storytelling to highlight GEO-funded work through news articles, award updates, and broader impact stories. It encouraged sharing of new solicitations, awards, and compelling stories that resonate with both internal and external audiences. Specific highlights included promoting award updates, new partnerships, and broader impact activities, such as NSF's Science Matters blog featuring student-led fieldwork and research. There was an emphasis on the need for scientists to help in telling these stories by providing impactful images and descriptions in accessible language for a broad audience.

Additionally, Ms. Jeffers stressed the value of community engagement by inviting program staff to contribute stories, fieldwork plans, publications, and visual content. The presentation concluded with an announcement about the upcoming Earth Science Week (October 13-19) and encouraged ongoing communication with the GEO team.

Dr. Gamage and Dr. Wilson Grimes raised questions about equitable representation in NSF's communication efforts, particularly for emerging research institutions and those lacking communication departments. Ms. Jeffers responded by emphasizing her team's efforts to ensure broader representation, such as focusing on underrepresented states and research areas.

Dr. Kraft and Dr. Nettles highlighted the challenges of communicating exciting research that may not yet be peer-reviewed. Jeffers explained her team's close collaboration with PIs to ensure sensitive information is handled carefully. Dr. Dave Verardo, Program Director in GEO/AGS, emphasized the need to shift from technical jargon to more accessible, engaging content, urging institutions to provide visuals and stories that communicate the broader societal impact of NSF research. Dr. Oboh-Ikuenobe and Dr. Bart discussed the potential for highlighting older, still-relevant research in NSF communications, with Ms. Jeffers confirming that her team welcomes such stories.

The session concluded with a consensus that communication efforts should focus on both timely and long-term impacts of research. Participants also emphasized the need for greater outreach to researchers, encouraging them to proactively share their stories with NSF's communication team. Finally, the importance of leveraging workshops and educational resources to improve science communication across institutions was reiterated.

After discussing recommendations, topics for future advisory meetings, and action items, and thanking the members who were rotating off for their service, the AC-GEO Co-chairs adjourned this meeting.

Recommendations:

Climate Equity Task Force Findings:

1. The AC was interested in the finding that proposals addressing both climate and equity came more often than average from PIs otherwise underrepresented, including from women, and from MSIs. Although the work of the Task Force is complete, the AC encourages further exploration of what produces this effect, taking into consideration the ways in which

perceptions of proposals about “equity” may intersect with perceptions of proposals by women.

2. The AC encourages NSF to continue tracking metrics identified by the Task Force, particularly as changes to solicitations (if any) are made in response to the Task Force findings.

Sexual Assault and Harassment Prevention Response (SAHPR):

1. Since it is not possible to have a victim's advocate present at all NSF-supported field sites, the AC recommends that NSF consider providing training around how to respond to a report of sexual harassment or sexual assault for USAP Station Managers, Chief Scientists on board research vessels, and Station Science Leaders (at a minimum). It would also be very helpful for PIs and senior personnel to receive this training; one approach could be to start with PIs from the larger field campaigns.

2. The Bystander Awareness training is excellent, and the AC recommends that NSF consider implementing follow-up training during the field season to remind people about what is acceptable behavior, and to encourage continual discussion of this important topic.

3. The AC recommends that NSF consider making an exit interview part of the field-support process for both the Antarctic and Arctic programs.

4. The AC encourages continued development of resources for PIs across NSF. This could start by expanding across GEO, so that training is provided for those conducting fieldwork in non-polar regions and for those working on UNOLS vessels. Clearly, additional funding would be required.

Topics for Future Advisory Meetings:

1. Divestment from facilities: Engage the AC in a focused discussion about strategic divestment from facilities and alignment of investment priorities with planning for the future. How and when do we do divestment? How do we set the priorities for the future? How and when do we sustain long-term activities, and how and when do we end them? How can NSF best engage the scientific community in this discussion?
2. How can we do more with less? How do we achieve transformative science at lower financial cost and lower cost to the environment? What models can we look to? (Space station? Remote surgery?)
3. Budget strategy and agility: How do we articulate what is lost in GEO budget cuts? How does GEO think about maintaining priorities around innovation and broadening participation in a constrained-budget environment, where individuals and institutions may tend to become more conservative?
4. Training students for new directions: How can NSF help ensure students receive outstanding training in increasingly complex and interdisciplinary/transdisciplinary work, in support of critical needs in Geoscience?

5. Open access and data sharing: Build on discussions in the last two meetings with additional discussion related to public access, data management, and NSF's policies, especially in relation to rapid changes in this area. How do we think about publishing needs across Geoscience and intersecting fields (e.g., publishing in many forms, from www to articles to books)? How do we think about human-subjects data in Geosciences? How do we incorporate and train more researchers in considerations related to local and indigenous ownership of data and data products?
6. Collaboration with humanities: Explore how NSF can promote scientific collaboration with humanities scholars, highlighting the growing interest in transdisciplinary work.

Action Items:

1. GEO to publish the list of existing data repositories for PIs to use in proposal preparation, particularly the Data Management Plan.
2. GEO to provide a brief summary of the findings of the Climate Equity Task Force, either as a one-page document or a short set of slides.