

COMMITTEE OF VISITORS (COV) REPORT
for
DIVISION OF EARTH SCIENCES
DEEP EARTH PROCESSES SECTION PROGRAMS

**TECTONICS (TE), PETROLOGY AND GEOCHEMISTRY (CH), GEOPHYSICS (PH),
EARTHSCOPE (ES), AND CONTINENTAL DYNAMICS (CD)**

RESPONSE TO SPECIFIC COMMENTS IN THE COV REPORT

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INTRODUCTION

The Committee of Visitors (COV) report reviews and assesses the Division of Earth Science's (EAR) Deep Earth Processes (DEP) Section programs in two primary areas: (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 Instrumentation and Facilities Program (IF), while a part of the DEP Section, is not reviewed here because it is reviewed by a separate COV. The COV report includes a number of recommendations that will help guide the management of the five programs reviewed. EAR is very appreciative of the effort and concerns by the members of the COV. The following sections outline the Division response to the specific recommendations contained in the COV report.

OVERALL PROGRAM FUNCTIONING

The COV assessment of the overall functioning of the EAR DEP Section is best summarized in the following summary from the COV report:

The COV was very impressed overall with the proposal review process, program management, interactions and collaboration among Program Directors, and external collaboration with other Directorates and Divisions in GEO. Based on our review and evaluation of proposal jackets and the material provided to us, we made the following observations:

- *Universally Program Directors provide fair and well-documented decisions that weigh both mail and panel input.*
- *Interaction and cooperation between Program Directors appears to be better than ever before, and we strongly encourage this interaction to continue.*
- *The Deep Earth Processes Section does a very good job of balancing individual investigator projects and larger scale collaborative projects. By its very nature, many of these projects are multidisciplinary and/or interdisciplinary.*
- *The work funded by the Deep Earth Processes Section programs is generally excellent. The quality of the science with NSF funding has been superb and the increase in our knowledge of deep Earth processes and the evolution of the deep Earth is outstanding. The quality of the science is well documented by the outcomes.*

- *The Program Directors are a model of pro-activity in terms of working with other Directorates and Divisions within GEO.*

DIVISION-WIDE RECOMMENDATIONS

Interaction Between Programs and Sections

The COV notes the excellent interaction between Program Officers in the DEP Section and recommends that care be given to maintain and improve successful interactions and best practices not only within the DEP Section, especially with the new EarthScope Program, but also between the DEP and SEP (Surface Earth Processes) Sections.

Comment. EAR recognizes that the boundary between the DEP and SEP Sections is somewhat arbitrary and that the programs within the entire division must continue to interact in advancing integrated or multidisciplinary research. The advent of the e-jacket is transforming working relationships throughout the Foundation and has made this an especially important time to develop and communicate best practices within the division.

Action. We intend to frequently emphasize this integrated whole, as well as best practices, in division-wide meetings and retreats.

Review Process and Workload

1. The COV strongly supports the current EAR review process of *ad hoc* mail reviews and panel review.

Comment. EAR agrees that the combination of *ad hoc* mail reviews and panel review of a proposal is the most effective and thorough process of peer review. This process, however, requires the greatest effort by the EAR workforce and alternatives should not be dismissed in the event that the workload continues to expand. Although no action is proposed now, some programs in EAR may have to explore either mail review or panel review only, or an annual proposal cycle, if no relief is found to the very high workload of Program Officers in EAR.

2. The COV is concerned that the very high Program Officer workload relative to other divisions in the GEO directorate compromises the Program Officer's ability to interact with the community and can cause Program Officer burnout with subsequent lowering of Program standards.

Comment. As noted by the COV, EAR has recently received and greatly appreciates the increase in personnel which has provided some welcome relief to the workload issue. Nevertheless, by any measure of Program Officer workload, EAR still has a long way to go to catch up with the other divisions in the GEO directorate and we are hopeful that enough progress will continue to be made to enable EAR to maintain its high review standards and morale.

Action. EAR will continue to explore options to bring EAR Program Officer workloads to reasonable levels.

Size and Makeup of Panels

The COV encourages the continuation of having a younger career person serve on a panel for one round, and recommends that the size of panels be increased by one, especially in PH, CH, and TE, to increase the disciplinary diversity.

Comment. The composition of the panel is primarily decided by the Program Officers in consultation with Division management. The experimental practice of including a younger career scientist in a panel for one round seems to be valuable for both the panel and for the young scientist's experience without negatively impacting that person's research and teaching that is critical to tenure decisions. EAR also notes the COV's recommendation to increase the panel size to improve disciplinary diversity. Although it is our experience that a panel's effectiveness might be compromised by having too many discussants on a proposal, we will continue to strive to maintain a balance of a panel's disciplinary breadth.

Action. Program Officers in the three programs mentioned have already requested and been granted an increase in panel size for the current review cycle.

Career Proposals

The COV encourages the stimulation and funding of more CAREER proposals. However, they question the dependence of the PECASE program eligibility on a CAREER proposal submission as outlined in the following:

CAREER awards require excellent science and a well developed education and/or outreach component. They are a prerequisite for receiving a PECASE award which is given for showing exceptional potential for leadership at the frontiers of knowledge. Many exceptional young scientific leaders are concentrating on pushing scientific frontiers, not integrating such research with education and outreach. Thus many deserving PECASE awardees are overlooked, and we question the reason for the prerequisite.

Comment. EAR and the entire GEO directorate have been examining our response to the CAREER program. In agreement with the COV recommendation, we have concluded that more CAREER awards should be encouraged.

Action. A GEO-wide mechanism will be determined for the means by which CAREER proposals will be increased. The COV questioning of the connection between the CAREER program and PECASE awards will be transmitted to the appropriate NSF management.

EarthScope Education and Outreach

The COV notes the potential of EarthScope for furthering Earth science education and outreach goals, especially for enticing underrepresented minorities to the Earth sciences. Specific suggestions are to install EarthScope instruments on K-12 school grounds and integrate the big picture science and data collection with the school's science curriculum.

Comment. These are excellent ideas. Some instrumentation is already being planned on school grounds where it makes sense.

Action. These suggestions will be passed on to the EarthScope sitting and E&O groups.

Cyberinfrastructure

The COV notes:

Better cyberinfrastructure is needed - i.e. more funding for cyberinfrastructure and for more permanent, stable platforms (homes) for databases, software, etc. that are being developed as part of Geoinformatics and other NSF ITR and cyberinfrastructure programs.

Comment. The need for cyberinfrastructure is a major NSF-wide concern and has resulted in the establishment of a new Office of Cyberinfrastructure that reports directly to the NSF Director. EAR has long recognized the community's cyberinfrastructure needs and has created a new funding line for this activity that now resides in the Instrumentation and Facilities Program. Our community is in the forefront of this issue with many successful proposals to the NSF-wide ITR program, including the GEON and SCEC ITR-Large grants.

Action. We will continue support for cyberinfrastructure as our budget permits.

Budgets for MREFC Science and Operations versus Core Programs

The COV notes:

The difficulty in meeting science budget needs for MREs such as EarthScope in times of flat or declining budgets. It would be a shame to not take the full advantage of the MRE facilities, but it should not be at the expense of core programs where the innovation and ideas are generated that advance the science and lead to MRE proposals.

Comment. The recent flattening of the NSF budgets is making balanced support of the MREFC facilities and research programs a difficult task. Numerous community workshops, Academy studies, and more recently the GEO Advisory Committee deliberations have affirmed the importance of EarthScope and other ongoing MREFC facility efforts for providing the foundation of the next generation's transformational science.

Action. Although we do not know from year to year what our budget will be, we will try to maintain the promise of EarthScope and at the same time maintain the health of the core Earth science programs.

RECOMMENDATIONS DIRECTED TO INDIVIDUAL PROGRAMS

The following responses only address those COV comments that bear on the general health of each program, and that are not addressed above in "Division-wide Issues".

Geophysics (PH)

The COV notes that the diversity of science supported by PH is a strength that allows the Program Directors to respond rapidly to the evolving needs of the scientific community and to take advantage of emerging scientific opportunities. The Program Officers are flexible and creative in working with other Programs to co-review and co-fund proposals where appropriate and this proactive approach has provided encouragement to interdisciplinary projects. Workload has improved with the addition of a third Program Director. Suggestions for disciplinary expansion of the PH panel are addressed above. PH is one of the few programs in any agency that addresses deep Earth research and we concur that the program is well-run and producing excellent science.

Petrology and Geochemistry (CH)

The COV finds that the CH program continues to be consistently well run as a model program. The Program Officers are energetic, leverage funds with other NSF programs, and stimulate diversity and international collaborations. Recent upgrade of the second Program Officer position from an IPA to a permanent position has improved workflow issues that were especially difficult during searches for replacement IPAs. EAR agrees that the quality of the science produced by CH is superb.

Tectonics (TE)

The COV for the previous period, FY 1999-FY 2001, identified major problems in the management of the Tectonics Program. In the FY 2002-FY 2004 period of this review, the COV finds that all significant management problems have been solved. The current Program Officers are conducting a superbly managed program. In the COV's words:

The outstanding management of this program can be seen in the statistics related to proposal dwell time, number of mail reviews received/proposal, the selection of reviewers and panel members, the wide range of high-quality, innovative projects funded, the meticulous Program Director comments and review analysis, and the strong interactions with other Program Directors.

The COV notes some possible improvements through more complete panel summaries, and more reviews for panelists' proposals that are reviewed by mail only. Also, in the cases of support for international fieldwork proposals, Program Officers should encourage (or better document) international collaborations in the respective countries.

Action. Panel summaries will be improved with the recent increase in panel size. Efforts will be increased to obtain more mail-only reviews and encourage or document international collaborations.

Continental Dynamics (CD)

The COV notes that the CD Program has a unique strength in addressing complex questions that require diverse expertise, large multidisciplinary collaborations, long-term planning and substantial funding. The COV finds:

Many of these projects are conducted internationally, adding complexity to the planning and execution and a potential ambassadorial role for scientists. For example, Continental Dynamics demonstrated agility in responding and participating in a multinational study of the collapse of the dome of the Montserrat Volcano. A particularly precious consequence of the global scope of Continental Dynamics is the story of the development of a strong cultural exchange between people in Northern California and a small town (in) Nepal. These opportunities are priceless in displaying Americans at their best to the world.

CD has been especially effective in outreach activities involving sponsored films, for example on scientific drilling and on field work in Tibet, that document showcase projects for public support and awareness.

The COV suggests CD improvement in soliciting reviews by international scientists familiar with an foreign area of field investigation, better documentation and transmittal of pre-proposal results to PIs, and more encouragement of potential investigators to incorporate early career PIs in projects. The COV also

recommends that the CD panel not have as members PIs that have submitted a pre-proposal or proposal that is being considered by that panel, and that panelists be limited to 3-year terms.

Action. The 3-year term limit of panelists and selection of panelists that do not have a proposal under consideration are suggestions that have already begun to be implemented in the CD Program. The Program will increase its efforts to incorporate more international reviewers, improve pre-proposal communication to PIs, and encourage PIs to incorporate early career scientists.

EarthScope (ES)

The ES science program had just one year of initial operation during the FY 2002-FY 2004 period of COV review. The COV notes that this first round of proposal support was necessarily directed more towards “service” activities or preparatory activities for facility construction as opposed to more weighting on scientific merit in these early stages. The COV anticipates that the future rounds will evolve towards more science, education and outreach utilizing EarthScope data.