

**COMMITTEE OF VISITORS (COV) REPORT**  
**for**  
**EARTH SCIENCE RESEARCH PROGRAMS**  
**GEOLOGY AND PALEONTOLOGY (GE) AND HYDROLOGIC SCIENCES (HS)**  
**PROGRAMS**

**RESPONSE TO SPECIFIC COMMENTS IN THE COV REPORT**

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Introduction

The Committee of Visitors (COV) report reviews and assesses two of the Division of Earth Sciences (EAR) Research Programs: Geology and Paleontology (GE) and Hydrologic Sciences (HS). Two areas are emphasized: (A) the integrity and efficiency of the processes which involve proposal review; and (B) the quality of the results of NSF's investments in the form of outputs and outcomes which appear over time. The COV report includes a number of recommendations that will help guide the management of EAR's Research Programs in the Surface Earth Processes (SEP) Section. EAR is very appreciative of the Committee's efforts and will work to address the concerns raised by members of the COV. The following sections outline the Division response to the specific recommendations contained in the COV report.

NOTE: The COV reviewed the GE and HS programs for the periods 2002-2004. Following 2004, the GE program split into three separate programs: Geobiology and Low Temperature Geochemistry (GG), Sedimentary Geology and Paleontology (SGP) and Geomorphology and Land-Use Dynamics (GLD). These programs, together with EHR, comprise the new Surface Earth Processes (SEP) Section. Thus, with the exception of EHR, this COV reviewed the SEP Section of EAR.

**OVERALL ASSESMENT**

The COV overall assessment of the functioning of the GE and HS programs is best summarized by the following quote from their report:

“We were very impressed that the POs represent a hard-working, hands-on, and efficient team dedicated to funding and managing a large and diverse set of projects for quality research and education in the Earth Sciences. The COV was pleased that the POs consider both Intellectual Merit and Broader Impacts of their awards. GE and HS are funding high quality science that results in publications in the top-rated journals and that corresponds to national priorities. They are also implementing educational programs that are congruent with national needs and

agency mission. The Program Officers are lauded for their time-consuming efforts to help their communities grow and to keep up with that growth.”

## **COV RECOMMENDATIONS AND RESPONSES FROM EAR**

1. High proposal loads make it difficult for Program Officers to complete their work: staffing should be augmented (A.1.7).

Response: We have recently restructured the GE program to three separate programs and have added an additional 1.5 Program Officers. We will continue to monitor proposal loads and request additional staff as needed.

Details: (A.1.7) The COV recommends adding staff and we agree that workloads are anomalously high in some programs. Still, the COV concluded: “Overall, it appears that both the GE and HS funding decisions are derived in reasonable time periods.” Thus, although we remain concerned about workloads, the PO’s in HS and GE have been working effectively, if under difficult conditions. Now that we have nearly doubled the PO’s dedicated to programs derived from GE, we will continue to carefully monitor workloads throughout the EAR division.

2. The meaning of the Broader Impacts criterion is not clear: Program officers should help the reviewers, panelists, and proposal writers reach consensus on the meaning of the Broader Impacts criterion (e.g. A.1.3).

Response: We will continue to direct PIs, panelists and reviewers to the documentation provided by NSF on Broader Impacts. We will also continue to discuss this issue at workshops, town hall meetings and in discussions with individual PIs. Program Officers will work, in particular, with panels to guide their deliberations in the consideration of “Broader Impacts”.

Details: (A.1.3) NSF has worked hard at communicating to the scientific community exactly what constitutes Broader Impacts. A wide variety of documents are available describing not only the kinds of activities that satisfy the Broader Impacts criterion but also examples of projects that have effectively achieved a strong broader impact. Perhaps the best discussion may be found at <http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf>. We acknowledge that despite the clear signal from NSF about what is meant by “Broader Impacts” the community may retain some lack of understanding and we will continue to discuss this matter with them in workshops, town hall meetings and in one-on-one discussions. The COV noted some inconsistency in the weighting of similar broader impacts activities in different proposals, pointing out that in some proposals an activity may be considered appropriate whereas another proposal may be criticized for including the same activity. Whereas evaluation of broader impacts activities must always consider the context of the particular subdiscipline

and the institutional setting, program directors and panels will work to apply the most consistent standards when considering “Broader Impacts”.

3. Few faculty from under-represented groups and minority-serving institutions receive funding from GE and HS: Program Officers should seek out new ideas and/or strategies to accomplish more participation of faculty and students from under-represented groups and minority-serving institutions and PO’s should work to increase awards to faculty at minority serving institutions (A.4.9; A.4.12).

Response: We agree that it is an important goal to increase the participation of under-represented groups in the Geosciences. We will continue to do our utmost to increase the numbers of awards to minorities and women and will do so while following best practices for proposal review.

Details: (A.4.12) The COV noted that the proportion of awards from GE and HS to female PIs during 2002-04 was roughly equivalent to the proportion of women in the Geosciences. For GE the proportion of awards given to minority PIs was lower than the proportion of minorities in the Geosciences and for HS the proportion was higher during some years and lower during others. The COV explains this as resulting from the small number of minority proposers: a small change in the number of awards results in a large change in the percentage. They encourage PO’s to continue efforts to increase the number of minority proposers. We agree that this is a serious challenge and we will do all in our power to encourage participation by minorities.

The COV also noted that participation by women and minorities in the two “large initiatives” (CHRONOS and CUAHSI-HIS) they reviewed was anomalously low. We note, however, that a woman leads the CHRONOS project, and a woman chairs the CUAHSI executive committee. We will work to guarantee that the large endeavors funded by EAR in all disciplines have appropriate participation by both women and minorities. Where appropriate, we will suggest including additional PIs to make this occur.

(A.4.9) We will encourage faculty at minority serving institutions to submit proposals, and will use them, when appropriate, as reviewers. We will give them appropriate feedback so as to increase funding to faculty at traditionally under-represented institutions.

4. Two of the funded large initiatives in GE/HS were not reviewed using a substantive review process that included careful mail review *and* panel review: such initiatives should be reviewed in a defensible and consistent fashion using best practices either by the EAR Instrumentation and Facilities panel itself or by using the best practices of that program; wherever possible, funding for large initiatives should not erode core budget

funding significantly but should be enabled partially or completely by discretionary funds (A.1.8; A.3.4; A.5.4).

Response: We believe that the projects considered “large initiatives” by this COV were reviewed in accord with NSF guidelines for merit review. The COV stated that the lack of panel review for large initiatives was problematic. We note, however, that review using only ad hoc mail reviews is an accepted mode of proposal review and is widely used throughout NSF. In the future we will continue to consider carefully whether any proposal should receive both mail and panel reviews and will document the decision in the proposal jacket. We will continue to exert care to be certain that proposal review for both large and small projects is as fair, balanced and as internally consistent as possible.

Details: (A.1.8 ) The COV raised concerns about inconsistencies in the way that EAR GE and HS handled “large initiatives”. They note that three such projects were reviewed during the three year period covered by the COV and that their modes of review were not identical. One of these three projects, CRONUS, was not DD concurred until FY 2005 and as a result is not part of the period covered by this COV. However, we made information about that award available to the COV because they expressed interest in comparing the three projects. The two projects that were included in the COV review period were each reviewed identically. The CHRONOS and CUAHSI Cyberinfrastructure proposals were each sent out for mail review, but neither was taken to a panel because the PO’s concluded that they were very different from the disciplinary proposals the panelists would be reviewing. The decision to make each award was based on careful analysis of the mail reviews, which is an accepted method of proposal evaluation used widely in NSF. The mail review scores were indicative of very high quality proposals and the awards were carefully considered and well justified. Each award was made with funds designated for Geoinformatics and each project was a clear Geoinformatics endeavor. Thus, we take exception with the statement that awards were made “without a consistently implemented review process.”

We modified our review of Geoinformatics proposals approximately one year ago, after this activity became more substantial. We now accept such proposals through our IF Program and announce this opportunity in the IF solicitation. The review of such projects will be uniform, using both mail and panel reviews, but we will, nevertheless, be discussing precisely how to best handle such projects in EAR’s Divisional retreat in September 2005.

The matter of the other award, for CRONUS, is entirely different. That project is not Geoinformatics. It is a discipline-focused project designed to refine cosmogenic radionuclide dating techniques and is funded by contributions from several different programs all of which see the benefit in a more refined dating technique. No Geoinformatics funds were used because the goal of the research is

not Geoinformatics. Thus, the review and funding of this project should not necessarily be the same as for the other two, which are in a different program.

(A.3.4) The COV pointed to a COI in the review of one of the “large initiatives” it reviewed, CHRONOS. One of the PIs was from the same university as the Section Head working on Geoinformatics. In the initial stages of the review of this proposal the Section Head worked with the PO to craft a letter to be sent to mail reviewers. The PO was concerned that reviewers might not be familiar with a collaborative proposal with a large budget and sending additional instructions to reviewers in such cases is not unusual. Before reviewers were chosen or the letter was sent, the COI was recognized and the Section Head ceased all activities related to the review of that proposal. The COV noted that this situation “emphasizes the benefit of a more rigorous and standardized review process for large proposals”. We agree that it is important to guarantee that all COIs are identified and handled appropriately, although we question whether a standardized review process will offer any benefits in this matter. We will continue to enforce the highest standards in this regard.

(A.5.4) We appreciate the concern that a few large endeavors could overwhelm the budgets of smaller programs and we believe that Program Officers and Divisional Management work hard to prevent this from happening. The development of new lines of research within EAR (e.g., Geoinformatics) requires the enhancement of budgets within programs, or the establishment of new budget lines within the division. In the former case, we pay particular attention to large budget proposals that may have a significant impact on a discipline. In the latter case, we generally entrust the initial management to a P.O. or to a Section Head, until we can incorporate the activity into the most appropriate program.

5. Large sums of money, such as the several million dollars of funding awarded in the area of Geoinformatics, should not be awarded without a publicized solicitation: such activity, along with the lack of panel review, could yield the appearance of impropriety. A significant lack of communication apparently existed during 2002-2004 and may still exist to date among the GE/HS Program Officers, Section Head, and Division Director. Communication must be fostered so that Program Officers understand funding priorities and allocations, so that all communities have equal knowledge of and access to funding opportunities, and so that administrators understand needs for both emerging and traditional areas of science and education (A.5.3).

Response: We agree that effective communication about availability of funds, both within NSF and the community, is important and that even the appearance of impropriety can seriously impact the reputation of NSF. The specific instances discussed by the COV were remedied before the COV met. However, we appreciate the concerns they have raised and will endeavor to prevent recurrences of such situations in the future.

Details (A.5.3) We agree with the COV that effective communication within EAR is desirable and we will attempt to improve the situation through regular Section meetings, division retreats, and more frequent EAR staff meetings. The instances discussed by the COV relate to earlier comments about a small number of proposals and uneven knowledge of the magnitude of funding available for Geoinformatics proposals. During the time period reviewed by the COV, Geoinformatics was considered to be an emergent area and many workshops were held and attended by NSF staff and members of the community, many talks were given at professional meetings by NSF staff and PIs and many discussions were held in EAR. Although there was no formal solicitation, demand for Geoinformatics activities had begun to grow. Not all Geoinformatics projects were funded by EAR funds, however. Some were supported by ITR, for which a solicitation was issued.

We reiterate that for several years Geoinformatics was a new and emergent field of research and we were in the process of determining the most effective methods of managing such proposals. Our initial forays were ad hoc but we have now formalized our procedures and are confident that best practices will be followed in the future. We regret that there is the appearance of impropriety but stress that our review of the two projects in question was rigorous even if a panel review was not employed and that no conflicts of interest influenced decisions.

6. The COV faced significant hurdles in gathering information about program actions with respect to the larger initiatives: both electronic and printed spreadsheets of *all* actions per program over the timeframe of interest should be provided so that the COV can be confident that all program activities are transparent and so that all program activities are included in statistical calculations of diversity (A.4.12; C.2; C.4).

Response: The COV report details accurately the events that occurred during their visit to NSF. An error was made in excluding one Project from their spreadsheet. This was caused by human error: the PO involved believed that because funding had come from the Geoinformatics budget, this particular project was not to be reviewed by this COV. We accept responsibility for this error and are sorry that it occurred. We wish to note that NSF identified the error on the second day of the COV and that the Section Head went immediately to the COV to make the chair aware of the problem. We moved rapidly to provide the COV with all the information they might need to evaluate the review of this project. As noted by the COV, because this was a large and complex project, they had insufficient time to carefully consider our actions. We have already communicated this potential problem to the other section in EAR and will guarantee that future COV's receive 100% accurate and complete information.

We also wish to note that program statistics, such as average award size and average review score, are calculated based on the typical research proposals excluding workshops, SGERs and large projects funded by other entities within NSF, such as Centers. For the period 2002-2004 the SEP COV received information on

approximately 1500 proposals; approximately 30 additional actions, such as SGER, supplements and workshops, could have been included in the statistical tables.

7. EAR should work with the GE/HS communities to articulate a clear vision for both growing and traditional areas and funding levels should be matched to this vision: for example, funding for high-growth areas should not disappear when a program disappears but should be put back into core programs when the core programs have changed to include the new areas (A.5.3; A.5.4).

Response: We will continue to engage the GE and HS communities, as we do with all research disciplines, through workshops, town hall meetings, and individual interactions and will make every effort to send clear messages about areas, both traditional and emergent, that we believe represent productive research topics. We will also continue to listen carefully to advice from the communities served by all programs and respond to emergent research topics to the extent that we are able.

We appreciate the concerns the COV raised about funds directed towards Foundation-wide special initiatives. These initiatives in new emergent science areas are cross directorate and EAR does not control those budgets. For the specific example mentioned by the COV, funds directed towards the Biocomplexity in the Environment initiative support a very successful project that serves the biogeology community. At the conclusion of these efforts, funds often become available to EAR. It is our intent to reinvest them into the most appropriate core programs or divisional activities.

8. HS and GE are both consistently receiving very highly rated proposals that are not getting funded: new money should be found to increase the core funding of these programs so that low success rates do not seriously impede the excellent science within GE/HS (A.4.1).

Response: We are hopeful that future budget allocations to NSF from Congress allow us to increase the budgets to the programs in question.

### **Additional Responses to Specific Comments in COV Report**

A.1.4 Inconsistency in mail reviews between numerical score and comments.

Program Directors pay particular attention to the detailed discussions submitted by mail reviewers and commonly make reference to discrepancies between review ratings and comments in their review analysis. Program Officers routinely bring such inconsistencies to the attention of the panel, attempt to discern real problems in a proposal, and to separate that from the raw numerical score. We have little control over how individual reviewers apply the ratings scale.

#### A.1.6 Insufficient/incorrect communication from Program Officer regarding recommendation.

The COV noted that in some instances in which the GG panel recommended funding but program budgets did not allow an award, the PIs did not receive appropriate feedback from the program officer. In the future this PO will work to provide better and more consistent feedback.

The COV also raised the issue of a letter sent to PIs given awards for the CHRONOS project. The GE program sent a “Context Statement” to all PIs in their program discussing the general conditions of the program during the time their proposal was evaluated. Among other items, the statement included the number of proposals reviewed and the number awarded. The language used stated that those proposals had been taken to the panel. Because the CHRONOS proposal was a complex Geoinformatics endeavor with 15 different PIs, the decision was made to withhold the disciplinary panel review, but the PIs were still sent the standard “Context Statement”. This was an error and as soon as EAR became aware that it had occurred we sent letters to the PIs correcting that mistake.

#### A.3.3, A.3.5. Use of minority reviewers and better review of interdisciplinary proposals.

POs will continue to make efforts to use minority reviewers. We endeavor to send no more than two proposals from any program to a reviewer in one round of submissions and when a PO notices that a particular reviewer has several proposal reviews pending they may choose to not send them another one. Within reason, we will endeavor to increase our use of minority reviewers.

As regards review of interdisciplinary proposals, PO’s make every effort to choose reviewers who are appropriate for interdisciplinary proposals. There is not an inexhaustible supply of such workers, however, and, as noted above, we endeavor to not ask too much of any one reviewer. However, PO’s will make every effort to choose the most appropriate reviewers possible for interdisciplinary proposals.

#### C.5 Incomplete eJackets and COV template.

We are aware that not all eJackets are sufficiently well populated especially since eJacket came into use during the period covered by this COV (2002-2004). As eJacket evolves and as POs become better acquainted with the system and the necessity of uploading all documents this problem will lessen. For an upcoming COV in EAR we are providing paper jackets as well as electronic ones to minimize the confusion experienced by this COV.

We will communicate comments on the COV template to those units within NSF that devise the templates.