

Response to the NSF Committee of Visitor's Report
Upper Atmosphere Research Section
Division of Atmospheric Science
Directorate of Geosciences
September 7-9, 2005

First, the Upper Atmosphere Research Section wants to thank every member of the COV for his or her hard work and thoughtful contributions to this report. We especially thank Dr Roger Smith, the chair, for his skill in leading the panel and organizing the report and its findings.

UARS is genuinely delighted with the COV report. It is insightful, challenging and constructive. We are very appreciative, indeed, of the many positive findings of the COV. Thank you for your kind words recognizing the talents and efforts of the UARS staff. I feel it is a very favorable report that justifies my pride in the work and accomplishments of the Section.

The first part of the review dealt with the efficiency and integrity of the proposal review process; the second part dealt with outputs and outcomes. I am pleased the Committee found "proposal processing is done with efficiency and good judgment" and that "overall performance management receives high praise from the Committee." The second part of the review dealt with Outputs and Outcomes. UARS provided the Committee with examples for each of the prescribed GPRA areas. I am very pleased to note that the COV found "these examples substantiate our evaluation that the Section performance is excellent."

The COV did make both overarching recommendations for the entire Section. Our responses are attached below. A few specific responses to individual programs where follow-up action is required are also attached. UARS, like all of NSF, is continually seeking community guidance on ways to improve performance. The COV process is the centerpiece of that guidance and we truly appreciate the opportunities your report provides us.

Richard Behnke
Head, UARS

Response to the UARS Committee of Visitors

CONCERNS AND ISSUES

a. Use of criterion #2

“The COV selected proposals jackets to show how program officers were implementing the considerations of review criterion #2. As expected, in the borderline cases chosen, there were some cases where the influence of criterion 2 evaluation becomes evident. These cases were in the minority, however. It seems evident that for research proposals, the intellectual criterion #1 is predominant in the judgment. The COV does not find fault with this, but feels obliged to point out that proposal actions do not show equal attention to arguments based on the two criteria.”

“The COV finds that, in practice, the treatment of the criteria in research proposals amounts to a strong emphasis on intellectual merit with the broader impacts having the role of tie breaker when the case in consideration is on the dividing line between acceptance and declination. The second criterion appears to be evaluated in a pass/fail mode and has most influence the proposal actions in borderline cases. The COV is not opposed to this use of the second criterion but points out the apparent inconsistency with the NSF assertion that the two criteria are to be used with equal importance in deciding proposal actions.”

“The UARS community is concerned that there is, in practice, uncertainty as to how the second criterion is used in proposal processing. If committee experience in examination of the use of the second criterion is consistent with what NSF thinks is appropriate, then the COV recommends that announcements concerning opportunities for research funding make it clear, in terms similar to our findings, how evaluations of the second criterion will be used”.

Discussion

The two merit review criteria are intellectual merit and broader impacts and are listed in Chapter III.A of the *Grant Proposal Guide (GPG)*. The criteria include considerations that help define them. These considerations are suggestions, and not all will apply to any given proposal. Chapter II of the GPG specifies that Principal Investigators (PIs) must address both merit review criteria in separate statements within the one-page Project Summary. This chapter also reiterates that broader impacts resulting from the proposed project must be addressed in the Project Description and described as an integral part of the narrative.

While proposers must address both merit review criteria, reviewers are asked to address only those considerations that are relevant to the proposal being considered and for which the reviewer is qualified to make judgments. The relative weight of these two merit review criteria is determined by the proposal itself. If the proposal deals mainly with the

broader impact area, for example, developing a visitor scientist program or installing a general use instrument at a large upper atmosphere facility, the reviews should concentrate on the broader impacts. The value and quality of the broader impacts will primarily determine the proposal's outcome.

Correspondingly, if the proposal focus is, for example, to develop an understanding of how equatorial scintillations are formed or develop a better magnetosphere-ionosphere model, then the primary consideration will be intellectual merit.

The COV noted that many awards were made in UARS for proposals that had their greatest strengths in criterion 2. These would include the eight FDSS awards, the award funding the new Space Weather Journal and the REU sites and supplements. In fact, UARS is very proud of the emphasis we place on broader impacts. The focus of the majority of UARS proposals, however, is usually a specific research area or "intellectual merit" and, thus it may appear that the broader impact criterion is secondary. But this is only a filtering effect. We consider both criteria to be equally valid criteria for funding proposals. But in any *specific* proposal, it is unlikely that the two criteria will be of equal weight. The weight will depend on the objectives of the proposal. That said, it is certainly true that any proposal will increase its chances of success by having strong components in both merit review areas. As competition becomes greater and greater, the difference in intellectual merit is often very small. In these cases, as noted by the COV, broader impacts are used as a "tie breaker."

ACTION

UARS will clarify the use of the two criteria and how the weighting depends on the focus of the proposal to each review panel at the start of the panel deliberations.

b. Differences of Panel and Mail-in Reviews.

"The COV was concerned that it found occasions when panel grading of a proposal differed considerably from that obtained from mail-in reviews. This occurred in a minority of cases. When it did occur, we expected to find a panel argument for the adoption of the panel view in preference to that of the mail-in reviewers. Some impressions of the arguments leading to the difference of grading were found in the Form 7 Review by the Program Officer. However, the lack of explanation in the panel report suggests that panel procedure lacked the level of deliberation we expect".

Discussion

The panel made some very clear and constructive suggestions, namely:

- i. Assign proposals to panel members without an initial appointment of the presenter. That will encourage at least two people to read the proposal thoroughly.*
- ii. Use more virtual panels where appropriate or keep number of panelists above 4 or 5. It has been noted that the "herd instinct" is less prevalent when the panel members are on a teleconference and when there is a minimum of 4 or 5 panelists participating on a single proposal.*

- iii. *Be sure that the panel objection to the proposal is not limited to a narrow aspect of the proposal. If so, the chair should encourage the panel to review the broader picture of the proposed work.*

The COV did note, however, that “these remedies might have the disadvantage of overburdening the panel members resulting in more declinations to serve. Hence we make these suggestions with some caution.”

We agree that it would be useful to have at least two of the panelists read the proposal thoroughly. However, the panel’s suggestion that there should not be an initial appointment of presenter is not possible to implement with the current NSF electronic systems. When the panelists are appointed to provide written reviews, the PARS system (Proposal and Review System) requires that the panelists be identified as a primary, secondary or tertiary reviewer. The panel review system in FastLane then requires that one of these designations (usually the ‘primary’ panelist) be designated as the ‘Lead Panelist’, i.e. the presenter. There is, however, an alternate strategy that can be used. If both the primary and the secondary panelists are required to provide written reviews prior to the panel meeting, this will ensure that at least two panelists have read the proposal thoroughly. In order not to overburden the panel members, however, this is likely to require a significant increase in the number of panelists.

ACTION

UARS will implement these strategies at major panels in the coming years to see the effects. We will also insist panel chairs provide a step-by-step argument for the rejection of the mail-in review and the adoption of the panel grading. We also note that in many instances exactly this sort of “paper trail” is provided in the “comments” of the panel review system. This is the “real time” dialogue box that reviewers use during the discussion of the proposal. In the instances giving rise to this concern, it is clear that much discussion was, in fact given to the discrepancy between the panel and mail reviews. UARS will endeavor to ensure that these discussions are fully captured in the panel summary.

c. High Risk Projects

“The 2002 COV report commented that UARS was not making a clear and consistent approach to awards for high-risk projects. This COV noted similar findings. Each program in the section seemed to be making so-called high-risk awards and no cases were found where the committee thought it necessary to challenge the decision. However, it does seem that what happens is more pragmatic than designed through policy. For example, some projects with the prospect of a high scientific return but with a wide range of mail-in grades have been funded because the program officer’s judgment is that they are worthwhile. In other cases, the proposer had been advised to submit an SGER proposal for an initial proof of concept. Like any venture capital activity, a few great successes are achieved but a higher failure rate is experienced compared to normal awards. There were too few cases for the COV to reach any reliable conclusion, but it is recommended

that a deliberate percentage of funds be assigned as an upper limit for high-risk projects”.

Discussion

Determining what constitutes “high risk” is very difficult and determining the amount of funds spent on high risk projects would be even more difficult. Thus it is not really possible for us to have a clear and consistent approach to these projects, and, as noted by the COV, we use a very pragmatic approach. We do feel that setting a deliberate percentage of funds for high risk projects might limit the ability of the Program Director to fund some very worthy “high risk” projects. We also note that the COV’s finding that “a few great successes are achieved but a higher failure rate is experienced compared to normal awards” is precisely what one would expect, and hope, for high risk projects.

2.5 OTHER RECOMMENDATIONS TO NSF

a. Accomplishment-based Renewals

“Although “Accomplishment Based Renewal (ABR)” proposals are an option in the Grant Proposal Guide, none of the STR proposals reviewed were of this type. As recommended by the 2002 COV, encouraging this kind of submission from established scientists would reduce the time commitment required both of proposers and reviewers. It seems to be the case that ABR proposals are not submitted for fear of being down-graded compared to full proposals. This negative view might be countered by educating reviewers on the advantages of ABRs and requesting that they be given equal consideration compared to standard proposals.”

Discussion

Actively encouraging submission of ABR proposals would be problematic in today’s budget climate. Any significant number of ABR awards would effectively fence-off a significant percentage of core program budgets, and would likely have a significant impact on the goal of increasing awards to young PIs. On the other hand, we certainly agree that ABR submissions should be reviewed in a context that considers their time saving benefits.

ACTION

Reviewers will be instructed to give ABR proposals consideration equal to standard proposals.

b. Preservation of CEDAR, GEM and SHINE

“Normally sub-programs such as CEDAR, GEM and SHINE would be expected to have a lifetime of 5 to 10 years and an eventual sunset as intellectual and broader impacts decline and priorities change. However, these special programs appear to have the seeds of vitality and renewal planted in them from the outset. The COV believes that with careful management, they will be good investments for NSF for many years to come”.

“Part of their strength is the grass-roots management through steering committees and their openness to new ideas through their workshop structure. Another part is through the strong support provided by UARS program directors. Emphasis on the importance of workshop participation by students and young scientists with oversight by more senior colleagues has led to self-selection of important scientific objectives. CEDAR, GEM and SHINE are healthy and vital organizations”.

“Nevertheless, occasionally there are signs of a clouding vision that needs to be refocused. CEDAR and GEM are energized by the prospect of new achievements to come with the AMISR and CISM projects. These hopes are mainly focused on tools. The COV recommends a return to a clear vision based on science as described in the CEDAR Phase 1,2 and 3 program documents. GEM achieves steady renewal through new campaigns and the development of campaign concept through planning meetings and document describing objectives prepared by the community that are available to proposers”.

Discussion

We appreciate the COV’s endorsement of these three focused programs, and we agree that all continue to produce excellent accomplishments in terms of NSF’s three strategic goals. It is precisely because these programs are community driven that they remain intellectually stimulating and scientifically vital.

The need for the CEDAR community to refocus objectives based on scientific accomplishments of CEDAR Phase III is echoed by the new Chairman of the CEDAR Science Steering Committee (Dr. Jan Sojka), and was discussed at the 2005 CEDAR Meeting in Santa Fe by the CEDAR Science Steering Committee (CSSC). There appears to be community consensus, growing from that meeting, that a return to organized observation campaigns involving multiple investigators is one direction that the CSSC is preparing to endorse.

ACTION

This COV recommendation shall be a topic for discussion within the November, 2005 CSSC meeting, and that committee will be urged to fashion a statement on CEDAR science direction at a minimum, and possibly a new document defining the science drivers and community objectives that will focus CEDAR activities in future years. We concur that this refocusing of CEDAR objectives is important for the preservation of a program that revitalized aeronomy research by addressing the upper atmosphere as a coupled system, as opposed to a series of unrelated “spheres”.

With regard to AMISR, we agree that careful planning is essential to ensure that this research tool provides maximum scientific benefit to both the CEDAR and GEM programs. There must be adequate coordination between the goals of these programs and AMISR, particularly in the initial stage of facility operations. Because the documents that described the scientific rationale for AMISR are more than ten years old, we intend to revisit the AMISR research objectives through a series of workshops that will eventually lead to the development of a formal science

plan. We will also assemble a scientific steering committee for AMISR that will be charged with ensuring that AMISR operations fully support CEDAR, GEM and National Space Weather Program goals, as well as contributing to core aeronomy and magnetospheric physics research. The Upper Atmospheric Facility long-range plan recommended by the UAF site visit panel will also include scientific planning considerations for initial AMISR operations.

c. Expand STR to include heliospheric physics

“The STR program should consider expanding its purview to cover all of solar-heliospheric physics, out to the heliopause, which can rightly be considered the New Frontier. In so doing, UARS would reflect the complete field of space physics and aeronomy as reflected, for example, in the structure of AGU, where we present our results. It would no longer systematically exclude this relatively small community. This proposed change is radical in the sense that the name “Solar-Terrestrial” would need to be changed to “Solar-Heliosphere,” but it is forward-looking because it reflects the new direction our field is taking to establish what we do as a universal science (see arguments made in NRC report, “Plasma Physics of the Local Cosmos”). To do that, we need to perform comparative studies (e.g., of shocks in the inner and outer heliosphere or of planetary atmospheres and magnetospheres) that focus on physical processes under various conditions in order to find the universal physical laws that govern them”.

“This change, of course, would increase the number of applicants for funds, with the resulting negative impact on the budget; but because it is forward-looking, it could serve as a selling point for new funds. As UARS embraced and nurtured the applied side of our field, space weather, in its infancy, so, too, it could embrace and nurture this new basic science thrust”.

Discussion

Since UARS belongs to the Directorate of "Geo"sciences, it is natural that the section focuses on that subset of solar system phenomena that affect the Earth. The area most relevant to this recommendation is the SHINE program. If SHINE activities are to be expanded beyond the realm of the “inner heliosphere” (as is currently stated by the SHINE mission statement on their web site), the SHINE community must decide to expand its purview. If this is decided, UARS will seriously consider changing the name of the Solar Terrestrial Program to Solar-Heliosphere.

Expansion of UARS programs to include research of comparative planetary atmospheres and magnetospheres, in general, is distinct from the specific recommendation that STR expand its domain to include the outer heliospheric. Comparative planetary research proposals are currently welcomed in AER and MAG, with the condition that the research should truly compare processes on other planets with earth. That condition grows from current programmatic limitations, including the disposition of UARS within the GEO directorate, and the presence of the planetary astronomy program within the Astronomy Division of the Physics Directorate. Nevertheless, AER typically funds between 2 – 5 comparative planetary atmosphere projects within its portfolio and the MAG program typically funds 1-2 projects on comparative magnetospheres. Expansion of that involve-

ment is certainly something that UARS would like to do, but expansion to the extent of program solicitation remains restricted by programmatic definition and by budgets. The committee charge to bring this new direction to UARS will be further evaluated as NASA redefines its mission for basic planetary research. We certainly wish to become a major player in the support of planetary research, and are actively monitoring opportunities for budget expansion that will permit that level of involvement. We agree that this research is appropriate, and a good opportunity for UARS growth.

ACTION

The NSF Division of Astronomical Sciences (AST) currently has responsibility for funding programs in planetary and solar system astronomy. Based on the COV recommendation, UARS will seek to collaborate more closely with AST in order to make progress in "solar system space physics." That process will require the close cooperation of the respective UARS and AST scientific communities as well. In particular, the STR program will solicit a response and a plan from the SHINE community to revisit their science priorities in light of this COV finding. The plan should be realistic and address priorities within a flat budget scenario.

d. Use of virtual panels

"Given this successful experience, the COV recommends continued use of virtual panels in cases where the participants are known to each other and are familiar with the process. The COV also recognizes that some activities are better done face-to-face because of the nature of the decision-making process and necessary security of information, for example this particular committee event".

Discussion

We agree with the panel's assessment of the pros and cons of virtual panels. Currently, we use virtual panels when the panels are not too large and when we expect participants to be familiar with the panel process and each other. UARS intends to continue using virtual panels in this way.

e. Admission of Proposals from other Federal Agencies

"However, we note that there are cases where research efforts that are well aligned with the goals of NSF have significant participation of scientists who happen to be civil servants employed by another federal agency. Some of this research is in fact better aligned with NSF goals than with their own agency goals. Unfortunately, these civil servant scientists do not have ready access to the NSF program funding. The result is that the advancement of science suffers because these civil servants are not able to participate to the level needed since they are unfunded to do so. The committee understands that exceptions are occasionally made to this policy, but that these are rare. The general NSF policy of not allowing civil servants to be funded by their programs should perhaps be revisited to enable a broader participation".

Discussion

Except in exceptional cases as defined in the Proposal and Awards Manual (PAM) we are simply not given the leeway to fund civil servants at other agencies or employees at other non-NSF FFRDC's. This policy has been put in place by the National Science Board and it is not something that UARS or even the GEO directorate can change unilaterally. As noted when this issue was raised during the committee's visit, it is important that NSF avoid any appearance of "thwarting the will of Congress." It is also our impression that another reason for having this policy was the concern that scientists at government laboratories and FFRDC's would have an unfair advantage in procuring NSF funding. Whether or not that would really be the case, it is certainly true that in the current budget climate, funding researchers at other government agencies would necessarily mean a further decline in the success rate for researchers at universities.

Responses Specific to the Aeronomy (AER) Program

Section A.1.1. Is the review mechanism appropriate?

"The panel review process may be improved by some modifications to the process, including changes to the current lead/scribe roles. In some cases, it appears that the lead panelist may have too much influence on the overall success or failure of the proposal, especially when there are few mail-in reviews for reference. This may be remedied by assigning the proposal to at least two panelists for review, but removing the lead/scribe designation in favor of a "presenter", to be determined at the time of the panel meeting. This will require that more than two people read and be involved in the ensuing panel discussion. A forum for discussion of the proposal among the reviewing panelists prior to the formal presentation would also be preferred".

Discussion

The proposed remedy is accepted.

ACTION

Subsequent panels will produce two written panelist reviews and one scribe-prepared panel summary. The forum for panel discussion prior to formal presentation is more difficult to achieve logistically, but can be facilitated by encouraging e-mail and telephone interactions among panel members prior to the panel meeting. That encouragement will now appear in letters to the panel organizing the process. One outcome of this panel review restructuring will be an increase in panel size (and therefore panel expense). Presently, panelists are asked to prepare written reviews of three proposals within the competition pool. Rather than augment that burden to six, we will increase the number of written reviews per panelist to four or five, and increase the number of panel members.

Section A.3.3. Did the program make appropriate use of reviewers to reflect balance among characteristics such as geography, type of institution, and underrepresented groups?

“The committee did not have complete statistics for reference in answering this question, but a cursory review of available proposals shows a satisfactory balance of reviewers”.

Discussion

The panel was offered a tabular breakdown of reviewer demographics by geographic location, by gender, and by ethnicity – as compiled by NSF. Those statistics are recognized to be nearly irrelevant, as the committee noted, because only about 10% of reviewers provide this information.

ACTION

We shall internally encourage better recovery of this information to improve those statistics.

Section A.4.2. Are awards appropriate in size and duration for the scope of the projects?

“The observed trend toward longer duration awards is encouraged, when appropriate”.

ACTION

Longer duration awards can and will continue to be encouraged.

Responses Specific to the Solar-Terrestrial Research (STR) Program

Section A.1.8. Discuss any issues identified by the COV concerning the quality and effectiveness of the program’s use of merit review procedures.

“Although “Accomplishment Based Renewal (ABR)” proposals are an option in the Grant Proposal Guide, none of the STR proposals reviewed were of this type. As recommended by the 2002 COV, encouraging this kind of submission from established scientists would reduce the time commitment required both of proposers and reviewers. It seems to be the case that ABR proposals are not submitted for fear of being downgraded compared to full proposals”.

Response

STR accepts ABR proposals and has funded them in the past. However, the success of these proposals has been limited because of negative reactions by the STR reviewer community to the ABR format.

ACTION

In order to mitigate such negative responses, STR will provide guidance to ABR reviewers reminding them that this class of proposals is legitimate and appropriate under NSF guidelines.

