

Dr. Karen St. Germain
Director, Earth Science Division
Science Mission Directorate
NASA Headquarters
300 E St SW
Washington, DC 20546

September 30, 2020

Dear Dr. St. Germain,

The Applied Sciences Advisory Committee (ASAC) met by video conference in July 2020. The Committee was very excited to meet you, and your energy and perspectives on the topics we covered were inspiring.

During the meeting, we received several exceptional briefings that led to productive discussions on various subjects related to the Earth Science Division's (ESD) and the Applied Sciences Program's (ASP) activities. The ASAC commends ESD and the ASP leadership and staff on the coordination and content of the ASAC meetings, which the Committee continues to find well-organized, informative, and transparent regarding both strengths and challenges. The sessions allowed us to provide advice through on-going dialogue and gave us confidence in the sound management of ESD and the Applied Sciences Program. Our letter report summarizes our deliberations regarding several vital topics along with our findings and recommendations from these discussions.

TOPIC 1: Consortium Models

The agenda included an engaging discussion on consortiums as an ASP programmatic model, including invited briefings by three speakers on the strengths and challenges associated with a Consortium model.

FINDING: Consortiums work especially well for big, complex problems where it's advantageous to pursue multiple pathways in parallel; they take time, resources, and resiliency.

Below are some takeaways on the topic:

- Traits for consortium success include transparency, explicit expectations, inclusion, and shared leadership.
- "Consortia of the willing" are far more effective than coerced or contrived consortia
- Time horizons of a Consortium should fit its mandate.

RECOMMENDATION: ESD and ASP should first look to join existing consortiums. There are many existing consortiums, and ESD could join current consortiums and doesn't necessarily need to start new consortiums.

RECOMMENDATION: ESD and ASP should develop a lessons-learned paper on consortiums. This paper would include best practices and provide guidance on success criteria and potential requirements that could be more tailored to consortium models.

TOPIC 2: ESD Research and Analysis Program

The agenda included discussing applications with the Research program, following a recommendation from a previous ASAC meeting. Jack Kaye, ESD Research Program Director, briefed ASAC about the program and application activities in R&A. The discussion covered the cross-benefit with research and applications.

FINDING: Amplifying the cross-benefit of research and applications involves multiple pathways.

ASAC suggestions to improve the cross-benefit include:

- 1) Regular communications are essential. ESD can make better use of dedicated collaboration tools like Slack and reduce email for cross-benefit work.
- 2) Proactive development of interdisciplinary teams.
- 3) Design solicitations that are inclusive in terms of resourcing and team building.
- 4) More success will be when colleagues proactively pursue cross-benefit work.

RECOMMENDATION: ESD should document where the successful collaboration of R&A and ASP on applications and cross-benefit has occurred. ESD should create information products around successful cross-benefits of ASP and R&A.

TOPIC 3: ESD Earth Science Data Systems Program

The agenda included a discussion on applications and GIS with the Data Systems program, following a recommendation from a previous ASAC meeting. Kevin Murphy, ESD Data Systems Director, briefed ASAC about the program and application activities.

ASAC applauds ESD for including the Data Systems Director as part of the ESD leadership team. This is going to be critical as data science and technology continue to evolve rapidly.

FINDING: NASA's leadership in promoting Open sharing of data and software is beneficial and should continue.

FINDING: GIS presents opportunities for more Earth science applications. ASAC recognizes the need to balance access for long-term archiving with community-driven requirements. We also need to understand better how data are used and what they are used for.

RECOMMENDATION: NASA should increase investments in generating and sharing appropriate training data to speed up the use of AI/ML to detect features of interest within remote sensing imagery. This is a shared interest across many funders in the private sector (foundations, philanthropies, tech companies), which could mean the possibility of co-investments, especially if the licensing is open.

TOPIC 4: Earth Science, Equity and Diversity

The agenda included a discussion on diversity, equity, and race and activities with ASP and ESD on these topics. The Committee is immensely pleased that ESD had this topic on the ASAC agenda.

FINDING: ESD and ASP are leaning forward on diversity.

The Committee praises ESD and ASP for leaning forward on the diversity, equity, and inclusion (DEI) topic. It is clear that ESD and ASP do not address DEI just as a pipeline issue but acknowledge the need to change the climate. The following bullet list captures items from the discussion as key DEI elements for ESD and ASP:

- Mentoring will be important (for people from under-represented groups plus for the mentors themselves)
- Excellence in science needs a diversity of thinkers
- Tokenism does not work
- Building a community that a diverse group wants to participate in is important
- Support existing movements for co-learning opportunities
- Transparency is critical when it comes to diversity, inclusion, and equity initiatives. This relates to sharing metrics and progress on these topics, documenting and sharing lessons learned and best practices at an organizational level, and having open dialogues.

FINDING: ESD and ASP have immense opportunities to showcase the diversity of its users and grow the diversity of users and applications as well.

Many of ESD's and ASP's partners and communities of users are also prioritizing diversity and inclusion, which presents an opportunity for ESD and ASP leadership.

RECOMMENDATION: ESD and ASP should pursue partnerships with technical and scientific organizations that have existing relationships with diverse communities.

There are opportunities for ESD and ASP to engage with organizations already connected to diverse communities; some examples include AfroTech, Lesbians Who Tech, and other communities that empower under-represented folks in STEM.

As ESD and ASP continue to identify members for its Advisory Committees, ASAC encourages ESD and ASP to recruit diverse committee members focusing on racial diversity and socioeconomic diversity and continue to focus on gender diversity.

TOPIC 5: Future Plans

The agenda included discussions on ASP's strategic planning activity and ESD studies.

FINDING: The Committee supports ASP's pursuit of a strategic plan.

ASAC was interested to hear about the strategic plan and anticipates the opportunity to review a plan. ASAC recognizes the work involved to reach consensus and create a plan, but ASAC reminds ESD and ASP to focus more on the execution of it. The Committee also emphasizes that it is crucial to communicate the plan in various ways to increase awareness and support for implementing stated goals.

ASAC received information on ESD studies on a foundation and philanthropy landscape analysis and user community assessments for the Designated Observables. The Committee supports ESD doing these and is interested in the results of the studies. ASAC is interested in hearing about them at a future meeting and is willing to review and provide feedback.

FINDING: Wildfires remains a topic of critical importance for ESD and ASP.

The Committee acknowledges that Wildfires is a cross-cutting topic within ESD, and the importance of Earth observations and Earth system science to Wildfires is becoming more and more critical. The nature and behavior of Wildfires are changing with climate change. Addressing it requires a robust observing system and connections to models for predictions and users.

Recommendation: ASP should reconsider having a Wildfires program.

ASAC reiterates a previous recommendation for a dedicated ASP Wildfires area and program manager. ASAC encourages ESD and ASP to amplify this given the potential impact on life, property, and environmental conservation. It is an opportunity for cross-benefit.

Since our last meeting, the Committee learned the sad news about the passing of Mike Freilich. The Committee recognizes the enormous impact he had on the entire field of Earth system science. His vision, leadership, and passion for how we see our planet will live on for generations to come.

On behalf of the ASAC Committee, we are very grateful for the opportunity to provide our advice and recommendations to you and NASA Earth Science, and we are grateful for how seriously NASA has considered prior findings and recommendations.

Please contact me if you have any questions about this letter report, and I am pleased to discuss the findings and recommendations with you.

Sincerely yours,



David Saah
Chair, Applied Science Advisory Committee
Professor of Environmental Science at the University of San Francisco
Principal of Spatial Informatics Group

Cc. Lisa Dilling, University of Colorado Boulder
Molly Jahn, University of Wisconsin-Madison
Rhiannan Price, Maxar Technologies
Daniel Sarewitz, Arizona State University
David Wilkie, Wildlife Conservation Society
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