

NSF Response to:

FY2016 Committee of Visitors (COV) report for the Atmosphere Section (AS),
Division of Atmospheric and Geospace Sciences (AGS), Geosciences Directorate (GEO)

The Geosciences Directorate (GEO) extends its appreciation to the Committee of Visitors (COV) team for conducting a thorough and thoughtful evaluation of the programmatic management of the Atmosphere Section (AS) within the Division of Atmospheric and Geospace Sciences (AGS).

The AS has responsibility for supporting a broad atmospheric science community and it interacts extensively with other NSF Sections, Divisions, and Directorates, as well as several federal agencies and the wider external science community. As such, it is critical to the NSF to have an independent and objective assessment of how the Section functions autonomously and collaboratively in its mission of service to the public.

The COV efforts in reviewing the Section were extensive. All AS program jackets relevant to the 2013-2015 review period were available for COV review, as needed. A subset of approximately one quarter of all jackets were defined as representative jackets by AS Program Directors and the Section Head. These jackets were explicitly supplied to the COV Members for evaluation based on the relevance of the information within the jacket to the questions posed to the COV Members in the COV Template. Additional jackets, beyond those highlighted by AS Program Directors and the Section Head, were made available to the COV in response to specific requests by the COV Members.

The Section took advantage of the NSF e-business systems for creation of a web-based version of the COV meeting materials. This allowed participants to access the COV data remotely and at their convenience for a period of four weeks.

The Section held one group web-based video conference for COV members and NSF staff on 2 February 2016 to: 1) explain the role of the COV; 2) clarify the NSF ethics requirements; 3) familiarize the COV Members with the NSF electronic system; 4) provide overviews of the science programs under review; and 5) review the data that were assembled for their evaluation of the Section activities. Over the ensuing weeks, individual virtual breakout group discussions were conducted between relevant Section Program Directors and their COV counterparts to discuss specific programmatic data and issues. The in-person meeting was conducted during 31 March – 1 April 2016. During the meeting, interactions among COV members and Program Directors led to discussions and clarifications of procedures related to the questions defined in the COV Report Template and to questions specifically requested by the Section.

Several Section-specific and Agency-wide programmatic themes emerged in the COV final report. In this response to the report, questions, comments, and recommendations from the COV are addressed in the order defined by the COV Report Template.

Section I. Quality and Effectiveness of the Merit Review Process

Overall, the COV found the current practices of the Section as contributing to promoting a merit review process of high quality and effectiveness. The Committee noted the practices of not restricting proposal submission to a specific time period and of seeking *ad hoc* reviews as being highly appropriate and relevant to the manner in which the atmospheric science research community operates. Furthermore, there is appropriate limited use of proposal submission deadlines and panel reviews for large field programs or complex interdisciplinary projects in which synergy with other NSF programs or collaborating agencies is required.

Issues raised by the COV relevant to specific questions in Section I are addressed below.

Q1.2: Are both merit review criteria addressed?

The COV examined how well both merit review criteria were addressed in individual reviews and in the Program Director review analysis.

Individual Reviews:

COV: "...The COV encourages continued communication from the Section to the broader community regarding what constitutes good and useful broader impact considerations, and how broader impacts are used to provide metrics related to the projects, and the program's value to national, international and scientific priorities. The COV is aware that this issue of broader impacts is currently a Foundation-wide discussion and encourages continued participation in that process and deliberations."

NSF: The COV noted disparity in reviewer efforts related to emphases on intellectual merit and broader impacts assessments of proposals. Beyond the AS, addressing broader impacts is an ongoing issue for all of NSF, which can be related to space limitations in a proposal and the opinion of some individual reviewers that broader impacts are of lesser importance than intellectual merit. Accordingly, the NSF Director and the National Science Board have taken steps to clarify the broader impact merit review criterion. The Section is committed to being proactive on providing reviewers the guidance and motivation for thoughtful and complete assessments of proposed broader impacts. The Section will continue to monitor the incoming reviews and will take measures, which may include further guidelines with specific points for reviewers to address, if review comments on the broader impacts are deemed inadequate.

Program Director review analyses

COV: ".....the COV notes that Program Director's review analyses contain great attention to the broader impacts in each case and articulate how such impacts (or lack thereof) contribute to the decision to award or decline."

NSF: During the period relevant to the COV review, the Section has strived to record in internal documents and to communicate with PIs appropriate examples of broader impacts. As a result, a positive impact on clarity in proposals and in reviews has been noted. The Section will continue

to strike a balance between being informative and prescriptive with reviewers who graciously and generously donate their time and expertise to the NSF merit review enterprise.

OI.7: Additional Comments on the Quality and Effectiveness of the Program's Use of the Merit Review Process.

COV: "....As prior COVs have emphasized, we encourage Program Directors to continue providing early-career PIs with sufficient rationale and appropriate details from their review analysis on 'declines' to enhance the potential for future success."

NSF: In AS, the practice is to provide written details to all PIs when communicating the funding recommendation. In all instances regardless of the mode of communication, the programs strive to clearly explain funding recommendations. This applies to experienced PIs as well as early-career PIs, which particularly benefit from detailed communication. Apart from any sensitive or confidential information, the goal is to make the feedback process transparent and informative. As noted by the COV, the Section will continue to improve communication of funding decisions in writing and following telephone calls with as many details as appropriate for the circumstance.

Section II. Selection of Reviewers

Overall, the COV found the current practices of the Section with regard to the selection and management of reviewers to be appropriate and of high quality. In particular, the COV noted that reviewer comments were generally extensive and relevant, which reflected the practice of Program Directors to make use of reviewers with appropriate expertise and qualifications. The COV provided comment related to one topic carried forward from the previous COV, which is examined below.

OII.3: Additional Comments on Reviewer Selection

COV: "The COV feels that while the practice of soliciting reviewers from outside the United States is good for addressing the science aspects, it is possible that at times the international reviewers may need an even more explicit guidance on the broader impacts criteria and the role of diversity. The COV encourages the program to consider whether there is a need for more guidance for the non-U.S. based reviewers, if the need arises."

NSF: The use of reviewers from outside the U.S. was a comment carried forward from the previous COV. The Program Directors find that they are more likely to get a positive response to a review request from researchers previously supported by NSF or from the international collaborators of those researchers. Experience shows that researchers supported by NSF funds are quite generous with their time and are willing to review multiple proposals per year as part of their contribution to the running of the merit review process. Nevertheless, the AS Program Directors remain proactive in adding to the reviewer pool from outside of the U.S. As stressed by the COV, the Program Directors will continue to add reviewers and solicit reviewers internationally as a means to provide the most highly-qualified reviewers as needs arise. In addition, the Section will develop standard text to provide context on broader impacts to reviewers from outside the U.S.

Section III. Management of the Program under Review

Overall, the COV found the AS programs to be well managed in nearly all aspects of dwell time, portfolio balance, program responsiveness, and program planning. The Committee raised points for discussion that are addressed below.

OIII.1: Management of the Program: Timeliness in Making Decisions and Use of Program Mortgages.

COV: "...The COV encourages expediting the replacement of key support staff as this will help reduce the longer dwell times for this particular program."

NSF: While the COV commended the Section for maintaining close attention to dwell times in the midst of several challenges, which include shortages in program support staff and some inconsistencies in staff assignments that caused delays in processing of some program actions. In particular, the impacts from staff changes and shortages have not been uniform across the Section. The AS is committed to working with the AGS Division Director and Program Support Manager to convey staff requirements, shortages, and needs for the equal support to all AS Programs.

COV: "...The COV encourages the programs to consider ways to mitigate mortgage burdens due to uncertainties in budgets from year to year. One approach would be to provide upfront funding for all years to the PI as is being done in some divisions."

NSF: While the COV notes that the use of a mortgage can be high risk in periods of budget uncertainty, and that some NSF divisions do not carry mortgages, the programs in AS carry a smaller mortgage than the NSF average. There are instances, which can include large field programs, when funding a proposal as a continuing award is beneficial. The AS Programs will remain committed to careful use of carrying program mortgages and maintain them at a level that hovers near the current levels. Each year, the AS Programs will assess current mortgage rates to maintain levels appropriate for Program balance.

OIII.3: Program Planning and Prioritization Process.

COV: "...The COV recognizes the challenges in planning and prioritization processes faced by the Section and the differences in the operation between the programs. While, in general, support for various categories of funding is driven by community proposals, programs often need to prioritize support for large field campaigns and funding of individual awards. The programs will need to determine the appropriate portfolio balance between non-field and field projects."

NSF: The Section continually monitors community demand for field programs. In working with the NCAR and Facilities Section (NFS), AS Program Directors coordinate schedules of facilities and research needed to support field campaigns over a period of years ahead of field deployments. By carefully coordinating schedules far in advance, the Program Directors are able to establish best practices for planning allocations and maintaining appropriate portfolio balance. The Section will continue to coordinate closely with NFS and community PIs with the goal of maintaining a portfolio balance that best meets demand and maintains high-quality, well-reviewed science.

Section IV. Questions about the Portfolio

Overall, the COV found the AS programs to be appropriately linked to the Mission of AGS and the NSF and to have appropriate balance of awards across disciplines. The Committee raised several points for discussion that are addressed below.

OIV.5: Does the Program Portfolio have an Appropriate Geographical Distribution of Principal Investigators?

COV: "The geographical distribution of PIs is uneven with some regions receiving more awards. The state-by-state distribution of awards may in part reflect the uneven geographical distribution of institutions with large and mature atmospheric science programs."

NSF: The geographic distribution of awards to academic institutions is somewhat constrained by the limited distribution of academic departments in the atmospheric sciences. To as much of an extent as possible, the NSF Experimental Program to Stimulate Competitive Research (EPSCoR) Program is utilized to promote scientific progress in jurisdictions that have historically received lesser amounts of NSF Research and Development. The AS programs make awards every year through this program. Additionally, there are efforts to involve local academic institutions in regions where AS-sponsored field programs are taking place. These efforts address students and teachers from elementary school through university to broaden awareness and exposure to NSF-sponsored science activities in their region. Often these activities can lead to NSF sponsorship of research and education activities in the region. The Section is committed to increasing the geographic coverage of its sponsored research and education activities and will monitor the distribution to identify gaps or locations over which the investments in science can be better diversified.

OIV.7: Does the Program Portfolio have an Appropriate Balance of Awards to New and Early-Career Investigators?

COV: "...The COV recognizes the efforts by program directors to provide timely and useful feedback to new investigators. We encourage program directors to continue the good work so that new investigators continue to remain in the field."

NSF: The number of CAREER proposals submitted to AS has increased as has the success rate for such proposals. However, as noted by the COV, the success rate for proposals submitted by early-career scientists and for CAREER proposals is lower than the Section average. The Section recognizes the highly competitive nature of CAREER proposals and that early-career PIs may lack experience in preparing effective proposals, which contributes to the lower success rates in these categories. The AS Program Directors actively engage in mentoring of early-career researchers with special attention to the suitability of CAREER proposals. The AS Program Directors will continue to monitor success rates in these categories and provide detailed, constructive, and timely feedback to those awarded and declined in these categories.

OIV.8: Does the Program Portfolio include Projects that Integrate Research and Education?

COV: "...On typical grants, it appears that the standard method for integrating education into research is to simply include graduate student funding on a proposal. However, reviewers do not seem to put much weight on integration of education and research."

NSF: The COV comments related to integration of research and education are closely related to comments on reviewer attention to broader impacts versus intellectual merit. As noted with respect to Question I.2, the Section is committed to being proactive on providing reviewers the guidance and motivation for thoughtful and complete assessments of proposed broader impacts. The Section will continue to monitor the incoming reviews and will take measures, which may include further guidelines with specific points for reviewers to address, if review comments on the broader impacts with respect to the integration of research and education are deemed inadequate.

OIV.9: Does the Program Portfolio have Appropriate Participation of Underrepresented Groups?

COV: "...The COV recognizes that there are no magic bullets to solve this long-standing issue. However, it strongly encourages the program to prioritize the participation of underrepresented groups through better integration of emerging ideas, data and research on increasing diversity. This may entail close cooperation with groups and agencies within and outside NSF."

NSF: As noted by the COV, the increasing representation of underrepresented groups is a continual issue with which the Section struggles. The issue of participation by underrepresented groups is one of concern for all the physical sciences. While proposal submissions by women have increased in the past three years, submissions from other underrepresented groups have not increased significantly. The Program Directors engage in outreach to underrepresented groups with the goal of increasing awareness of funding opportunities, practices that contribute to successful proposals, and awareness of the types of programs supported in the Section. Additionally, Program Directors seek members from underrepresented groups to participate as reviewers and panel members as a means to increase participation in the entire merit review process. The Section remains committed to increasing participation in all aspects of the proposal process by underrepresented groups. The Program Directors will continue outreach in a proactive manner such that members of such groups are engaged with the Section as proposers and reviewers. Proposal submission rates, participation rates, and success rates will be monitored continuously to gauge the Section progress in this matter.

Other Topics: Postdoctoral Research Fellowship Program

The AS asked the COV to investigate the Postdoctoral Research Fellow (PRF) Program. Specific questions were presented to the COV. In response to several of the questions, the COV recommended specific actions and these are addressed below. Overall, the Section is considering these recommendations prior to releasing the FY17 AGS PRF solicitation.

Q1: Does the "freedom" afforded by directly supporting the postdoc outweigh the administrative burden on the postdoc (e.g., managing health care, travel) and NSF staff who seemingly jointly serve the traditional SRO/SPO role?

COV: "...the COV finds that NSF staff, particularly the program directors are being excessively burdened owing to the fact that, effectively they also act as sponsored research officers (SRO/SPO). Remedies should be considered that might serve to lessen this burden."

NSF: Advantages of making the PRF award directly to the fellow rather than to the mentor or institution are that the fellow is able to select the mentor and select the institution that provide the best opportunity for conducting his/her proposed research. Additional advantages are that the process of writing a successful proposal as a sole PI and managing the funds for the resulting award may be viewed as excellent hands-on training for future academic positions where securing and managing an external funding portfolio are essential requirements. However, the COV notes that one consequence of the awarding to the fellow is that Program Directors have much more post-award responsibilities than with typical awards. To reduce these responsibilities, the Section will examine alternatives to post-award management of the PRF awards. Current suggestions include making the award to an institution as in a standard grant, contract with an outside organization to manage the post-award process, and combine with other NSF/GEO Divisions and Programs who have similar geoscience-related award programs.

O.2: What role do you see the AGS PRF playing in the context of other available postdoctoral programs and is there benefit to Program-specific awards rather than AGS in general. ?

COV: "The AGS PRF appears to be the only postdoctoral fellowship program that allows the fellow complete flexibility to propose a research project within the disciplines under the purview of the AGS, as well to select a mentor and institution that provide the best opportunity for conducting the proposed research project..... it would appear to be appropriate to continue the program under the auspices of the AGS Division"

NSF: Based on the COV response, the Section does not intend to issue Program-specific PRF awards.

O.3: Currently, the PRF proposal is due to NSF in the middle of January. Does the timing of the postdoc announcement and award cycle make sense in the context of graduation, faculty positions, and other postdoc programs?

COV: "... If the timing of the announcement and award cycle for the PRF program is viewed as disadvantageous to proposers who are applying to other fellowship programs, alternative options might be considered such as changing the deadline for proposal submission to a date early enough to result in award decisions at times comparable with those of competing postdoctoral programs. Alternatives to a single annual deadline also might be considered such as accepting applications on a quarterly basis as is done for the NRC postdoctoral awards or on a rolling basis as is done for traditional research proposals submitted to the AS."

NSF: Based on the COV input, the AS is considering removing the PRF deadline and allowing for proposals to be submitted without restriction. A decision on this change will be made before the FY17 AGS PRF solicitation is released.

Q.4: Should the postdoc program be limited to U.S. academic institutions, or open to other types of institutions such as NCAR, government labs, or foreign organizations?

COV: "...it might be advisable to consider requiring justification for proposing to conduct research at NCAR, federal laboratories, and foreign organizations. Such justification should address why the proposed research cannot be performed at U.S. academic institutions, such as a mentor or research facility that only can be found elsewhere."

NSF: Based on the COV input, the AS is considering requiring specific justification for the proposed postdoctoral research to be conducted at NCAR, federal laboratories, and foreign institutions. A decision on this change will be made before the FY17 AGS PRF solicitation is released.

Q.6: Should there be any restrictions on where the postdoctoral candidate works in relation to their Ph.D. institution or any other post-Ph.D. work experience?

COV: "The option of choosing a graduate adviser as a research mentor should be discouraged if not prohibited, consistent with the goal of the PRF program to provide recent Ph.D. recipients the opportunity to become independent research scientists. Aside from this exception, prospective fellows should have the option to continue at their current institution, but should be required to provide appropriate justification addressing why the proposed research cannot be performed elsewhere."

NSF: The Section is taking the recommendation of prohibiting a graduate advisor from being a PRF mentor. A decision on this change will be made before the FY17 AGS PRF solicitation is released.

Q.8: Currently, a mentor is required to submit a mentoring plan as part of the proposal. Should there be formal monitoring of the postdoctoral fellow-mentor relationship?

COV: "Formal monitoring of the relationship between a fellow and his/her mentor could prove as difficult as attempting to do the same for a Ph.D. student and adviser. Nevertheless, less-formal options might be considered, such as requiring the mentor to sign off on progress reports submitted by the fellow to NSF."

NSF: While most PRF mentors take the responsibility seriously and perform valuable service to the PRF fellow, it has been found that in some cases the role of a PRF mentor varied from total lack of interaction with the postdoctoral fellow, which often places undue burden on the fellow related to non-award activities. Currently, the only requirement of a mentor is to provide a letter of support in the PRF proposal. The COV noted that additional input from a mentor may be one way to ensure consistent mentoring activity across the PRF awards. The Section is considering this recommendation and will make a decision prior to the release of the FY17 AGS PRF solicitation.