

Earth Science Advisory Committee Meeting Report

August 2-3, 2022

From: The NASA Earth Science Advisory Committee (ESAC) - Sara Tucker (Chair), Indrani Das, Belay Demoz, Nancy Glenn, Daven Henze, Lucy Hutyra, Jasmeet Judge, Venkataraman Lakshmi, Jennifer Logan, Rowena Lohman, Colleen Mouw, Beth Plale, Anastasia Romanou, Robert Wright, and Lisan Yu.

To: **Karen St. Germain** (Director, Earth Science Division, SMD)

Cc: Lucia Tsaoussi (Executive Secretary, Earth Science Advisory Committee), Julie Robinson (Deputy Director, ESD), Jack Kaye (ESD Associate Director for Research), Kathleen Boggs (ESD Associate Director for Flight Programs, Acting), Lawrence Friedl (ESD Associate Director for Applied Sciences), Michael Seablom (Associate Director Earth Science Technology Office, Acting)

Date: 31 January 2023

Dear Dr. St. Germain,

The Earth Science Advisory Committee (ESAC) met at NASA HQ and via WebEx on August 2-3, 2022. Nine topics were presented by ESD leadership, and the Applied Sciences Advisory Committee (ASAC) Chair (David Saah) provided a summary of the December 2021 ASAC meeting.

The important themes of Diversity, Equity, Inclusion, and Environmental Justice permeated ESAC discussions on each of the presentations. Several of the highlighted Findings and Recommendations to follow reflect these cross-presentation themes.

Findings

In the context of the ESD's strategy to Deliver, Aspire, and Inspire, the committee finds the division is demonstrating an increased emphasis on the importance of observations of environmental events tied to climate change and recognition of how these events unequally impact communities. ESAC applauds ESD's demonstrated commitment to diversity and inclusion at many levels, including

- leading by example on gender balance at the leadership level and continuing to push Earth Science programs being executed at NASA centers to follow ESD's lead in these areas,
- developing funding opportunities at minority serving institutions (MSIs) to build institutional capacity and provide students experience working with scientific data, satellite validation, atmospheric physics and chemistry, and instrument support,
- piloting a requirement for PIs to present Diversity and Inclusion plans in ROSES elements, and
- focusing on review panel composition and accessibility (e.g., virtual panels) to ensure participation from a more diverse community.

The committee also finds areas with room for improvement. For example, of 36 selected tasks for the Decadal Survey Incubation (DSI) opportunity, only 6 (16.7%) were awarded to female investigators indicating a need for increased emphasis on encouraging diversity in PI applications at the ROSES level and ensuring diverse review panels for future DSI solicitations.

The Committee agrees with SMD/ESD's recognition that Open Source Science (OSS) faces cultural barriers and that a change in incentivization is needed (e.g., less emphasis on scientists' publication H-index and more on teaching and applications) is needed. The ESAC commends the TOPS effort on funding efforts to promote cultural adoption and partnering with AGU to develop a core open science curriculum.

Impacts from Covid on the ESD Flight Program were reported to be on the order of \$100M/year plus the costs of inflation, resulting in the necessary postponement of new missions to ensure the success of the current Program of Record. Despite this, ESAC finds that NASA ESD continues to make important progress on missions critical for observing and dealing with climate change.

Recommendations

While designed with inclusion and expanded science in mind, several ongoing and new initiatives within ESD place additional requirements on Principal Investigators (PIs), potentially overwhelming new PIs and those at institutions that provide fewer proposal and grant execution resources. The ESAC thus recommends providing additional resources to reduce barriers for PIs at all levels (i.e., ROSES studies through mission AOs) and at all types of institutions. Such resources could include additional training opportunities, listing of best practices, templates (where applicable), and examples, in the following areas:

- *Open Source Science (OSS)*: clarification of SPD-41A requirements to meet OSS objectives, including types of data/metadata subject to OSS, explanation of NASA provided resources available to meet OSS requirements (e.g., archives, available funding for cloud computing, etc.), guidance on OSS cyber-infrastructure setup and resource costing, and protection of intellectual property.
- *Diversity and Inclusion plan proposal requirements*. examples and guideline documents on how to set up, propose, and implement DEI plans. In addition, if possible, ESD should consider having a DEI expert present on all panels when D&I plans are weighted in proposal evaluations.
- *Applications*. Guideline document and examples for how to obtain funding for Applications by joining Applied Science teams, extending existing Science research to Applications, or proposing stand-alone Applications efforts.

ESAC recommends that ESD, together with SMD, provide more regular Principal Investigator (PI) Launchpad workshops and preferably hold them at MSI locations and/or in underserved communities to help diversify the PI pool for future missions. Likewise, the ESAC recommends providing shorter PI workshops addressing the smaller ROSES science and technology opportunities that can lead to larger studies and missions. ESAC also recommends that NASA work to increase awareness of these workshops beyond the NSPIRES notification (e.g., notices in scientific trade magazines such as EOS newsletter and AGU Weekly, or notices on NASA Science websites).

Among the new programs enacted within ESD to increase diversity and inclusion of underrepresented communities, several are considered pilot programs, and thus are subject to impermanence that could risk future inclusion and trust. The ESAC recommends that ESD evaluate these pilot programs early, and provide continued support in areas that are working, as such continuity helps ensure long term success and stability for these communities as well as demonstrate long-term commitment by ESD.

With a focus on directed programs at NASA centers, ESAC recommends that ESD shine a spotlight on the importance of program diversity, looking at program organization charts and, where allowed, providing a breakdown of program workforce diversity statistics. ESAC also recommends that ESD continue encouraging program and project managers at the mission level to include young investigators, including those selected for the FINESST program, in their larger programs and on review panels for external opportunities.

Given that NASA has a preset inflation rate that is no longer in line with current values, but that proposers are instructed to use, the ESAC recommends that ESD review and reconcile the inflation numbers used for NASA programs to ensure spending levels are commensurate with planned budgets.

Given the value of open-source data in performing Environmental Justice focused research, the ESAC recommends that ESD begin including Environmental Justice among the categories used to determine whether to migrate specific data sets to the cloud.

The ESAC recommends coordinating meetings between the ESAC and the Applied Sciences Advisory Committee (ASAC), allowing for one-half to one day of joint meeting to review overlapping topics including incentivization to work in applied science and connections between applications and research.

The next committee meeting is planned for Spring 2023.

Sincerely,



Earth Science Advisory Committee

Sara C. Tucker, Chair

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