

**FY 2006 Report
Directorate for Geosciences (GEO)
Committee of Visitors for Geosciences Education and
Diversity Programs**

**Date of the COV: January 31-February 2, 2007
Program: GEO Education and Diversity programs**

Committee Membership:

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1.0 PROCESS

The Committee of Visitors (COV) for the Directorate for Geosciences Education and Diversity (E&D) Programs met at the National Science Foundation (NSF) Headquarters on January 31-February 2, 2007. The meeting began with introductions by Art Goldstein, Director of the Earth Sciences Division, and a review of the charge for the COV by Jarvis Moyers, Acting Assistant Director for Geosciences, and a briefing on NSF conflict of interest policy by Marge Cavanaugh, Deputy Director for Geosciences. Jill Karsten provided a comprehensive overview of the GEO E & D Program portfolio that included a review of the 2003 COV recommendations and subsequent NSF responses to the recommendations, programmatic procedures and actions during 2003-2006, and challenges for FY07 and beyond. Subsequent presentations by Lina Patino, Paul Filmer, and Jill Karsten provided programmatic details for each element of the GEO E&D portfolio: Geosciences Education (GEOEd), Opportunities for Enhancing Diversity in the Geosciences (OEDG), Earth Sciences Education and Human Resources (ESEHR), Digital Library for Earth System Education (DLESE), Global Learning and Observations to Benefit the Environment (GLOBE), and Geosciences Teacher Training (GEO-Teach). Detailed materials on major program elements, relevant cross-directorate activities, and specific issues were provided in meeting materials and on a website with links to background information on programs and outcomes.

Following the summary presentations, the COV devised a strategy for responding to the Charge to the Committee of Visitors: a) review of the actions taken by GEO E & D programs related to education and diversity during the fiscal years 2003-2006; b) evaluate the products and contributions of these activities over this period; and c) review and comment on the efficacy of GEO E&D's activities as a whole and recommend a future course. A template was provided to guide the COV report and served as the basis for much of the report included herein. Based on the Charge to the Committee and the report template, this report is divided into 4 major sections. Section 1 describes the GEO E&D COV review process. Section 2.0 provides an overview of the COV's findings. Detailed information on the integrity and efficiency of individual program's processes and management is provided in the COV Template (Part A). Section 2.0 examines the Directorate-wide outputs and outcomes with respect to NSF goals and mission and Section 3.0 presents a detailed list of suggestions for improvement of existing individual programs. Section 4.0 examines how the COV perceived NSF-wide issues and provides suggestions for addressing GEO E&D issues.

The review of the efficiency and integrity of each individual program's processes and management (Part A of the NSF template) was carried out by three subcommittees of the COV. Detailed examination of available jackets (or subsets for the larger programs) for many of the

programs in the GEO E&D portfolio of education and diversity programs were conducted. The subcommittee assignment included GeoEd, GEO-Teach, OEGD, ESEHR, and GLOBE. Within these broad categories several smaller program elements were reviewed, such as Research Experiences for Undergraduates (REU). This process produced recommendations for improvement of existing programs as well as suggestions for addressing Geosciences Directorate- and NSF-wide issues.

As the charge to the COV was beyond the scope of what could be accomplished in the allotted time, the COV recommends to the Directorate that the Geosciences Education Working Group be continued in future years with the goal of providing strategic advice on program opportunities. Discussions with NSF staff indicated that the next few years will be a period of intense strategic visioning and planning for GEO E&D, the Geosciences Directorate, and in other closely related units of NSF.

2.0 OVERVIEW OF FINDINGS

The current GEO E&D leadership team has the professional expertise, programmatic experience, and community support necessary to nurture and sustain an innovative portfolio of GEO E&D programs that spans the educational continuum from kindergarten through post-graduate work. Significant GEO E&D funding limitations are the only factor that may restrict the future growth of an increasingly important suite of education and diversity projects. NSF and the Geosciences Directorate are to be commended for the progress that has been made in recruiting a GEOE&D leadership team that will ensure the academic excellence and diversity of the next generation of students in the geosciences and geosciences professionals. Enhancing the quality of geosciences education in K-12 also contributes to the national need for increasing student interest in all areas of science, technology, engineering, and mathematics.

2.1 Integrity and Efficiency of Processes

The COV found the GEO E&D programs' processes and management to be exemplary. Differences among individual program elements, both in process and management, seem to reflect a true need for different approaches necessary to achieving optimal outcomes. An especially commendable aspect of the review process across the GEO E&D program elements reviewed was the typical professional, friendly and respectful tone of program officers in responding to PIs (email, panel summary, etc.). The COV did observe a few proposal jackets that did not include any record of the PO's communications with the P.I. In other jackets there was an extensive record of the dialogue between the PO and the PI. Overall, the mechanics of the process, including selection of reviewers and the path to decision making, seemed on the whole fair, efficient and effective. The COV recognizes that PO's aim to include reviewers with a broad range of expertise and backgrounds in review processes. However, because reviewer information is not available to the COV, we cannot judge accurately how effective the reviewer selection process is in terms of disciplinary expertise. Individual program portfolios appear balanced, the majority including adequate numbers of innovative and high-risk proposals, appropriate geographic and institutional mixes and a balance of new and established PIs. Program management is perceived to be responsive and dedicated to excellence.

The COV discovered examples of inconsistency in effective response provided from reviewers, particularly panelists (as reflected in the panel summary), as to the application of the Merit Review Criterion 2, Broader Impacts. As recommended by the 2003 COV this aspect of

the review could be helped by examples of effective activities that accomplished Broader Impacts, more specific instructions to the reviewers and panelists, a more active role by program officers in emphasizing the requirement, and modification of the template for panel reviews to include two boxes – one for each criterion. Another concern is the inconsistent response to declined proposals with regard to encouraging or discouraging resubmission. Not all declined proposals should be recommended for resubmission, but a certain number of proposals are declined simply due to lack of available funding, or a deficit in an area that could be readily addressed. The current decline letter template does not encourage program officers to provide detailed feedback or advice regarding opportunities for improvement, and/or encouraging PIs to call their program officer to discuss the potential of revising the proposal for resubmission. Finally, there is the problem of overly terse and/or negative reviews. Reviewers should be instructed to consider the review process as an opportunity for mentoring colleagues and building a stronger national community of geoscience educators and researchers.

2.2 Outputs and Outcomes

The COV did not see evidence that 2003-2006 GEO E&D Programs were highly influenced by the previous NSF strategic plan and its outcome goals. The COV was provided a few example nuggets of projects that represented successful outcome goals for several specific areas of the three broad *People, Ideas, and Tools* outcome categories. Time limitations did not allow the COV to investigate this subject in any detail.

The COV commends the NSF and Geosciences Directorate for their continuing efforts in crafting a strategy to address strategic goals, in particular for the increasing effort they are making across the GEO portfolio of education and diversity programs to fund projects that directly enhance opportunities for participation of underrepresented groups. However, the recommendation of the 2003 COV that GEO E&D thoroughly investigate pathway/pipeline issues remains relevant. The 2007 COV did not find significant engagement of tribal universities, community colleges, and other important Minority Serving Institutions (MSI's) in GEO E&D programs, or applying to GEO E&D opportunities. GEO E&D, in close collaboration with EHR, should explore new opportunities to overcome barriers that prevent participation of MSI's in geoscience education and diversity programs.

3.0 PRIORITY RECOMMENDATIONS FOR IMPROVING EXISTING PROGRAMS

3.1 The COV recommends that the new GEO E&D leadership team consider initiating a dialogue with a wide range of current and potential stakeholders in the geosciences education community. The objective of the dialogue would be to shape a planning process, share NSF strategic goals relevant to the GEO E&D program, and explore opportunities for future initiatives. Special emphasis should be placed on a stakeholder driven plan for enhancing participation by a broader group of Minority Serving Institutions in GEO E&D programs.

3.2 The COV recommends that GEO E&D implement a more consistent and informative process for providing feedback on declined proposals, especially in cases where a lack of funding was the primary reason for the decline. This use of the proposal review process as an opportunity for

mentoring and continuous improvement will benefit the stakeholder community and geosciences education.

3.3 The issue of how to educate both proposal writers and reviewers about the NSF Broader Impacts criteria is a continuing challenge. The COV suggests that GEO E&D might consider using the following questions to assist the community in understanding some aspects of broader impacts:

- (a) Is there demonstration of a pipeline to facilitate educational and professional development of students in geosciences?
- (b) Does the project demonstrate an opportunity to gain support from sources other than NSF?
- (c) Is there broad enough participation and representation of minority groups?
- (d) Does the project provide a good test model to be replicated?

3.4 The COV recommends that every effort should be given to insuring that the disciplinary diversity of reviewers be an appropriate match to the content of multidisciplinary proposals.

3.5 The REU program would benefit from some degree of standardization in the program evaluation process.

3.6 The COV recommends a comprehensive review and reconsideration of the goals and implementation of the GeoTeach program. In its current form the program is expected to have a transformative effect on geosciences education. However, it's not clear which aspects of geosciences education GeoTeach aims to transform. For example, if increasing the number of qualified geosciences teachers is a program goal, then it seems that program guidance should recommend demonstration projects that focus on scaling-up strategies with the potential to achieve a transformative impact.

4.0 GEO DIRECTORATE ISSUES

The GEO E&D program appears to be attracting a growing number of proposals. The recommendations of this COV encourage program officers to spend considerable time developing and implementing strategies that will enhance the participation of additional Minority Serving Institutions in GEO E&D programs. The additional time and workload generated by the recommended activities, combined with the increasing demands of cross-directorate and interagency committees and activities, will require additional staff support for GEO E&D to maintain a six month proposal processing time.

The Geosciences Directorate would benefit from having a single document that describes the rational and distribution for the total investment in education activities. Is GEO E&D a large or small fraction of the total Geosciences Directorate investment in education? Is the current balance of investments in education in various program elements appropriate to the goals of the new NSF strategic plan? Given the fundamental need to enhance the diversity in the geosciences, it may be appropriate to reconsider how to allocate and distribute education funds across the Directorate to better accomplish this urgent challenge.

**FY 2007 REPORT TEMPLATE FOR
NSF COMMITTEES OF VISITORS (COVs)**

The table below should be completed by program staff.

Date of COV: January 31 – February 2, 2007			
Program/Cluster/Section: Geosciences Education Programs			
Division: Office of Assistant Director (OAD) and Earth Sciences (EAR)			
Directorate: Geosciences			
Number of actions reviewed: Awards:		Declinations: Other:	
Total number of actions within Program/Cluster/Division during period under review:			
Awards: 239	Declinations: 401	Other: 18	
Manner in which reviewed actions were selected:			

PART A. INTEGRITY AND EFFICIENCY OF THE PROGRAM'S PROCESSES AND MANAGEMENT

Briefly discuss and provide comments for *each* relevant aspect of the program's review process and management. Comments should be based on a review of proposal actions (awards, declinations, and withdrawals) that were *completed within the past three fiscal years*. Provide comments for *each* program being reviewed and for those questions that are relevant to the program under review. Quantitative information may be required for some questions. Constructive comments noting areas in need of improvement are encouraged.

A.1 Questions about the quality and effectiveness of the program's use of merit review procedures. Provide comments in the space below the question. Discuss areas of concern in the space provided.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCEDURES	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE¹
1. Is the review mechanism appropriate? (panels, ad hoc reviews, site visits)	Yes and No

¹ If "Not Applicable" please explain why in the "Comments" section.

<p>Comments:</p> <p>GeoEd: The overall process of using a mix of panels and ad-hoc reviews (no site visits in this period) seems appropriate to the GeoEd program. However, we are concerned that in past years there was often a total overlap in the ad hoc reviewers and the panel members. The COV was pleased to learn that the current Program Officer stated that in 2006 at least 4 ad hoc reviews were solicited in addition to reviews by panel members.</p> <p>EAR-EHR: The COV noted examples in previous reviews of the DLESE and REU programs where a broader community of reviewers would have been preferred. Ad hoc reviews are especially important to insuring better scientific oversight of the REU projects.</p> <p>GeoTeach: The review mechanism for GeoTeach did include four or more reviewers. Unfortunately, some of the reviews received were too brief to provide a useful analysis of the strengths and weaknesses of the proposed project. This issue is not under the control of the Program Officer, but does further illustrate the value of having a minimum of four reviewers per proposal.</p> <p>OEDG and GLOBE: The review processes for these programs seemed appropriate. However, the often disappointing response to requests for reviews illustrates that the relatively small community of geoscience educators is feeling overburdened.</p>	
<p>2. Is the review process efficient and effective?</p> <p>Comments:</p> <p>The COV was unable to suggest changes that would significantly change the NSF overall review process. Properly implemented by the Program Officer and reviewers the process has high regard in the scientific community. Questions can be raised about metrics used to judge efficiency and effectiveness and about a few specific actions in past review processes. However, the review processes observed by this COV were generally implemented in an efficient and effective manner. It seems that more specific guidance to reviewers on how to address NSF review criteria (especially the Broader Impacts criteria) would be valuable to enhancing the quality of reviews received. It is also important that reviewers always use information on programmatic goals as stated in the call for proposals in their assessment.</p>	Yes
<p>3. Do the individual reviews (either mail or panel) provide sufficient information for the Principal Investigator(s) to understand the basis for the reviewer's recommendation?</p>	Yes, with reservation

<p>Comments:</p> <p>The quality of reviews was variable, but generally found to be satisfactory in terms of the justification provided for an overall evaluation. However, exceptions were noted where a reviewer would score a proposal as "good" without noting any negative findings. Continued diligence should be paid to ensuring that reviewers are made aware of NSF review criteria and what ratings mean in terms of proposal strengths and weaknesses.</p>	
<p>4. Do the panel summaries provide sufficient information for the Principal Investigator(s) to understand the basis for the panel recommendation?</p> <p>Comments:</p> <p>Panel summaries typically provide sufficient information for the PI's by synthesizing the results of the individual reviewers' comments. However, to be most useful the panel summary information should be clearly be organized and labeled as "intellectual merit" and "broader impact" as well as "additional comments."</p>	<p>Yes, with reservation</p>
<p>5. Is the documentation for recommendations complete, and does the program officer provide sufficient information and justification (a) for her/his recommendation? (b) for the Principal Investigator(s)?</p> <p>Comments:</p> <p>(a) Yes, the PO provides sufficient information and justification for his/her recommendation and this justification is outlined on the Review Analysis.</p> <p>(b) No, the grading system does not always correlate well with funding decisions (e.g., two of the GeoEd proposals were rated E,E,E and "Fund", but were declined). Often the PO points out concerns that are not captured by the Panel or Reviewers' comments. The PI only has access to the comments of the Panel and Reviewer after a decline. This means that the justification provided by the PO on the Review Analysis is not communicated to the reviewer; although the reviewer can email or call the PO if desired. The declination letter is a generic form letter and should be modified to contain sufficient justification for PI's to understand reasons for decline.</p> <p>It appears to be up to the PI to email the PO when a proposal comes back "Not Funded" but the reviews and panel recommendations are E,E,E and "Fund". It is our opinion that the PO justifications for "Not Fund" should be communicated to the PI in the official letter of declination. If this is not possible all PO communications via e-mails should be documented in the e-jacket.</p>	<p>(a) Yes (b) No</p>

<p>6. Is the time to decision (dwell time) appropriate?</p> <p>Comments:</p> <p>Six months is an appropriate dwell time. For 2006, the dwell time of 8.6 months was due to an anomalous backup of programmatic solicitations and review processes. The COV was only concerned that the dwell time seemed to be creeping up in the REU program, where timing of recruiting students for summer programs is essential to success.</p> <p>The COV notes that that in the case of Geoscience Education Programs the PO's deal with a large and highly diverse number of proposals. Thus, this workload may require additional staff member to realistically maintain a goal of a six month dwell time.</p>	<p>Yes</p>
<p>7. Additional comments on the quality and effectiveness of the program's use of merit review procedures:</p> <p>The COV recommends that external reviewer comments, panel comments, and program recommendations on proposals should be focused around the following key ideas (categorized as broader impacts or intellectual merit):</p> <p>Broader impacts:</p> <ol style="list-style-type: none"> 1) Is there demonstration of a pipeline to facilitate educational and professional development of students in geosciences? 2) Does the project demonstrate an opportunity to gain support from sources other than NSF? 3) Is there broad enough participation and representation of minority groups? 4) For Track 1 proposals, does the project provide a good test model to be replicated? <p>Intellectual merit:</p> <ol style="list-style-type: none"> 5) Is adequate sensitivity and cultural awareness of the target group demonstrated? 6) Is there effective involvement of the geosciences community? 7) Has support for the project within the institution and collaborating institutions been demonstrated? 8) Are there sufficient and specific metrics to evaluate project performance? 9) Are specific tasks adequately described and well related to project objectives? 10) Are project resources allocated efficiently? <p>For nearly every program reviewed by this COV that did not receive funding, at least one of the above specific criteria was not met. Directing reviewers to focus on these specific elements (perhaps even by a rank score per item) would enhance the proposal submission and review process. We also recommend that the above list of key ideas be incorporated into the existing descriptions of broader impacts and intellectual merit that are made available to proposal developers and reviewers.</p>	

A.2 Questions concerning the implementation of the NSF Merit Review Criteria (intellectual merit and broader impacts) by reviewers and program officers.

Provide comments in the space below the question. Discuss issues or concerns in the space provided.

IMPLEMENTATION OF NSF MERIT REVIEW CRITERIA	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE ²
<p>1. Have the individual reviews (either mail or panel) addressed both merit review criteria?</p> <p>Comments:</p> <p>The COV found that in most cases the reviewers addressed both merit review criteria. Comments on broader impacts are typically more general and of less value to decision making. Defining a process for evaluating broader impacts remains a challenge for both the community and for NSF staff. Our findings show that in most cases, adequate feedback is provided in the reviews that will help strengthen or improve future proposals and/or funded research.</p>	Yes.
<p>2. Have the panel summaries addressed both merit review criteria?</p> <p>Comments:</p> <p>Panel Summaries reviewed by the COV do not consistently address both review criteria explicitly. Headings should be used in the Panel Summaries, just as they are in the individual reviews.</p>	Not in a consistent manner
<p>3. Have the <i>review analyses</i> (Form 7s) addressed both merit review criteria?</p> <p>Comments:</p>	Yes, with minor exceptions

² In "Not Applicable" please explain why in the "Comments" section.

<p>The COV found that in most cases reviewed the Form 7s did address both merit review criteria very thoroughly. However, in the case of GeoEd proposals from past competitions, there were examples of Form 7s that did not address both merit review criteria explicitly. Headings in bold should be used to address both criteria in the Review Analysis.</p>	
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4. Additional comments with respect to implementation of NSF's merit review criteria:

More guidance should be given in the "Broader Impact" category as to what would qualify as a minimum broader impact. See A.1-7 above.

A.3 Questions concerning the selection of reviewers. Provide comments in the space below the question. Discuss areas of concern in the space provided.

SELECTION OF REVIEWERS	YES , NO, DATA NOT AVAILABLE, or NOT APPLICABLE ³
<p>1. Did the program make use of an adequate number of reviewers?</p> <p>Comments:</p> <p>The COV appreciates the challenge in selecting and obtaining reviews from qualified scientists. However, there are examples in past reviews of inadequate reviewer input to the decision process. We recommend that a combination of ad hoc and panel reviews be used for evaluation whenever feasible. In cases where the review process does not use a panel, we recommend a minimum of 3-4 ad hoc reviews. It is especially important to utilize more than 3 reviewers for large proposals (e.g., GeoTeach, OEDG-Track 2).</p>	<p>Yes, in most cases</p>
<p>2. Did the program make use of reviewers having appropriate expertise and/or qualifications?</p> <p>Comments:</p> <p>The COV is unable, in many cases, to assess the qualifications of the reviewers. Although the reviewers' answers were sufficient in most cases, there is not enough information provided to the COV about reviewers' specific backgrounds to answer the question of whether or not the reviewers have the appropriate expertise. Another column could be added to the reviewers' information that lists their degree, area of specialization, etc.</p>	<p>Data not available</p>
<p>3. Did the program make appropriate use of reviewers to reflect balance among characteristics such as geography, type of institution, and underrepresented groups?⁴</p> <p>Comments:</p> <p>The COV is not able to determine the ethnicity of reviewers. We are aware that</p>	<p>Data not available</p>

³ If "Not Applicable" please explain why in the "Comments" section.

⁴ Please note that less than 35 percent of reviewers report their demographics last fiscal year, so the data may be limited.

<p>the current PO's are very dedicated to achieving an equitable and balanced review process. Our sample cases did suggest that smaller institutions and some underrepresented groups (e.g., high school teachers, community colleges, and Tribal colleges and universities) may be under-utilized.</p>	
<p>4. Did the program recognize and resolve conflicts of interest when appropriate?</p> <p>Comments:</p> <p>The COV found that the current GEO E&D PO's pay very careful attention to any potential conflicts of interest. COV members have found this to be the case in every area of NSF where members have had participated in review activities.</p>	<p>Yes</p>
<p>5. Additional comments on reviewer selection:</p> <p>The COV finds GEO E&D Programs face a unique challenge in the breadth of reviewer diversity necessary to conduct a comprehensive review process. In the past, reviewers sometimes appear to have been selected for their pedagogical expertise, with an eye to disciplinary diversity on each panel. Nevertheless, given the enormous breadth of disciplines, it is impossible to achieve adequate diversity on a small panel – and proposal numbers do not warrant larger panels. Furthermore, reviewers with keen pedagogical understanding are not necessarily comparably strong in their scientific disciplines. It's hard to be expert in both. This can be mitigated by using ad hoc reviews specifically to elicit solid reviews of intellectual merit from disciplinary experts. The panel can then focus more on pedagogy.</p>	

A.4 Questions concerning the resulting portfolio of awards under review. Provide comments in the space below the question. Discuss areas of concern in the space provided.

<p align="center">RESULTING PORTFOLIO OF AWARDS</p>	<p align="center">APPROPRIATE, NOT APPROPRIATE⁵, OR DATA NOT AVAILABLE</p>
<p>1. Overall quality of the research and/or education projects supported by the program.</p> <p>Comments:</p> <p>GeoEd: Of the projects reviewed, the reviewers gave the PI's high marks. In this program the COV did not have sufficient data to fully answer the question of overall program quality. However, the projects reviewed have the potential for impacting pedagogical practices in classrooms if they are successful.</p> <p>DLESE: The COV found no clear basis for the projects selected for the DLESE portfolio. The impression was that the portfolio includes a mix of some very high quality and some of dubious value.</p> <p>GeoTeach & OEDG: (see additional comments below)</p> <p>The overall quality of the REU and GLOBE programs was appropriate.</p>	<p>Appropriate, with possible minor exceptions</p>
<p>2. Are awards appropriate in size and duration for the scope of the projects?</p> <p>Comments:</p> <p>GeoEd & OEDG: The COV recommends that the PO review the current balance between Track 1 and 2 funding. The Track 1 awards may not have sufficient funding and time to establish metrics that allow for determining likely future success.</p>	<p>Appropriate</p>
<p>3. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Innovative/high-risk projects?⁶ 	<p>Data not available</p>

⁵ If "Not Appropriate" please explain why in the "Comments" section.

<p>Comments:</p> <p>Based on the data available, it is difficult for the COV to determine if projects are innovative/high risk. The COV would suggest that adjusting the funding portfolio to increase the number of Track I awards might enhance opportunities for innovation.</p>	
<p>4. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Multidisciplinary projects? <p>Comments:</p> <p>The balance of multidisciplinary projects seemed appropriate in all of the materials examined by the COV.</p>	<p>Appropriate</p>
<p>5. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Funding for centers, groups and awards to individuals? <p>Comments:</p> <p>The COV finds an appropriate portfolio balance in most cases. However, in the case of GeoEd the available data did not specify the characteristics of participants in each award. In the OEDG program there is a need to place additional emphasis on broadening the participation of MSI's and community colleges.</p>	<p>Appropriate, with exceptions</p>
<p>6. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Awards to new investigators? <p>Comments:</p> <p>The COV finds that new investigators are well represented in awards in the overall Geoscience Education Program. However, new investigators seemed underrepresented in the OEDG program due to the low number of Track I proposals that were funded.</p>	<p>Appropriate, with exceptions</p>

⁶ For examples and concepts of high risk and innovation, please see Appendix III, p. 66 of the Report of the Advisory Committee for GPRA Performance Assessment for FY 2005, available at <www.nsf.gov/about/performance/reports.jsp>.

<p>7. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Geographical distribution of Principal Investigators? <p>Comments:</p> <p>The COV examined the map of awards for 2003-2007 and found an appropriate overall geographical balance. However, there are relatively few awards in several programs. The result is that PI's from MSI's can be highly underrepresented in states with large populations of Hispanic and African American citizens.</p>	<p>Appropriate, but could be improved</p>
<p>8. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Institutional types? <p>Comments:</p> <p>The COV recommends that PO's increase efforts to encourage PI's from institutions that are not research intensive Ph.D. institutions. This will require special efforts such as campus visits, mentoring of potential PI's, and facilitating of partnerships between established research institutions and those institutions primarily dedicated to teaching.</p>	<p>Appropriate, with exceptions</p>
<p>9. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Projects that integrate research and education? <p>Comments:</p> <p>The COV did not find evidence of imbalances in the integration of research and education. However, for some projects the time available for our assessment and limited data precluded a through investigation.</p>	<p>Appropriate</p>
<p>10. Does the program portfolio have an appropriate balance:</p> <ul style="list-style-type: none"> • Across disciplines and subdisciplines of the activity and of emerging opportunities? <p>Comments:</p> <p>The COV finds an appropriate balance of disciplines and subdisciplines in the GEO E&D Programs. It will always be the case</p>	<p>Appropriate</p>

<p>that more could be done to reach across disciplinary boundaries. In GEO E&D one example would be to encourage more effective integration of Native American traditional knowledge and strategies for adaptation to environmental variability.</p>	
<p>11. Does the program portfolio have appropriate participation of underrepresented groups?</p> <p>Comments:</p> <p>The COV notes that in the GeoEd 2005 competition, 17 minority PI's submitted proposals but all were declined. However, in the overall suite of GEO E&D Programs underrepresented groups have a good track record of success in receiving awards. As stated previously, our primary concern is that NSF is not reaching the MSI's where most underrepresented groups are enrolled. This challenge is an NSF-wide issue and may be appropriate for consideration as an National Science Board study.</p>	<p>Appropriate, but could be improved</p>
<p>12. Is the program relevant to national priorities, agency mission, relevant fields and other customer needs? Include citations of relevant external reports.</p> <p>Comments:</p> <p>The COV finds that GEO E&D Programs directly support many of the recommendations by the American Competitive Initiative (ACI) and Rising Above the Gathering Storm report. In fact, the COV recommends that GEO consider an increase in the funding allocated to education as a percentage of the total Directorate budget. The Geosciences have the lowest participation of minorities of any science and engineering area supported by NSF. In the long-term excellence and creativity in research will only be sustained by increasing the diversity of the Geosciences workforce.</p>	<p>Appropriate</p>
<p>13. Additional comments on the quality of the projects or the balance of the portfolio:</p>	

A.5 Management of the program under review. Please comment on:

1. Management of the program.

Comments:

The COV has great respect for the current GEO E&D staff. NSF is to be especially congratulated for recruiting Jill Karsten into a career position as GEO Program Director for Diversity and Education. We expect this GEO E&D team to shape and implement a program that will serve our nation's need for a skilled geosciences workforce and educated public in the 21st century.

2. Responsiveness of the program to emerging research and education opportunities.

Comments:

The program solicitations generally encourage innovative ideas and direct attention to emerging research needed to solve important priority issues.

3. Program planning and prioritization process (internal and external) that guided the development of the portfolio.

Comments:

What is the vision guiding the overall portfolio for education in the Geosciences Directorate?

4. Additional comments on program management:

PART B. RESULTS OF NSF INVESTMENTS

NSF investments produce results that appear over time. The answers to the first three (People, Ideas and Tools) questions in this section are to be based on the COV's study of award results, which are direct and indirect accomplishments of projects supported by the program. These projects may be currently active or closed out during the previous three fiscal years. The COV review may also include consideration of significant impacts and advances that have developed since the previous COV review and are demonstrably linked to NSF investments, regardless of when the investments were made. Incremental progress made on results reported in prior fiscal years may also be considered.

The following questions are developed using the NSF outcome goals in the NSF Strategic Plan. The COV should look carefully at and comment on (1) noteworthy achievements of the year based on NSF awards; (2) the ways in which funded projects have collectively affected progress toward NSF's mission and strategic outcomes; and (3) expectations for future performance based on the current set of awards. NSF asks the COV to provide comments on the degree to which past investments in research and education have contributed to NSF's progress towards its annual strategic outcome goals and to its mission:

- To promote the progress of science.
- To advance national health, prosperity, and welfare.
- To secure the national defense.
- And for other purposes.

Excellence in managing NSF underpins all of the agency's activities. For the response to the Outcome Goal for Organizational Excellence, the COV should comment, where appropriate, on NSF providing an agile, innovative organization. Critical indicators in this area include (1) operation of a credible, efficient merit review system; (2) utilizing and sustaining broad access to new and emerging technologies for business application; (3) developing a diverse, capable, motivated staff that operates with efficiency and integrity; and (4) developing and using performance assessment tools and measures to provide an environment of continuous improvement in NSF's intellectual investments as well as its management effectiveness.

B. Please provide comments on the activity as it relates to NSF's Strategic Outcome Goals. Provide examples of outcomes as appropriate. Examples should reference the NSF award number, the Principal Investigator(s) names, and their institutions.

B.1 OUTCOME GOAL for PEOPLE: Developing "a diverse, competitive and globally engaged workforce of scientists, engineers, technologists and well-prepared citizens."

Comments:

The GEO E&D programs are a crucial element of preparing the future workforce for the geosciences community in America and beyond. The Achilles' Heal is the very slow

progress in enhancing diversity of the geosciences community. According to data the COV reviewed only 313 Hispanic Americans, 135 African Americans and 49 Native Americans having earned Ph.D.s in any of the geosciences during the period 1973-2003. In 2003, the non-Caucasian graduate enrollment in Earth, Atmospheric and Ocean Sciences was at 5.6% of total (817 students). NSF aspires to play a significant role in the effort of addressing this challenge, but more focus needs to be put on developing a comprehensive long-term plan for achieving the goal of diversity in the geosciences. It is not clear what overall target goal has been set and how the programs in the portfolio work together to achieve it. The COV has provided numerous recommendations in the above sections of the template which are relevant to improving performance on this outcome goal.

B.2 OUTCOME GOAL for IDEAS: Enabling “discovery across the frontier of science and engineering, connected to learning, innovation, and service to society.”

Comments:

The GEO E&D program provided several examples of funded projects that have achieved significant success in connecting discovery, learning, innovation, and service to society.

B.3 OUTCOME GOAL for TOOLS: Providing “broadly accessible, state-of-the-art S&E facilities, tools and other infrastructure that enable discovery, learning and innovation.”

Comments:

The GEO E&D programs provide funding for student and faculty research that often leads to tools and infrastructure crucial to discovery, learning and innovation in the geosciences.

B.4 OUTCOME GOAL for ORGANIZATIONAL EXCELLENCE: Providing “an agile, innovative organization that fulfills its mission through leadership in state-of-the-art business practices.”⁷

N/A to this COV

⁷ For examples and further detail on the Organizational Excellence Goal, please refer to pp. 19-21 of NSF's Strategic Plan, FY 2003-2008, at <http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf04201>. Please note that there will be a new Strategic Plan in FY 2007.

PART C. OTHER TOPICS

C.1 Please comment on any program areas in need of improvement or gaps (if any) within program areas.

What can NSF do to better promote minority PI's, new PI's, and smaller institutions to submit proposals? Is it possible to focus on population centers across the US that have high concentrations of underrepresented groups, and then to encourage geosciences centers and programs within that location? National requirements such as ACI and Rising Above the Gathering Storm indicate that we need more Americans studying science and this starts in K-12 classrooms, particularly in the middle school (6-8th grade); that is, we need more direct impact on teaching geosciences to elementary, middle, and high school students; this may include connecting faculty with schools to enhance STEM education directly or testing the effectiveness of geosciences pedagogy and content/curriculum materials in K-12 classrooms.

C.2 Please provide comments as appropriate on the program's performance in meeting program-specific goals and objectives that are not covered by the above questions.

The GeoEd solicitations typically provide very broad programmatic goals. It would be helpful to the community if the goals were accompanied with benchmarks (e.g. what does "increase the number of..." mean? Relative to what?) What are the goals we are striving for? Is it possible to set concrete goals to address program performance (e.g. number of publications for the year, number of students reached, etc.). For example, one goal of this program is to "improve geosciences education for all educational levels."

C.3 Please identify agency-wide issues that should be addressed by NSF to help improve the program's performance.

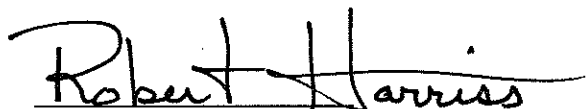
Agency-wide issues addressed in other sections include: (a) revising the decline letter so that it is more specific in the feedback to PI's, especially for PI's who do not receive funding; and, (b) formatting panel summaries and Review Analysis forms so that the merit review criteria are clearly addressed. Finally, we believe the grades (E, VG, G, F, P) given by reviewers are very subjective and lead to unnecessary complexity in ranking proposals. In addition, there seems to be little distinction between the grades of projects that get funded and those projects that do not get funded but are "Fund If Possible." How can the grading system better differentiate between these projects? Can it be standardized? We suggest that reviewers only be asked to provide text that addresses the merit criteria, and that panels provide a Fund, Fund If Possible, Do Not Fund recommendation. This may alleviate any problems caused by projects that receive all E's and VG's, but are not funded.

C.4 Please provide comments on any other issues the COV feels are relevant.

C.5 NSF would appreciate your comments on how to improve the COV review process, format and report template.

It would be useful to have a way to exchange electronic files between COV members during the COV meeting (as with panel reviews). We would also like to know which specific program(s) we will be responsible for reviewing before we come to the COV meeting. If we know the program we are assigned to, we can review the program solicitation, the program background materials, and programmatic data ahead of time so that we can better focus our preparation for the limited time available at the COV meeting.

SIGNATURE BLOCK:

A handwritten signature in black ink that reads "Robert Harriss". The signature is written in a cursive style with a long horizontal line extending from the end of the name.

Committee of Visitors for Geosciences Education and
Diversity Programs
Robert Harriss
Chair