

**NSF Committee of Visitors Report
Deep Earth Processes Section
Division of Earth Sciences
Directorate for Geosciences
June 9-11, 2008**

**RESPONSE TO SPECIFIC COMMENTS IN THE
COMMITTEE OF VISITORS REPORT**

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On June 9-11, 2008, a Committee of Visitors (COV) met at NSF to review five Programs in the Deep Earth Processes Section (DEP) of the Division of Earth Sciences (EAR). These Programs included: *Tectonics, Petrology and Geochemistry, Geophysics, Continental Dynamics, and EarthScope*. The review covered proposal and award actions for the Fiscal Years of 2005, 2006, and 2007. We are very pleased with the overall results of the COV as outlined in their report:

“The most important general finding of the COV is that the overall management of the five programs we evaluated appears to be excellent. The review process, including both mail reviews from experts in the area of the proposal and review by the broadly knowledgeable panels, is thorough and fair. The outcomes of the reviews are well documented by Program Officers, and sufficient information on the basis for award decisions is typically provided to the proposers. The Section meets NSF guidelines for proposal dwell time – the time between proposal submission and transmission of a decision to the proposer – for four of the five programs evaluated. The Program Officers communicate well within the Section and with their counterparts in the rest of the Earth Sciences (EAR) Division and the Geosciences (GEO) Directorate, as well as the rest of the Foundation. That communication has enabled balanced reviews of interdisciplinary proposals and has resulted in a variety of teaming arrangements across programs that have permitted the leveraging of Section resources to support a range of attractive projects. The Section generally pays appropriate continuing attention to the diversity of its proposers, awardees, reviewers, and panelists. Most fundamentally, the scientific projects supported by the programs evaluated are all of high scientific merit and often of broad scientific impact.”

While positive and complimentary of NSF’s management of the DEP Section, the COV report contains some specific recommendations on areas that could be improved by the Section:

1. The committee recognizes that cross-disciplinary research offers exciting opportunities for new and even “transformative” advances. At the same time, some of the most important scientific achievements have come from bright individuals, a situation likely to continue for the foreseeable future. The COV recommends that the DEP programs preserve a healthy fraction of awards to individual-PI projects.

Response: The number of collaborative and interdisciplinary projects submitted to all DEP Programs has increased over the past few years, reflecting the reality that some problems can only be solved using an interdisciplinary approach. We will endeavor to continue to balance the needs of disciplinary and single investigator projects PI's and, at the same time, encourage new partnerships that are formed to investigate Deep Earth questions from a multi- and interdisciplinary perspective.

2. We recommend that Program Officers take steps to communicate to their constituent communities the means by which proposers can satisfy the "broader impacts" criterion in their proposals as well as the importance that this criterion will play in proposal evaluation and award decisions.

Response: NSF has an excellent website that describes examples of broader impacts appropriate for use in proposals (<http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf>). We agree that NSF Program Officers should make a greater effort of educating the reviewer community and the review panels, as well as PIs, to ensure that proposals are evaluated and assessed in a consistent manner for their strengths and weaknesses in the broader impacts criteria.

3. We recommend that the combined use of external mail and panel reviews be continued.

Response: EAR agrees that the combination of mail and panel reviews of a proposal is the most effective and thorough process of peer review. Although more time consuming for Program Officers, this merit review practice is greatly endorsed by the DEP community. Based on feedback from members of the earth sciences community, the recommendations of previous COV's, and the recommendations of this COV report, the DEP Section remains committed to the combined use of external (*ad hoc*) and panel reviews.

4. The COV was encouraged to hear that the Petrology and Geochemistry Program has recently reduced the number of requested mail reviews and at the same time increased the rate of return on those requests (to approximately 70%), in large part by means of follow-on requests from the Program Officer that stress the importance of each particular review. The COV recommends that this practice be emulated by the other programs, and that all programs continue to stress the importance of substantive commentary as a critically needed component of all mail reviews.

Response: This is an excellent recommendation, but we note that this approach is common to several Programs within the DEP Section that have broadly similar reviewer return rates. However reviewer return rates are highly variable and reflect the fact that some PI's and communities have increasingly higher review workloads resulting from requests from more than one Program in EAR and elsewhere within NSF. Accordingly, the Programs in the DEP Section will continue to solicit reviews from qualified researchers from the domestic and international science communities, and will encourage reviewers to provide substantive commentary in their assessments of the intellectual merit and broader impacts of proposals. We will continue to strive for a good balance between requests and returns of reviews.

5. The COV noted a small number of instances where a panel did not appear to take sufficiently seriously the critical comments of an expert mail reviewer on a proposal in a narrow field not well represented among panel members. The panel and Program Officer should pay particular attention to the substantive comments, both positive and negative, of the most expert mail reviewers in such situations and should seek additional advice if expert reviews are mixed.

Response: NSF Program Officers are ultimately responsible for making the final recommendations regarding the fate of proposals. In making these recommendations, they rely

on the expert advice from both *ad hoc* reviewers and panelists. These decisions are also driven by Programmatic factors such as the desire to support a diverse portfolio of investigators (including early-career PI's), institutions, and modes of research. However, Program Officers are not experts in all disciplines and sometimes cannot judge if reviewer criticisms are warranted. In these cases of mixed reviews, the Program Officer may also provide the PI with the opportunity to rebut the reviewer or panel criticisms prior to making a final recommendation.

6. The Program Officers should take steps to inform potential multi-investigator proposers that the thoughtful development of a management plan would not only improve their chances for an award but would also improve the expected outcomes of their project if funded.

Response: This is an excellent suggestion. For large, complex, multi-investigator and interdisciplinary projects, a management plan should be required. EAR will discuss revisions to our current Program solicitations that would encourage such a plan in these types of proposals.

7. The maturation of the EarthScope Program introduces other pressures as well, including the pressure to focus studies in North America and the pressure to take advantage of EarthScope assets in geophysical networks by supporting projects that utilize those assets. These pressures, likely to be most keenly felt in the Geophysics, Tectonics, and Continental Dynamics Programs, should be acknowledged in budget formulation decisions within EAR and GEO. At the same time, Program Officers in the affected programs should take steps to ensure that the most compelling scientific projects unrelated to EarthScope continue to be supported.

Response: We agree that EAR needs to continue to evaluate and monitor the proper balance in Program funding based on both internal budgetary considerations and input from the scientific community. We will continue to seek input from AC/GEO, National Academy of Sciences committees, and other community organizations as appropriate. A key tenet of all the Programs at NSF is to support the most compelling scientific projects.

8. Despite the overall high quality of the Tectonics Program, the COV identified the small number of CAREER proposals as a potential problem. We recommended that the program identify methods for increasing the number of CAREER proposals submitted as a route to increasing the likelihood that one or more such proposals can be funded over the next three-year period.

Response: All of the Programs within the DEP Section encourage CAREER proposals from our communities. However, as noted in presentations to the COV, early-career PI's in some communities and disciplines have preferred to submit proposals to the standard EAR solicitations, and many have been successful in obtaining funding for their projects via this route.

9. Although the feedback provided to proposers is already exceptionally strong, the COV recommends that the nonconfidential information contained in the PO review analysis be shared with the PIs to the greatest extent possible.

Response: We agree that this practice is uneven in the Section. The Programs that are currently not taking full advantage of the "PO Comments" function of eJacket to convey non-confidential information contained in the Review Analyses to PI's will be encouraged to do so.

10. The COV notes that the 2005-2007 EarthScope PI pool included a large fraction of researchers who have a long history of involvement in EarthScope Program development. We believe that the program would benefit from a greater diversity of prior program involvement within the PI pool. We suggest that a broadly advertised or clearly

articulated statement of the EarthScope Program's goal of engaging a broader spectrum of Earth Scientists would be helpful in such an expansion of the PI pool.

Response: As noted by the COV, the EarthScope Program is young, but is maturing appropriately. Greater participation by the community is already occurring as more data become available and the focus of EarthScope expands eastward across the continent.

11. The COV noticed some confusion among both mail reviewers and panelists as to what constitutes an appropriate EarthScope proposal. This confusion is a bit baffling to us since the criteria seem well articulated in the program announcement. Because the EarthScope Program is still relatively young, renewed efforts to heighten the understanding of EarthScope's scientific and educational goals among prospective mail reviewers and panel members would be worthwhile.

Response: We, too, are baffled by this, especially given: the multiple annual Town Hall meetings convened at professional meetings, the high visitorship to the EarthScope booth at the very wide range of meetings where it has been present, the inclusion of EarthScope in the widely distributed *Active Earth* kiosks, the ~1000 recipients of the EarthScope newsletter (4 times annually), the constantly updated website (www.earthscope.org), regular mass emails to the EarthScope (and IRIS and UNAVCO) email lists, etc. However, the Program will continue its efforts to further the understanding of the scientific and educational goals of EarthScope to members of the Earth Sciences community.

12. The Continental Dynamics Program mortgages funds at a rate significantly higher than the NSF goal (60-65%). We recommend that efforts be made to decrease the mortgage rate in order to enable funding more new projects each year.

Response: The CD Program funds large, multi-year projects. As with most Programs in the DEP Section, the CD budget has been flat for the past four years. Given these constraints, it is very difficult to have a viable program (i.e., start several new projects each year) without increasing the outyear mortgage. However, the CD Program will make a concerted effort to reduce the mortgage in coming fiscal years.

13. In the Continental Dynamics Program, a typical proposal – even after a valuable pre-proposal stage – is submitted two or more times. We therefore recommend that cohort statistics (whereby projects are tracked from the pre-proposal stage through each annual decision cycle) be used to evaluate success rates in addition to annual statistics.

Response: We agree with this recommendation and will implement a program of compiling appropriate cohort statistics in order to evaluate success rates more accurately in the CD Program.

14. Now, with more than 20 years of experience and the exciting EarthScope program underway, we believe that the time is right to review and possibly realign the priorities of the Continental Dynamics Program, including geographic project balance, through a geosciences community workshop.

Response: A Workshop on "Future Research Directions in Continental Dynamics", attended by over 100 leading researchers in the Earth science community, was held in Chandler, Arizona in March 1989. The output of that Workshop was the report "A National Program for Research in Continental Dynamics CD/2020". This report provided the scientific roadmap for the CD Program over the last 20 years. It has been widely distributed and translated into a number of languages (including Chinese) and has been a very effective framework document for evaluating CD priorities. We agree that the time is appropriate for another such community workshop to

examine both the scope and the future priorities for the Continental Dynamics Program and to update the CD/2020 document.

15. The Continental Dynamics Program has done an excellent job of supporting large, multidisciplinary, multi-investigator projects that have led to a deeper understanding of the continental crust and lithosphere. The current review system involving both preliminary proposals and full proposals is very thorough. We recommend better documentation, however, of the post-panel discussions between the Program Officer and the PIs, which are an important part of administering complex, multi-institutional proposals.

Response: The Program Officer often has extensive discussions (many phone calls) with the PI's of large CD projects regarding budget issues, project logistics, instrument availability, ship time (if applicable), etc. We will endeavor to make better use of the 'Diary Notes' feature in eJacket to capture the important points in this dialog, as well as uploading the results of electronic communications with PI's in order to assure that there is proper documentation of Program decisions and oversight.

16. Common to all multidisciplinary programs, we encourage NSF to develop criteria by which to assess the extent to which the funding of multidisciplinary projects yields results or insight that exceed those that would come from funding an equivalent set of individual disciplinary projects.

Response: Some of the NSF cross-disciplinary activities have been evaluated professionally in the past. However, there are no accepted criteria for successful outcomes of multi-disciplinary activities that can be broadly applied and evaluated. Because of the complexity and significance of this issue, NSF has released a new Program solicitation in the Social, Behavioral and Economic Sciences (SBE) Directorate entitled "Science of Science and Innovation Policy" (SciSIP). Projects funded under this solicitation will have as one of their goals to develop "quantitative measures or indicators that provide summary information on the size, scope, quality, and impact of science and engineering activities, with particular focus on inputs and outputs of the science, technology and innovation system." This is a new area of social sciences research that will inform how we assess these multidisciplinary projects.

17. NSF is encouraged to modify the FastLane review template to include a line item encouraging comments on specific aspects of the budget.

Response: Currently, the Fastlane review template does not include a specific question about the budget and its allocation with regard to assessing intellectual merit or broader impacts of proposed projects. However, reviewers are asked to comment on "project resources" and whether they are sufficient to complete the project. Moreover, it is not uncommon for reviewers and panelists to comment on budgetary issues that are not well justified by the proposed activities. More detailed evaluation of budgetary items is generally deemed to be within the purview of the Program Officers and, if the issue is raised in the review process, they are in a position to make recommendations to the PI's about changing the budget to have it fall in line with the activities to be supported by NSF.

18. Although the choice of meeting date was agreeable to the COV members, the selection of a meeting date in the first half of June meant that Program Officers had to collect background information for the committee at a busy time in the proposal review cycle. A meeting time in August for the next COV for this Section would permit the Program Officers to devote more time to the COV process.

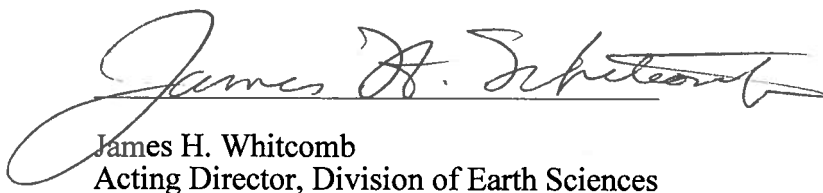
Response: This is a good suggestion. This recommendation will be forwarded to those in the GEO Directorate who schedule the COV meetings.

We would like to thank Dr. Solomon and the members of the COV for their time and efforts in making these excellent recommendations that will improve the Programs of the Deep Earth Processes Section.

A handwritten signature in blue ink that reads "David D. Lambert". The signature is fluid and cursive, with the first name "David" being the most prominent.

David D. Lambert
Acting Head, Deep Earth Processes Section

Concurrence by:

A handwritten signature in black ink that reads "James H. Whitcomb". The signature is cursive and includes a long horizontal stroke at the end.

James H. Whitcomb
Acting Director, Division of Earth Sciences