Committee of Visitors, April 7-9, 2010
Atmosphere Section
Division of Atmospheric and Geospace Sciences
National Science Foundation

RESPONSES TO COV RECOMMENDATIONS

FY11 Update: This past year brought significant changes to the management and leadership of AGS. AGS welcomed a new Division Director, conducted searches for two Section Heads, and said goodbye to a long serving member who died. The Division pivoted from a Section approach towards a more integrated approach in governance and operations. The FY11 Updates in response to the Recommendations of the COV reflect this strategy.

David J. Verardo, Head, Atmosphere Section

We thank the Committee of Visitors for their time and thorough evaluation of the merit review practices and research outcomes in the Atmosphere Section (AS). We are pleased that the Committee found our practices to be generally appropriate and thorough, and the outcomes of AS-supported research to meet the NSF's goals of Discovery, Learning, Research Infrastructure, and Stewardship. However, the Committee also made some recommendations, and we wish to take this opportunity to provide some responses.

> *[A.1.1.] The Committee commented on the use of panels vs. mail review only in the core programs, and concluded "The COV is satisfied that the POs exercise appropriate judgment in balancing panels and ad hoc reviews and also appropriately revisit the arguments in favor of panels and ad hoc reviews."*

Indeed, this question continues to be debated in the Section and the optimum solution for each case is sought. Among the advantages of using panels are possible efficiencies in the review, and the possibility of real-time discussion among reviewers of diverse scientific backgrounds and viewpoints. Possible disadvantages are the need for deadlines, limited time available to discuss every proposal, and a range of scientific topics that may be difficult to cover with a panel of limited size. Panels have been used and will be used (on a case-by-case basis) for special programs (e.g. P2C2, CAREER, REU sites) or field programs.

> *[A.1.1.]"Some proposals by-passed peer review and were fast-tracked by the program managers (outside of the normal SGER/EAGER/RAPID process). These were generally small efforts tied to planned field campaigns. This seems like a good way to fund emerging ideas but the COV recommended that it should always be exercised with utmost integrity to avoid being over-used."*

AS Response: We note that other than SGER/EAGER/RAPID, supplements, and conference awards there are in fact no mechanisms available that allow for the recommending of awards without peer review.

FY11 Update: Our response is substantively unchanged because the policy conditions under which we operate within the larger NSF are unchanged. We note, however, that the NSF is actively exploring new mechanisms to fund emerging areas of potentially transformative research that utilize merit review and peer review in innovative ways that preserve the best elements of merit review. Some of these innovative mechanisms may emerge in FY12 and could therefore be part of our response for FY12.

FY12 Update: A task force exploring the full range of NSF Merit Review was created in FY12. A final report was drafted and is currently undergoing senior review by the NSF Office of the Director. The goals of the task force were to explore how merit review is conducted across the NSF and to explore new mechanisms for such review. In FY12, the NSF instituted a pilot merit review program involving highly interdisciplinary and multi-program research that used only internal NSF merit review to evaluate proposals (i.e., INSPIRE, CREATIV). This was created in direct response to an express concern by the wider science community that traditional peer review aspects of merit review are sometimes too risk adverse and lead to non-award recommendations that are detrimental to high risk research. An evaluation of this experiment is forthcoming.

> *[A.1.2.] "Recommendation: The COV recommends that AS consider piloting the formation and use of a separate, standing pool of Broader Impacts reviewers with particular expertise in education, outreach, and knowledge transfer, as is done, for example, with STC site visit teams, to establish a consistent and high level of broader impacts review across all the AS proposals."*

AS Response: We agree with the Committee that selecting separate reviewers for Broader Impacts is advantageous for proposals that have a significant education or outreach component. This was, in fact, done in some Programs during the period reviewed. As an example, in recent years, the Atmospheric Chemistry Program (ATC) and the Climate and Large-Scale Dynamics Program (CLD) asked separate ad-hoc reviewers to comment on the educational components and related broader impacts of the CAREER proposals received by the respective programs. As another example, a virtual panel was used in 2008 to review REU site proposals. In FY 2010, as a Division-wide pilot effort, a panel will be convened to review the education components of all CAREER proposals.

On the other hand, in many of the core program proposals the broader impacts focus on student/post doc mentoring and beneficial outcomes to the community, such as improved models, facilities, etc. We believe that the "science reviewers" for each program are qualified to review these broader impacts aspects as well.

FY11 Update: The AGS Division convened, in FY11, an in-person panel to evaluate the educational and broader impacts aspects of all CAREER received in the Division. All CAREER proposals were also received review by ad hoc reviewers for intellectual merit and broader impacts. We concluded that such a specialized panel did a fine job of providing important feedback to the proponents but we would not convene a specialized panel each year for CAREER proposals.

We are committed to exploring other mechanisms and to experiment further with new ideas for all proposals in AGS to further the NSF goals of greater integration of all merit review criteria. In FY11, for example, we began a concerted effort to reach out the wider AGS community at Town Hall meetings at the annual gatherings of the relevant science societies to better communicate NSF's goals in merit review

and to listen to suggestion from the science community about how we can, collectively, improve our performance.

FY12 Update: The AGS Division did not continue to create separate panels to evaluate the Broader Impacts in CAREER proposals in FY12 because our collective assessment was that the expense and time of the panel was not well justified, considering the outcome. Near the close of FY12, the AGS Division created a new division-wide program in Education and hired an Education Program Director to help assess AGS needs and help integrate those needs across AGS, GEO, and the wider NSF.

> *[A.1.8] "The POs might consider making additional site visits to see the PI's operations at their home institutions. The COV feels this could add an additional perspective that does not necessarily emerge through the external or panel review process, but the COV recognizes that staffing and resources may not generally permit this."*

AS Response: We agree that site visits can be useful and interesting, especially when there is an opportunity for a PO to see instrumentation, facilities, meet students and collaborators, etc. that are critical to carrying out proposed or awarded proposals. However, as the Committee noted, the high PO workload prevents us from visiting a significant number of the PIs in the Programs and so we need to carefully prioritize visits over a few years. POs find that the best way to interact with a large number of PIs is to attend professional society meetings (in particular, AGU and AMS), workshops, and field projects. Other possible venues are NSF outreach days and specialized workshops, as well as PI visits to NSF or communications via email or telephone.

FY11 Update: The Section, as part of the AGS Division, continues to communicate actively with the wider AGS science community through a variety of imaginative and innovative ways beyond traditional in person site visits. This is partly due to practical limitations brought about by balancing timely performance in proposal management with in-person communication but also due to limitations in travel funds government-wide.

The Section, as well as the wider NSF, continues to actively experiment with distance communication technologies to help keep the conversations fresh between the Programs and the external community. The AGS Division has invested in distance communications hardware and technologies that will help remove the sense of remoteness that some researchers say they are concerned may develop. This challenge is as much a cultural one as it is a technological or financial one.

Our experience with new methods has been positive thus far and we continue to explore and invest in new hardware and explore new venues for effective communication that allow institutions, regardless of size, to participate.

FY12 Update: We continue to explore new methods of communication with the wider science community. We use video technologies more and more to reach many more AGS external constituents than is possible by person-to-person contact, travel budgets, and workloads. We continue to make concerted efforts to reach out to larger numbers of researchers through large-scale community meetings. In FY13, AGS will explore the creation of a division newsletter that contains NSF and community news of interest that could serve as a means of two-way communication between NSF and the research and the community.

[A.3.2.] "NSF is relatively unique among federal science funding institutions in its sustained commitment (at all levels of the organization, including that of individual programs) to supporting and promoting education. Precisely defining the meaning of "integration of research and education," and established a desirable level (scientifically? societal?) is not straightforward.

Education has many aspects, including career development, as well as skill development. It would be helpful to have some statistics about various outcomes, e.g., how well the community of scientists has been doing at placing students in various positions, both academic and other professional positions".

AS Response: This comment is really aimed at NSF as a whole, and we will forward this suggestion. The NSF Division of Science Resources Statistics (SRS, http://www.nsf.gov/statistics/about.cfm) in fact collects data on many aspects of science funding, including student support and science careers. Their most comprehensive publication is the annually published "Science and Engineering Indicators" (http://www.nsf.gov/statistics/pubseri.cfm?TopID=8&SubID=1&SeriID=2).

These data of course are not broken down by NSF Program. In the science divisions, we have neither the resident staffing resources nor expertise to carry out our own community surveys. On a qualitative level, some of this information can be gleaned from Annual and Final reports which are routinely reviewed by POs. In addition, we benefit from the advice of the Directorate's education team which works with the education community on best practices for learning and evaluation.

FY11 Update: Generally, we continue to support Agency and community efforts in finding ways to assess our investment outcomes. Specifically, for the programs that we control locally, such as investments in early career scientists through our new AGS Post Doctoral Research Fellows, AGS has created ways to help individuals progress by bringing together awardees in cohorts of colleagues to discuss their research, career challenges, and best practices in building a professional career.

FY12 Update: We continue to assess our investment outcomes, as appropriate.

[A.3.10.] "Does the program portfolio have an appropriate balance: Across disciplines and sub-disciplines of the activity?

Comments:

This appears to be a priority for AS, where cross-disciplinary and interdisciplinary ideas and proposals are proactively encouraged and appropriately supported. The large number of awards and the amount awarded for projects co-funded with other NSF programs speaks well of the interdisciplinary nature of research conducted in the Section. Most if not all of the major sub-disciplines appear to have at least some representation.

The COV found that the Paleo Program has a broad interdisciplinary portfolio, both within Paleo and also extending to other Divisions, but there was not as much cross-disciplinary activity between Paleo and the other programs in AS. Some formal strategic planning process, as

discussed in A.4 below, might help identify reasons for this and opportunities for additional collaboration."

AS Response: As the Committee notes, the Paleoclimate Program is inherently interdisciplinary and, via the P2C2 competition, collaborates closely with the Divisions of Earth and Ocean Sciences (EAR, OCE) and the Office of Polar Programs (OPP).

Regarding collaborations within the Section, it should be noted that informal agreements are occasionally made instead of formal co-funding to simplify the paperwork. For example, PCP funded a workshop that was mostly CLD-related research ("Predicting the Climate of the Coming Decades"). PCP and CLD have several researchers in common.

In general, we share projects as appropriate and as necessary to accommodate the research community.

FY11 Update: All AS Programs continue to explore and support fruitful research collaborations with their colleagues and counterparts through the Section, Division, Directorate, Agency, and with other federal partners. Programs routinely join to support important science even though the partnership may not be obvious.

FY12 Update: Cross-fertilization of scientific research and sharing of financial resources have increased as the NSF continues to seek greater integration of scientific research. The AS programs work towards this integration through formal and informal arrangements that make scientific and programmatic sense in helping extend scientific frontiers.

[A.3.11.] "The POs are appropriately concerned about diversity in their awards. The proportion of female (roughly 10-15%) and minority (roughly 2-5%) PIs in AS is low. However, this reflects the present situation in earth and atmospheric sciences as a whole, a problem that goes far beyond AS. We are satisfied that AS takes seriously the issue of broadening participation. The COV is satisfied that the Section is firmly committed to diversity and engagement of underrepresented groups and that the POs are doing their best to attract minorities in all areas. However, NSF could take additional steps to support the POs in their efforts to do so.

Recommendation: The COV recommends that NSF investigate ways to offer additional institutional support for developing pools of reviewers and potential PIs from currently underrepresented groups and for building relationships with these individuals."

AS Response: This recommendation appears to be aimed at NSF as a whole, and we will forward this suggestion to appropriate levels of management. In the meantime, the Division and Section continue to explore outreach venues to attract more members of underrepresented groups as PIs and reviewers, such as NSF outreach days, professional meetings, organized visits to NSF, etc. We are also exploring ways to develop databases of members of underrepresented groups, however, we have to carefully evaluate legal issues. As the Committee pointed out, the fraction of reviewers who supply their demographic information is frustratingly low.

FY11 Update: The Section and Division began a concerted outreach effort, through our division education program coordinator, to engage communities historically underrepresented in the sciences. This effort has included direct participation in professional society meetings and workshops aimed at

improving the participation of various groups in science, such as men and women from Hispanic and Native American backgrounds. Section staff members have also been active within the NSF in internal strategy sessions and programs that would identify and bring best practices to all of NSF on this issue and for all groups.

FY12 Update: The demographics of individual program PIs varies widely. The AS programs actively pursue mechanisms to increase the diversity of reviewers and has stepped up its efforts to attract a greater diversity of persons to AS-funded program activities as a way to help the wider science community become more inclusive and attractive to a new generation of researchers. The AGS Division also has stepped up its efforts to recruit members of underrepresented groups to serve as Program Directors in an effort to represent a broader segment of the civilian scientific workforce.

> *[A.3.12.] "AS research features prominently in the products of the IPCC, USGCRP (formerly CCSP), and the National Academies. AS is intrinsically linked to national priorities in weather, climate, and air quality. As the goals and objectives of the Paleo Program (including P2C2), CLD, and ATC are explicitly tied to the USGCRP, as well as to NSF's Geovision report, and the 2006-2011 Strategic Plan, these programs are indeed relevant to national priorities and the NSF's mission. Certainly, the types of studies conducted within the PDM program are needed to estimate the affect of climate change on local-to meso-scale weather phenomena, and to assess effects of these phenomena on issues of national interest such as commerce, transportation and agriculture.*
>
> *The Section should be a 'Flagship' for NSF's contributions to the USGCRP. But other than the P2C2 endeavor we saw little evidence that the Section has a well-delineated implementation plan to contribute to the USGCRP via perhaps CCSP goals. When asked of the program officers how the section is contributing to this national effort. The philosophy seems to be that it is up to the strategic vision and planning. The COV recommends that the Section itself be more proactive in reaching out to the community in this regard".*

AS Response: Indeed, all Programs in AS are closely linked to the national and international priorities, and we will attempt to present these linkages better to the next COV. Specific interagency examples of projects are the Climate Processing Teams, the IPCC analysis grants supported by CLD, various field campaigns co-sponsored by PDM and CLD with their interagency partners at the USGCRP and NAS activities. Currently there is no written implementation plan for how we contribute to the USGCRP. It should be noted, however, that the USGCRP itself is in the process of developing a new strategic plan. AS program managers will be providing input to the development of the new USGCRP strategic plan, as appropriate. When that plan becomes available, we will revisit how our efforts map to those.

However, we note that not all research supported by AS directly maps to USGCRP plans. NSF has a unique role in that it accepts and funds proposals that are not explicitly linked to externally developed programs. We consider it important to retain that flexibility and keep the door open for unforeseen advances, and continue to balance research in other areas that directly link to the USGCRP. Of course, these distinctions are often not easily made.

We agree with the Committee on the value of formal strategic planning, and indeed the Division will commence a major strategic planning effort shortly. We also agree that outreach to the community is a

very good idea. We intend to intensify our efforts in particular at professional meetings and NSF outreach events at professional meetings.

FY11 Update: The USGCRP is nearing completion of its new strategic plan and AS Program directors have been intimately involved with many aspects of its development to help ensure that AGS science is accurately portrayed and that essential non-federal research community voices are heard. The USGCRP plan as undergone public comment and members of the wider science community have been afforded an opportunity to craft the final document. Once the USGCRP strategic plan is available, we will revisit how our programs activities map on to those of the USGCRP.

FY12 Update: We continue to assess our involvement, as appropriate.

> *[A.4.1] "As with the previous COV, there was concern with the gap in staffing during periods of transition of rotating staff. In addition, while the COV fully recognizes the benefit of IPAs bringing fresh ideas and an evolving sense of the community into each program, this must be balanced against the continuity, institutional memory, and accrued experience that can only be achieved with full-time NSF POs.*
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> *Recommendation: The COV recommends that each program establish a policy of having at least one full-time PO and one IPA at all times, to achieve this balance and ease transitions."*

AS Response: We agree with the Committee that pairing rotators with POs who are permanent employees is a very good idea, and this is, in general, the goal. However, due to a variety of circumstances, staffing transitions occur and seamless replacement is not always possible. Currently, ATC has two rotators, CLD two permanent POs, one rotator, and two experts, PCP one permanent PO, and PDM one permanent PO and one rotator. (Rotators can be but don't have to be IPAs.)

FY11 Update: The Section continues to assess and respond to the staffing needs of the primary programs (i.e., core foundational programs) as well as the need to staff research areas and programs of opportunity developed on an annual basis by the NSF. This presents challenges in finding individuals with the scientific talent capable of spanning areas of inquiry that have evolved on timescales shorter than the education and credentialing of professional scientists.

FY12 Update: In FY12, the Section developed a strategy of hiring program directors with expertise in at least two Section science programs and to bring them onboard with a minimum of one month of overlap with outgoing program staff. The Section also used innovative means to bring to existing personnel at the NSF to AGS to aid in covering science program areas.

> *[A.4.3.] "As noted by the previous COV, as well as in the NRC report, "Strategic Guidance for the National Science Foundation's Support of the Atmospheric Sciences" (2007, page 66), this COV notes that the Paleo budget is conspicuously low when compared to the budgets of the other programs. In an environment of essentially constant percentage increases, such as was the case in FY07-09, this disparity will only continue to grow.*
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> *Recommendation: The COV is not in a position to comment on the appropriateness of the size of the budgets within the AS programs. However, the COV recommends that AS establish a formal*

strategic planning process to transparently establish and justify the basis for the future budget trajectories of each of the programs within the Section.

As discussed in #1 above, the AS programs are extremely well managed, and the POs are entrepreneurial in seeking opportunities for collaboration both within, and outside of, the Section (e.g., the success of the Paleo PO in convincing POs in other parts of Geosciences to pool funds and create an integrative program, P2C2). However, discussions during the COV review made clear that there is no formal process for joint strategic planning across the four programs. The COV feels that such a process would be helpful in a number of ways: e.g., to establish and justify budget trajectories (as noted above), to identify additional opportunities for collaboration across the programs (e.g., between Paleo and CLD in the area of multi-decadal dynamical variability in the atmosphere and ocean), and to link up even better with evolving top-down priorities (e.g., NSF-wide,national)."

Recommendation: The COV recommends that AS establish a formal strategic planning process across the four programs in the Section and the Section leadership. This process would explicitly address issues including future budget trajectories of the program, inter-program collaboration, mapping the Section scientific priorities onto higher-level strategic plans at NSF and the U.S. government as a whole, identifying and seizing emerging opportunities, and articulation of a shared "Section identity." This process would be aided by a number of mechanisms, including meetings, retreats, and a written strategic plan."

AS Response: As stated above, we agree with the recommendation of the COV for a formal strategic planning process and intend to develop and implement one shortly.

FY11 Update: AGS held a Division retreat in the autumn of 2010 to discuss strategic issues and is nearing completion of a draft strategic plan that lays out the science themes and strategies that the Division aims to pursue. This draft plan will be available for public comment early in FY12 with the goal of completing it shortly thereafter.

FY12 Update: In FY12, program budgets were developed in consultation with program directors and based on need. The Section did not support the notion of spreading financial resources evenly across the Section without consideration of special need or the ability to leverage funds from other areas of investment at the NSF or at our National Center (NCAR).

[A.4.3.] This COV concurs with the recommendation of the previous COV that additional, quantitative metrics and measures of success of AS outcomes may be very valuable in aiding planning and prioritization, despite the difficulty in establishing them.

Recommendation: The COV recommends that AS establish and track additional, quantitative outcome metrics for Discovery, Learning, and Research Infrastructure and use this tracking information to aid in planning and prioritization. Such metrics might include outcomes such as papers published, the numbers of undergraduates, master and graduate students and Post Docs funded through grants, student tracking (graduation of students on projects and their subsequent job histories), availability of gathered data sets, basis for subsequent proposal activity, number of

proposals that explicitly target NSF's USGCRP objectives, number of conference presentations, number of patents, etc.

AS Response: As discussed above, the decision of what data to collect and what metrics to apply, is made at the NSF level. Data collection is subject to some legal constraints, but efforts are underway to acquire and disseminate more information about program outputs and impacts. Also, staffing resources and expertise are insufficient for major additional data collection efforts within the Division or Section. If additional staffing is available in the future (e.g., a summer intern), some of this could be attempted.

FY11 Update: As noted previously in this document, AS, as part of AGS and the larger NSF is pursuing assessment and metrics strategies as appropriate.

FY12 Update: We continue to assess, as appropriate, outcomes of our investments.

[A.4.4.] "Comments: The COV finds a lack of response to the disparity in program funding allocations and the way in which this disparity is being considered by the Section. This was brought up previously by past COVs."

AS Response: We attempted to answer this question. The following considerations are relevant: There is no a priori reason why different programs have similar budgets. The reason why CLD, ATC, and PDM are roughly of equal size is coincidental and due to the fact that both CLD and PDM resulted from the merger of two separate programs each, all of which had very different budget levels. Paleoclimate research is not only funded by AGS, but also by OCE, EAR, and OPP. Their combined contribution to the P2C2 program is $7M/year.

In terms of the process for setting Section priorities, we agree with the Committee's suggestion to engage in formal strategic planning, as discussed above.

FY11 Update: Strategic planning underway within AGS and informed by community input will help inform the level of funding for research in the Section. As noted in the preamble to this update, the AGS Division is moving towards more integrated and strategic management planning and operations, including resource allocation.

FY12 Update: As noted elsewhere in the FY12 Update, budgets are now developed strategically in consultation with program directors and based on need.

[C.5.] Recommendations

Inform the COV members about the computer software system (ejackets) that will be provided, and let members know that they can use their own personal computers in lieu of the ones provided by NSF. The software system became very slow, and nearly inoperable in the second half of the first day.

AS response: We regret the slowness of eJacket. However, this would unlikely be any different on personal computers. The complete shutdown for about an hour on the day of the COV was a very rare occurrence.

FY11 Update: The NSF continues to improve and enhance eJacket operations and performance in response to similar concerns raised by other COVs and proposal evaluation panels.

FY12 Update: No additional comments beyond the FY11 Update.

> • *Improvements to the computer and software system were also identified as a weak spot in the last COV and it is clear that there's been an improvement since then.*
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> • *Give COV members access to the ejackets BEFORE they arrive, on site, so that we have more time to review the portfolios, and THEN can spend more time, on site, talking with Program Officers, and each other, before filling out the review template.*

AS response: We will offer the next COV the opportunity to have access to the material ahead of time, if GEO and/or NSF policies permit this. This of course could add to their burden and time commitment.

FY11 Update: No comment.

FY12 Update: No additional comments beyond the FY11 Update.

> • *Add a Section description to the COV review packet, analogous to the Program description provided to the COV at the start of the review.*
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> • *Add a presentation on the major findings of the last review and subsequently what changes were made as a result, including explanations of recommendations that were not taken.*
>
> • *Some of this was included, but more information would be an improvement.*

AS response: This could certainly be done.

FY11 Update: No comment.

FY12 Update: No additional comments beyond the FY11 Update.

> [C.5]
>
> • *Include statistics about how well the community of scientists has been doing at placing students in various positions, both academic and other professional positions.*

AS response: Please see response to item [A.3.2.] above.

FY11 Update: Please see response to this concern elsewhere in this document.

FY12 Update: No additional comments beyond the FY11 Update.