

**National Science Foundation  
Committee of Visitors Report  
Division of Earth Sciences  
June 19-20, 2017**

**RESPONSE TO THE 2014-2016 REPORT  
July 19, 2017**

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The 2017 Committee of Visitors {COV} met at the National Science Foundation {NSF} from June 19-20, 2017, to review programs in the Division of Earth Sciences (EAR) for the period since their last COV review. These programs and their review period are:

**FY2014-FY2016**

Critical Zone Observatories (CZO)  
EarthScope {ES}  
Geobiology and Low Temperature Geochemistry {GG}  
Geoinformatics {GI}  
Geomorphology and Land Use Dynamics {GLD}  
Geophysics (PH)  
Integrated Earth Systems {IES}  
Hydrologic Sciences (HS)  
Paleo Perspectives on Climate Change (P2C2)  
Petrology and Geochemistry {CH}  
Sedimentary Geology and Paleobiology {SGP}  
Studies of the Earth Deep Interior {CSEDI}  
Tectonics (TE)

**FY2013-FY2016**

Education and Human Resources (E&HR)  
GeoPrisms (GPR)  
Instrumentation and Facilities {IF}  
Postdoctoral Fellowships (PF)

## INTRODUCTION

The Division of Earth Sciences {EAR} greatly appreciates the efforts of the 2017 COV committee, including their careful review of materials in the months prior to the COV meeting, excellent discussions, observations, and the recommendations outlined in their report. The report follows the NSF COV template, and makes observations and recommendations in four areas: {1} the merit review process, {2} selection of reviewers, {3} program management, and {4} portfolio planning. In addition, the COV addressed the impact of a "No Deadlines" policy pilot, introduced recently by some EAR programs to aid with workload management.

Some issues, including poor reviewer response rates, confusion over broader impacts, the need to broaden participation, and concern for program officer {PO} workload are commonly highlighted in COV reviews. Their inclusion in this most recent EAR COV report signals the need for Division leadership, the Directorate for Geosciences {GEO}, and NSF to address these problems and effect solutions through concerted and sustained effort. Other recommendations point out the need for good communication to raise awareness among the public for the quality and value of NSF-funded research. Finally, the COV brought forward recommendations related to portfolio planning: the proportion of EAR's budget allocated to research versus infrastructure, the decision-making processes by which strategic initiatives are established, and the allocation of funds among program budgets. These recommendations point to the need for a transparent process of strategic planning by EAR that includes formal mechanisms to include community input.

EAR recognizes the incredible value of the COV review process. Each recommendation will result in actions that will help increase the effectiveness of the division, improve the consistency and quality of its merit review, and develop clear and transparent decision-making processes by which EAR sets priorities. Below we respond to the 19 recommendations of the COV, explaining how we will act on each.

## Section I: Merit Review

**Recommendation 1.** *The COV views the combination of ad hoc and panel reviews to be highly effective, and recognizes it as the "gold standard" of merit review undertaken so expertly by EAR staff. While we acknowledge the value of including alternative mechanisms for merit review within their portfolio of delivery mechanisms (e.g. virtual panels, panel review only, etc.), we strongly encourage EAR to continue the use of the ad hoc peer review coupled with on-site panels as the principal merit review process.*

**Response:** EAR agrees that the combination of ad hoc and on-site panel review represents the "gold standard" of NSF's merit review process. We note that virtual panels are of value in some circumstances, for example for reviewing small numbers of proposals and when the number of panelists is smaller than a normal panel. Moreover, virtual participation by small numbers of panelists at on-site panels (the so-called "hybrid" model) provides opportunities for some panelists to participate who may have limitations that preclude on-site participation.

**Recommendation 2.** *The COV was disappointed with the chronically low response rate of ad hoc reviews, despite tremendous effort on the part of EAR staff to solicit reviews. We encourage EAR to promote alternative reviewer management technologies that allow reviewers to accept or decline review requests quickly and to recommend alternate reviewers as one mechanism for improving the response rate. Such technologies may also enable EAR to more efficiently monitor the proportion of invitations and responses for ad hoc and panel reviews, from women, under-represented minorities, early career scientists and scientists from different institution types to broaden reviewer participation (see Recommendations 16, 17 and 18).*

**Response:** EAR program officers strive to obtain high-quality feedback from ad hoc reviewers with the appropriate expertise. This is a difficult task but modern technologies may improve ad hoc reviewer response rate as well as expand the available reviewer pool. NSF currently is in the process of a multi-year effort to modernize both internal- and external-facing electronic business applications. One of the many ongoing projects is devoted to reviewer services, a project that will provide the kind of tools the COV recommends. The pace of modernization largely depends on project complexity, interdependencies with the many other modernization efforts underway, and available resources. The timeline of the reviewer services project is not yet set but it is likely to start in the next year. GEO program officers and administrative staff are active on the modernization working groups, affording us an excellent opportunity to advocate for the changes the COV recommends. Please note that our system is limited in terms of demographic data because we can only include that information in our databases if it is voluntarily reported by ad hoc reviewers.

**Recommendation 3.** *The COV was pleased to learn of the initiatives already underway to improve community understanding and appreciation of the Broader Impacts criterion (e.g., the pilot educational webinar training for reviewers and panel members). We encourage EAR to continue its efforts to improve community understanding and assessment of Broader Impacts. We recommend that EAR consider developing a checklist directly on the ad hoc reviewer and panelist review forms to encourage more thorough responses from reviewers.*

**Response:** The ad hoc review form used by Fastlane provides a box for comments about the proposal's Broader Impacts, and the review cannot be completed without entering text in the box. In addition, the review form states that reviewers should consider the five review elements in filling out the form. Inclusion of a check-list directly on the ad hoc review form could be a helpful reminder to reviewers but would require action at the agency level. However, many EAR programs provide a panel summary template that explicitly requires that the panel address the broader impacts. EAR will review the templates in current use by division programs and ensure that each includes a section devoted to assessment of Broader Impacts.

**Recommendation 4.** *We recommend that Program Officers use their PO Comments to signal the importance of Broader Impacts to the EAR community in feedback.*

**Response:** Feedback from program officers about Broader Impacts is a critical means of transmitting expectations and furthering understanding of the quality and significance of Broader Impacts in the EAR community. We will expand the mechanisms to communicate the importance of Broader Impacts with the principal investigators, including PO comments and other correspondence. The record of these communications will be uploaded in the electronic jacket.

**Recommendation 5.** *The COV supports the important role EAR staff play in maintaining portfolio balance (see Section IV). However, the rationale for funding decisions should be clearly documented, particularly in those rare cases where disparity exists between ad hoc and panel reviews or where projects are elevated or demoted significantly relative to the panel ranking.*

**Response:** EAR section heads and the division director (DD) will ensure that clear and complete documentation is provided with proposal recommendations as they DD Concur each proposal.

**Recommendation 6.** *The COV recommends that EAR provide a consistent summary of panel activity in the Review Analysis across all programs. This includes essential information such as the number of panelists, where they convened, who led which aspects of the review, and a generalized statement of the proposal's relative ranking in the panel's assessment.*

**Response:** EAR will investigate ways to provide a more consistent record of the merit review process, including panel activity. We will review the Proposal and Award Manual (PAM), which provides agency-level guidance on the information that is included in the documents that make up the review record in e-Jacket. We will review current practices within the division and develop a set of division best practices consistent with agency policy.

**Recommendation 7.** *Clear communication to the PIs, including strengths and weaknesses of proposals with respect to both Intellectual Merit and Broader Impacts, is essential, especially for new investigators and declined proposals. We recommend that EAR provide consistent feedback to PIs with respect to merit criteria across all programs in panel summaries, PO comments and context statements, including indications of relative proposal rankings.*

**Response:** EAR will review current program templates and practices as well as agency guidelines, and we will develop best practice guidelines for what must be included in each of these documents.

## **Section II: Selection of Reviewers**

**Recommendation 8.** *The COV was disappointed by the low response to requests for review from the earth science community, as this creates excess workload for POs and potentially risks the quality of merit review. We encourage EAR to explore innovative means to incentivize the community to respond to requests.*

**Response:** Division program officers expend much effort in securing ad hoc reviews, and we thank the COV for raising this issue. The return rate varies by program within EAR, and we commit to a discussion where we share practices that have worked well. Some technology changes on the horizon also will simplify the task of identifying responsive reviewers. Program officers will have more complete profiles of reviewers that include their response rates. The future technology changes summarized in recommendation 2 also will help greatly with ad hoc reviewer response rate.

## **Section III: Program Management**

**Recommendation 9.** *The COV commends EAR staff for the excellent management of their programs, particularly through periods of resource challenges. The COV is concerned about the sustainability of this excellent work, given the workload demands relative to other NSF programs. The COV emphasizes the need for increased personnel and fiscal resources to help sustain the important contributions of EAR staff.*

**Response:** The Division agrees. Earth Sciences will strive to maintain a fully-staffed organization, an ongoing challenge in a dynamic environment where there is regular turnover of rotator and temporary science staff and many permanent staff are retirement-eligible. Although our fiscal resources are determined elsewhere, we appreciate the COV's view. We agree that both healthy program budgets and division travel budgets are important. The latter helps POs maintain good relationships with our science community, which has many positive effects including better ad hoc review return rates.

**Recommendation 10.** *The COV noted the significant increase in the proportion of EAR's budget devoted to infrastructure in recent years. The COV recommends that EAR be strategic in determining the appropriate balance of future funding for infrastructure relative to other areas of investment. Processes should be put in place for identifying major investments that may eventually need to be sunset, and the timelines for doing this to make way for new commitments, so that both EAR and the community can plan well in advance for these changes.*

**Response:** The division is mindful of the balance of infrastructure and research program spending and the need to make sure that decisions about infrastructure and research awards are integrated. We also recognize that EAR infrastructure investments need to evolve over time. Our science staff, led by EAR's Science Leadership' Committee, currently are having internal discussions on these topics. In addition, the division believes it would be beneficial to commission an external study of division activities that includes an examination of the balance between infrastructure and research investments and future directions and needs. We will investigate options, develop a statement of work, and plan to start such a study in 2018.

**Recommendation 11.** *We recommend that EAR develop a clearer way of articulating to the community the mechanism(s) used for developing strategic initiatives, clarifying where they are driven top-down in response to stated national priorities (responding to known societal needs) and where bottom-up driven by specific science communities.*

**Response:** The COV correctly recognizes that initiatives can originate from both top-down and bottom-up drivers, and commonly there is some of both in play. We agree that the division needs to do a better job at explaining to the community how initiatives are developed. One avenue that can be implemented immediately is to ensure that in each new solicitation of an initiative and its Dear Colleague Letter announcement provide some explanation of how the program originated, including the factors to which it responds.

**Recommendation 12.** *We commend EAR for their responsiveness to previous COVs and recommend they continue current progress with issues such as Broader Impacts and improvements to the ad hoc review software system.*

**Response:** EAR will continue to use feedback from past and current COVs to improve the quality of the merit review process.

#### **Section IV: Portfolio Planning**

**Recommendation 13.** *We recommend that EAR increases transparency to stakeholder communities regarding the processes by which individual program funding levels are determined. A variety of factors, including perceived trends in science, proposal pressure, and collective opinion are presumably at work, but long-term EAR strategic planning should be driven by a transparent process at the Division level.*

**Response:** We agree that although the level of funding appears in program solicitations, information about how individual program funding levels are set is not available to our stakeholder communities. Flat budgets across NSF mean that EAR program budgets have been static for many years. We are dedicated to advancing the frontiers of Earth science even in an uncertain future budget environment. The time is right to evaluate division priorities via a planning process that includes an external study of future research directions and infrastructure needs and the distribution of funds to support them. This process will include communication with our community, inviting them to give us their perspectives and informing them of the decisions that result.

**Recommendation 14.** *The COV recommends that EAR as a whole (in addition to individual programs) engage in long-term strategic planning based, in part, on formal mechanisms to ensure broader community input.*

**Response:** EAR agrees with this recommendation and plans to launch an external study in 2018 as described in our responses to recommendations 10 and 13.

**Recommendation 15.** *EAR is currently limited by the mechanisms available to rapidly disseminate discoveries and innovation to PIs and the broader public. The COV encourages EAR to work with partners in GEO and elsewhere within NSF to explore ways to more effectively disseminate discovery and innovation in a timely fashion.*

**Response:** The Division agrees that mechanisms to communicate with the Earth sciences community and to disseminate discoveries and innovation rapidly to principal investigators and the public is critical to EAR's mission and success. During the creation of the new Integrative Activities Section during the Division's reorganization in January 2017, a formal communications group was developed to lead communications and outreach efforts. EAR's communication representatives will develop a strategic communications plan for the division and intends to

increase the flow of information through partnership with NSF's Office of Legislative and Public Affairs and other stakeholder groups as well as through autonomous communication tools.

**Recommendation 16.** *The geographic distribution of awards seems to map well onto proposal pressure, state populations and research-intensive institutions. At the same time, we recognize the need to further broaden participation in fundamental research, and recommend that EAR continue their efforts to broaden outreach to states with low proposal success rates and, especially, numbers of submissions.*

**Response:** EAR will continue outreach efforts to states with low participation rates. We actively participate in the agency's "NSF Days" in which program officers visit universities in EPSCoR (Established Program to Stimulate Competitive Research) states or those with low participation rates. We will continue to promote our "Navigating NSF" workshops at GSA (Geological Society of America) and AGU (American Geophysical Union) meetings. In addition, we will investigate converting the Navigating NSF workshop into a webinar that can be accessed by all potential principal investigators any time. If travel budgets allow, we will encourage EAR program officers to speak at universities that have research capacity but have low proposal success rates or submission rates. Finally, we will continue to encourage staff participation in regional professional society meetings, which draw more students and faculty from undergraduate-only and non-RI institutions.

**Recommendation 17.** *The COV recommends that EAR enhances outreach efforts to under-represented institutions to increase submissions from more diverse institution types. We anticipate that this will have the added benefit of diversifying the pipeline and participation of diverse students and early career researchers in EAR.*

**Response:** EAR will continue to participate in outreach activities organized by NSF that focus on regions with diverse types of institutions. In addition, EAR will continue to host "Navigating NSF" sessions at meetings like GSA and AGU to promote engagement of scientists from a wide range of institutions. Besides these broad efforts, the EAR E&HR program is working with others in GEO and the Directorate of Education and Human Resources to design outreach activities targeted at Historically Black Colleges and Universities and Tribal Colleges and Universities. Most of these institutions do not have traditional geology departments, but they have departments like environmental sciences, agriculture, geography, engineering, chemistry, and physics that can be an entry point for EAR. For these targeted efforts, EAR and its partners will design a targeted messaging campaign to encourage faculty and students from these institutions.

**Recommendation 18.** *We recommend EAR continue and expand their efforts to broaden participation of under-represented groups based on demonstrated best practices. This should*



*include establishing success metrics, rigorous assessment of ongoing activities, and implementation of new approaches.*

**Response:** In addition to the activities described in Recommendation 17, the EAR E&HR program and EAR's management team will develop plans to broaden participation, based on best practices of reaching out to the external community and proven internal practices within the Division.

### **Section V: No Deadlines Pilot**

*Recommendation 19. The COV recommends that EAR move forward with the No Deadlines pilot, but should continue to monitor workload, dwell time, success rate, PI and institutional demographics, and should undertake more in-depth research into any unintended consequences, including impacts on proposal quality or participation by prospective PIs.*

**Response:** We will continue to monitor the outcomes of the no-deadline pilot. As of July 2017, all core programs have gone to no deadlines. As a result, we will have more data to analyze in the coming years. Changes in proposal quality are difficult to assess, but anecdotal evidence from recent panels in programs without deadlines suggests that ranking has become more difficult because there are fewer noncompetitive proposals. A possible approach to quantify this is using statistical data from ad hoc scores within programs as a metric, and will include the results of this analysis along with proposal numbers, dwell time, success rate, principal investigator, and institutional demographics data in a future report to the NSF Advisory Committee for Geosciences.