

FY2013 COV Report
Directorate for Geosciences (GEO)
Geosciences Education and Diversity (GEO E&D) Programs:
Geoscience Education (GeoEd)
Opportunities for Enhancing Diversity in the Geosciences (OEDG)
Earth Sciences Education and Human Resources (EAR/EH)
Global Learning and Observations to Benefit the Environment (GLOBE)
Geoscience Teacher Training (GEO-Teach)
Date of the COV: 30-31 May 2013

Committee Membership:

George Hornberger (Vanderbilt University; Committee Chair)
Carmen Aguilar (University of Wisconsin – Milwaukee)
Diana Elder (Northern Arizona University)
Leon Johnson (CUNY Medgar Evers College)
Rebecca Haacker-Santos (UCAR)
Rhonda Spidell (Albuquerque Academy)
David Voorhees (Waubonsee Community College)
Talithia Williams (Harvey Mudd College)
Richard Yuretich (University of Massachusetts – Amherst)

Committee Charge

The COV was charged to:

- review actions taken by the programs during the fiscal years 2010-2012;
- evaluate the products and contributions supported and overseen by the programs over the three year period; and
- review and comment on the effectiveness of the programs, areas needing improvement, and recommend future courses for the programs.

With respect to proposal actions during the FY 2010 - 2012 period, the COV was asked to examine:

- the integrity and efficiency of processes used to solicit, review, recommend, and document proposal evaluation and actions, including the effectiveness of the program's use of NSF's two merit review criteria, and
- the relationship between decisions and program goals.

Procedures

The COV held a virtual meeting via webinar on 29 April 2013. Following introductions, Program Officer Jill Karsten presented material on the COV process. She reviewed the charge to the committee and a timetable for completion of the work of the committee. She then reviewed in detail the requirements of committee members to disclose conflicts of interest and to maintain strict confidentiality of all materials. Jill then went over directions for committee members to access the electronic materials for review.

Jill next reviewed the GEO Vision E&D Strategic Framework, the strategic goals that guided the program over the period covered by the review, and the portfolio approach used by GEO E&D. She covered the key issues for the program to address and she discussed the evaluation process for proposals, including avoidance of conflicts of interest in panelists and reviewers.

An overview of the program elements to be reviewed by the COV was presented by Jill and by Program Officer Lina Patino. Various statistics regarding each element were reported and highlights of work sponsored were summarized.

Following the webinar presentations, the COV was organized into three teams with assignments to review in detail certain elements. The COV members agreed that each team would have a conference call before the scheduled meeting at NSF in late May to determine if any issues had arisen that should be called to the attention of NSF staff so they could prepare additional information for the visit.

The COV met on 30 and 31 May 2013 to complete their review. The availability of material in electronic form ahead of the meeting time proved to be extremely beneficial. Each team had reviewed material and arrived at the meeting prepared to begin review activities right away. Following a brief introductory presentation by Jill Karsten to refresh memories about the committee charge and to give a few updates, the COV began work. Discussions and analyses by the three teams in separate meetings and by the entire COV in plenary sessions resulted in the evaluations contained in this report.

Overview of Findings

The current GEO E&D leadership team continues to demonstrate a high level of professional expertise, programmatic experience, and broad-based community support in nurturing and sustaining an innovative portfolio of programs. These programs span the educational continuum from informal education and K-12 through post-graduate work.

The COV found that the Programs comprising GEO E&D are very well managed, have balanced portfolios that address priority areas, show evidence of significant impact, and are very important to the Foundation's mission. Many programs (e.g., OEDG) are focused on the Earth

sciences and are critical for the Geosciences Directorate. The connections of the E&D programs to the geosciences research community are one of the keys to the success achieved.

The response to the previous COV demonstrates exemplary management; as one COV member put it, “this is the way things should be done.” The COV particularly notes that the response to the suggestion by the previous COV to make material available in electronic form before the physical meeting at NSF was acted on with great success. The use of electronic access to jackets and evaluation materials was extremely helpful to this COV. The approach made for a very efficient process. We also particularly commend the response to the recommendation of the previous COV to improve engagement with Community Colleges. The efforts made in response to this recommendation have been very productive and should be developed further. The COV has some suggestions for these in main body of the report template.

The Program Officers (PO’s) in GEO E&D have been quite effective in building an active community aimed at achieving the strategic goals of the program. We note that to realize truly “transformative” impacts require ‘staying the course’ for many years with focused programs with consistency. Despite serious funding limitations, the PO’s have managed to maintain consistency for many years and the COV hopes that this can continue into the future.

Priority Recommendations

These are uncertain times! It is imperative that GEO find a path in the new order that continues to address the critical workforce and education needs in the Earth sciences specifically.

The NSTC Committee on Science, Technology, Engineering, and Math Education has indicated clearly that “evidence-based” approaches will continue to gain ascendancy in coming years. The GEO E&D programs should continue to build ways to evaluate success into reporting mechanisms. The OEDG assessment approach is excellent and at least certain aspects of the approach may be useful in further development of evidence-based reporting in other programs.

There is a critical need to maintain, and even strengthen, the connections among geoscientists and educators. The GeoEd program has been very successful in fostering linkages of geoscientists with a broad community of educators. The regional networks and alliances funded by GeoEd through the GeoTeach and Globe programs have proven to be very successful in broadening participation and improving Earth system science education. Other programs within GEO E&D, such as the REU and the postdoctoral fellowship program, also are very effective in making the geoscience-education connection.

Improving participation by underrepresented minorities in the geosciences continues to be a vexed problem. Although the problem goes well beyond what is known as the “pipeline,” this aspect of the issue must receive focused and continuous attention. Geology (in fact all of the

Earth sciences) is a “discovery major” at colleges and universities in that students rarely enter higher education knowing that they want to study this science. The nurturing of the pipeline for the Earth sciences therefore spans K-12 through post-graduate training. All of the programs that this COV reviewed play an important role in solving the pipeline problem for GEO. The COV notes that the percentage of proposals and awards from minority-serving institutions (MSI) or with an underrepresented minority (URM) as PI is approximately double that of the typical GEO science program. For GeoEd, a continuing emphasis on workforce development in the geosciences is critical. The diversity improvement goals of OEDG are essential to retain. The nurturing of alliances with organizations such as SACNAS needs continued reinforcement. Also, Two-Year colleges potentially could play an even more important role in building a diverse pipeline in GEO than they have in the past with solicitations that are sensitive to their culture to maximize their competitiveness.

The positive impact of education and diversity efforts within the Geosciences Directorate is obvious from our review. We reviewed GeoEd, OEDG, EAR/EH, GLOBE, and GeoTeach. We recognize that all of these named programs will not continue in the future. One of our primary observations is that even though these programs have separate labels, they contribute to an integrated whole in addressing the GEO E&D strategic goals. It will be essential for the Directorate to keep a similarly balanced portfolio of programs and initiatives in the future.

FY 2013 REPORT TEMPLATE FOR NSF COMMITTEES OF VISITORS (COVs)

The table below should be completed by program staff.

Date of COV: May 30-31, 2013
Program/Cluster/Section: GEO Education and Diversity Programs [Geoscience Education (GeoEd); Opportunities for Enhancing Diversity in the Geosciences (OEDG); Global Learning and Observations to Benefit the Environment (GLOBE); Geoscience Teacher Training (GEO-Teach)] and the EAR Education & Human Resources Programs [Research Experiences for Undergraduates (REU) and Postdoctoral Fellows (EAR-PF)]
Division: Office of the Assistant Director (OAD) and Division of Earth Sciences (EAR)
Directorate: Directorate for Geosciences (GEO)
Number of actions reviewed: Awards: GEO/OAD Programs (15); EAR EH&R Programs (15) Declinations: GEO/OAD Programs (13); EAR EH&R Programs (15) Other: GEO/OAD Programs (1); EAR EH&R Programs (1)
Total number of actions within Program/Cluster/Division during period under review: Awards: GEO/OAD Programs (133); EAR EH&R Programs (76) Declinations: GEO/OAD Programs (159); EAR EH&R Programs (144) Other: Withdrawn Proposals: GEO/OAD Programs (5); EAR EH&R Programs (5)
Manner in which reviewed actions were selected: A sub-set of proposals was selected from one year's competition for each program, with each Fiscal Year represented by a program (FY10: EAR REU; FY11 EAR-PF and OEDG; FY12: GeoEd). For each program, one or two proposals were chosen from the extreme end-member categories of a) rated highly by reviewers and awarded funding, or b) rated poorly by reviewers and declined funding. The rest of the proposals were chosen to represent the intermediate situation, where some proposals that were relatively highly rated were declined and some proposals that were less well rated were awarded funding. A few proposals representing actions on ad-hoc actions (RAPIDs, workshop proposals, supplemental funding requests) were included.

COV Membership

	Name	Affiliation
COV Chair	Dr. George Hornberger	Institute for Energy and Environment Vanderbilt University
COV Members:	Dr. Carmen Aguilar	School of Freshwater Sciences University of Wisconsin Milwaukee
	Dr. Diana Elder	School of Earth & Environmental Sustainability Northern Arizona University
	Dr. Leon Johnson	Dept. of Physical, Environmental & Computer Sciences (PECS) CUNY Medgar Evers College
	Ms. Rebecca Haacker-Santos	University Consortium for Atmospheric Research (UCAR)
	Ms. Rhonda Spidell	Albuquerque Academy (retired)
	Mr. David Voorhees	Earth Science and Geology Waubonsee Community College
	Dr. Talithia Williams	Mathematics Department Harvey Mudd College
	Dr. Richard Yuretich	Department of Geosciences University of Massachusetts Amherst

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(s) under review. Quantitative information may be required for some questions. Constructive comments noting areas in need of improvement are encouraged.

I. Questions about the quality and effectiveness of the program's use of merit review process. Please answer the following questions about the effectiveness of the merit review process and provide comments or concerns in the space below the question.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCESS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
<p>1. Are the review methods (for example, panel, ad hoc, site visits) appropriate?</p> <p>Comments: The review process in general was fair and thoughtful. In instances where the program officer made a recommendation contrary to the panel or ad hoc reviews this recommendation was well justified on the basis of other criteria. Clarification on the second to last column in the "Review Record" would be useful to understand the number and types of reviews that were requested and received and reviewed. The review history was clear to the panel, but we had difficulty understanding what some of the codes referred to (e.g., "D"). It would be useful for the COV to have this information in order to assess the review process more effectively. The diversity of the panels for OEDG is commendable.</p>	Yes
<p>2. Are both merit review criteria addressed</p> <p style="margin-left: 20px;">a) In individual reviews?</p> <p style="margin-left: 20px;">b) In panel summaries?</p> <p style="margin-left: 20px;">c) In Program Officer review analyses?</p> <p>Comments: Ad hoc reviewers tend to be somewhat variable in their approach to the two merit criteria, although major flaws or assets in these categories are usually addressed thoroughly. Commonly, the Intellectual Merit is well described, and the Broader Impacts commonly less so. Panel summaries are generally very good in discussing both categories, and the PO's do an excellent job in elaborating upon these aspects. The panel observed that "mentoring" of new PIs through substantive feedback in Panel Summaries and communications by the POs is worthwhile and should be continued.</p>	Yes (for the most part)

<p>3. Do the individual reviewers giving written reviews provide substantive comments to explain their assessment of the proposals?</p> <p>Comments:</p> <p>The reviewers do a good job overall in this, with a few exceptions. It was noted that individual reviewers may provide more expansive comments when they are passionate (positive or negative) about the proposed idea. It was not clear if the reviewers had been encouraged to refer to the strategic plan and the program goals in the initial review request. The COV notes that the on-line review form has been modified to include a separate section for program-specific goals. Reviewers should be urged to address the GeoEd goals in this section to provide a more robust analysis.</p>	<p>Yes</p>
<p>4. Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)?</p> <p>Comments:</p> <p>The panel summaries are impressive in laying out the rationale for the recommendations. The summaries included both strengths and weaknesses, which provided an opportunity for improvements to even a very competitive proposal. The COV thinks that convening panels is an essential component of a thorough review process.</p>	<p>Yes</p>
<p>5. Does the documentation in the jacket provide the rationale for the award/decline decision?</p> <p>[Note: Documentation in the jacket usually includes a context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), program officer review analysis, and staff diary notes.]</p> <p>Comments:</p> <p>The record regarding the decision is usually documented extensively. The written reviews are provided verbatim as well as summarized by the PO in the review analysis. The panel summary is also available and the PO comments on the project strengths and weaknesses identified by the reviewers in crafting a decision. Inclusion of quotes from the individual reviews in the Review Analysis was very useful to convey specific reviewer concerns. The logic and procedure of the decision process is easily followed.</p>	<p>Yes</p>

<p>6. Does the documentation to the PI provide the rationale for the award/decline decision?</p> <p>[Note: Documentation to PI usually includes context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), and, if not otherwise provided in the panel summary, an explanation from the program officer (written in the PO Comments field or emailed with a copy in the jacket, or telephoned with a diary note in the jacket) of the basis for a declination.]</p> <p>Comments: The PI receives excellent feedback concerning the decision including verbatim reviews, the panel summary, the PO comments and the context statement describing the general award process. The context statement does a commendable job in providing an overview for the PI concerning the evaluation of the proposal. The PO comments in particular were supportive and constructive, providing areas for improvement and fostering future PI and program success. The COV debated whether more specific information concerning the relative ranking of the proposal should also be included.</p>	<p>Yes</p>
<p>7. Additional comments on the quality and effectiveness of the program's use of merit review process:</p> <p><u>EAR E&HR</u>: The co-funding rate, and the attendant opportunity for PIs to have interdisciplinary reviews for interdisciplinary proposals was considered exemplary.</p>	

II. Questions concerning the selection of reviewers. Please answer the following questions about the selection of reviewers and provide comments or concerns in the space below the question.

SELECTION OF REVIEWERS	YES , NO, DATA NOT AVAILABLE, or NOT APPLICABLE
<p>1. Did the program make use of reviewers having appropriate expertise and/or qualifications?</p> <p>Comments:</p> <p><u>Geo-ED.</u> The reviewers comprise a fine representative cross-section of both education and geosciences specialists suitable for the solicitation. The PO has apparently developed a good reviewer pool to draw upon, and she is well aware of the need to solicit reviews from higher education, K-12, and informal education environments.</p> <p><u>OEDG.</u> The reviewers represent a broad range of technical, educational and industrial expertise. The COV was only presented information from the FY11 list of reviewers, so we are unable to comment on the reviewer makeup in FY10 and FY12, if there were any. The COV likewise recognized the broad representation of institutions, disciplines, race and gender of reviewers, which should be applauded.</p> <p>Based on documentation provided, the team is unable to comment on individual qualifications. Consistent with the 2010 COV findings, the 2013 COV would have liked more information about the reviewers' backgrounds. It was clear from the documentation provided and discussion that the current PO's are very dedicated to identifying and using highly qualified reviewers. The COV continues to encourage the POs to remain diligent in the selection of reviewers, including both experienced and new reviewers in the pool.</p> <p><u>EAR E&HR:</u> Data not available. We were not able to assess individual reviewer areas of disciplinary expertise. The review record only included broad categories (i.e. "Geological Sciences" or "Other Sciences"). For the PF, it was considered positive that there was a good representation of international reviewers, although it was still hard to glean the disciplinary expertise of the reviewers. Greater representation of different types of institutions, such as more Two-Year college faculty to review REU proposals, would be helpful. In assessing institutional diversity of reviewers, it would be useful to use a standard institutional classification, such as the Carnegie Classification or others, as part of an individual reviewer profile.</p>	<p>Yes (when data were available)</p>

<p>2. Did the program recognize and resolve conflicts of interest when appropriate?</p> <p>Comments:</p> <p>In conversations, the COV found that the PO's had paid careful attention to potential conflicts of interest among reviewers and moved to quickly resolve them when COL's were identified. Conflicts of interest for panelists were clearly noted in the review sheet. The process seems very effective and comprehensive.</p>	<p>Yes</p>
<p>Additional comments on reviewer selection:</p> <p>It appears that the program has made excellent choices in ensuring diversity ethnic and gender among the reviewers. It is important to continue this and to ensure that specific proposals have reviewers with the appropriate cultural awareness to provide a fair contextual framework.</p>	

III. Questions concerning the management of the program under review. Please comment on the following:

MANAGEMENT OF THE PROGRAM UNDER REVIEW

1. Management of the program.

Comments:

Geo-ED. Program management is generally very effective. The COV thinks that flexibility in using available funds is commendable and a sentence or two clarifying these decisions would be helpful

OEDG. The goals of the program are presented to the panel at the beginning of the meeting and direct consideration is given to how proposed work would contribute to the Strategic Objectives, especially to those most important to the aims of improving participation of under-represented groups in the geosciences. The program is managed effectively to achieve balance across multiple important directions, as detailed in several questions below.

The (non-planning) awards made through this program over the past three years were in late 2011 and so are not mature enough to have achieved all of their goals. The annual reports from several of them suggest that the work is proceeding as expected and that the program has indeed made wise investments.

EAR E&HR: The REU and PF programs are well-managed. It is clear that the program has cultivated a large community of engaged reviewers and has an important impact on workforce development. It was noted that some projects were co-funded, which is a positive approach to funding interdisciplinary projects. There was concern about the decrease in the number of proposals submitted to the REU program, it was not clear why this occurred, nor what approaches might reverse this trend. It was noted that the PO follows up with the PI in regard to failing to meet goals of a proposal, such as with plans for recruitment and diversity of the REU participants. Recruitment plans for REUs to target regional Two-Year Colleges is a novel and potential high impact strategy for recruiting students from underrepresented populations that should be encouraged.

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

Comments:

Geo-ED. The funding of ad hoc proposals enables the program to test proofs-of-concept and explore new ideas that could provide direction for future opportunities, and help support and build the communities.

OEDG. The program solicitations request proposals that address strategic goals that are responsive to the vision of the Geosciences Directorate. The solicitations are broadly based and they seek the

kinds of research and education opportunities that can lead to increases in the participation in the geosciences by underrepresented minorities. The funded projects that we reviewed appear to be highly meritorious.

EAR E&HR: The REU and PF typically have a strong educational component coupled to research. It was suggested that the RET opportunities continue under the REU program, as the downstream impact of the engagement of teachers in research is potentially high.

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

Comments:

Geo-ED. The opportunity to start new collaborations via planning grants and related ad hoc proposals is very helpful to the development of robust and effective projects. It would also be beneficial to make sure that the larger community is aware that planning proposals are welcomed. Can the planning grant process be more formalized and be formulated to involve the community colleges or MSIs in a more proactive manner?

OEDG. The OEDG portfolio shows that the program planning and prioritization aimed for and was successful in funding projects that contributed to the strategic goals. In particular, projects contributed heavily to the goal of preparing the geosciences workforce for the future – building and sustaining the pipeline, preparing students for geosciences careers, building capacity at minority serving institutions, and fostering retention through mentoring and networking. The panel summaries indicate that the program priorities were a main consideration in the evaluation process.

EAR E&HR: The planning and prioritization of the programs was appropriate and thoughtful. For the REU program, the following aspects guided portfolio development: discipline, Broadening Participation, Geographic Distribution, and inclusion of K-12 teachers. For the PF program, the following aspects guided portfolio development: discipline (paneled in disciplinary panels), geographic distribution, and Broadening Participation. Portfolio development for the Ad-Hoc program was more varied. It is this vision by the PO that is contributing to developing geoscientists for the future by developing and enlarging the pipeline into geoscience careers. Most of the pipeline development proposals have been through the ad-hoc program, which should be continued and expanded. A possible extension might be to offer a new solicitation aimed at involving Two-Year College faculty as PI's involving their students in place-based research.

IV. Questions about Portfolio. Please answer the following about the portfolio of awards made by the program under review.

<p style="text-align: center;">RESULTING PORTFOLIO OF AWARDS</p>	<p style="text-align: center;">APPROPRIATE, NOT APPROPRIATE, OR DATA NOT AVAILABLE</p>
<p>1. Does the program portfolio have an appropriate balance of awards across disciplines and sub-disciplines of the activity?</p> <p>Comments:</p> <p><u>Geo-ED.</u> Since much Geoscience education is concerned with Earth System Science and Geology it makes sense that these disciplines comprise the bulk of GEO-Ed activities. The ascendance of climate science and its societal relevance make this an obvious effort as well. In the context of NSF it may be that the atmospheric sciences are underrepresented in the GEO-Ed portfolio.</p> <p><u>OEDG.</u> The award distribution is consistent with the percentage of proposals that are received across disciplines. The PO's make a concerted effort to balance award distribution by discipline and sub-discipline.</p> <p><u>EAR E&HR:</u> Appropriate. The REU is concentrated in Surface Earth Processes, "Earth Sciences", Hydrology and Environmental. This is combined with a significant component of proposals involving Biology, which is commendable. The PF portfolio is appropriately balanced.</p>	<p style="text-align: center;">Appropriate</p>
<p>2. Are awards appropriate in size and duration for the scope of the projects?</p> <p>Comments:</p> <p><u>Geo-ED.</u> It is hard to judge from the data. Compared to GEO research awards, these grants are small and of short duration, although the median and the averages in the documents don't reflect the actual award size of the proposals reviewed by the COV. On the other hand, if the PIs are able to accomplish their stated goals, then these are the proper size. We will need to see the outcomes to properly evaluate this question.</p> <p><u>OEDG.</u> The COV focused on the track 2 awards and found that the award sizes and duration were appropriate.</p> <p><u>EAR E&HR.</u> Appropriate. PF and REU solicitations have guidelines, which are followed. Budgets for the REU program are largely dependent on the number of student participants and international vs domestic programs.</p>	<p style="text-align: center;">Appropriate</p>

<p>3. Does the program portfolio include awards for projects that are innovative or potentially transformative?</p> <p>Comments: <u>Geo-ED</u>. The short duration of the GEO-Ed awards makes it difficult to determine if there is a more sustainable impact that has been achieved. There are certainly innovative aspects to many of the funded proposals.</p> <p><u>OEDG</u>. Many of the Track 1 “proof-of-concept” awards aim at testing the efficacy of potentially transformative projects and thus are definitely inclusive of this NSF criterion. The record for the full Track 2 projects suggests that these definitely are innovative and the hope is that most, if not all of them, will prove to have at least some transformative aspects as the future implications of the work evolve. The evaluations in the April 2013 report from the American Institute for Research show strong evidence that the Track 2 funded projects have enjoyed significant positive effects in improving participation of under-represented minorities in the geosciences.</p> <p><u>EAR E&HR</u>. Appropriate. Both the REU and PF include innovative aspects that would encourage future geoscientists into the career pipeline. Some awards seemed to be transformative.</p>	<p>Appropriate</p>
<p>4. Does the program portfolio include inter- and multi-disciplinary projects?</p> <p>Comments: <u>Geo-ED</u>. An effort is made to leverage funding from other programs such as LSAMP and GLOBE to support GEO-Ed proposals. Of necessity, the awards are focused on Geosciences, although many draw upon resources of other sciences.</p> <p><u>OEDG</u>. Many of the Track 2 OEDG projects have strong field components that naturally lead to integration of multiple geosciences disciplines and to linkages with biogeosciences. The approaches are appropriate for the program.</p> <p><u>EAR E&HR</u>. The REU program contains an exciting population of multi-disciplinary projects. PF have multi-disciplinary projects based upon co-funding within GEO, which is commendable.</p>	<p>Appropriate.</p>
<p>5. Does the program portfolio have an appropriate geographical distribution of Principal Investigators?</p> <p>Comments: <u>Geo-ED</u>. The awards reflect a reasonable distribution that reflects the number of proposals submitted and the population density. Perhaps there could be a greater number of awards in the south and northern plains, but of</p>	<p>Appropriate.</p>

<p>course this requires competitive proposals to review.</p> <p><u>OEDG</u>. If we consider by state the number of schools that have geology programs, grant geology degrees, or offer geology courses and the number of submissions that are received from various states, there appears to be some inconsistency. For example, Pennsylvania has approximately 29 such schools, but had no proposal submissions, whereas Texas, which has 25 such schools, had 10 proposal submissions. It may be worth trying to understand such outliers. (ref. http://geology.com/colleges.htm) In general, the program portfolio is geographically well balanced among proposals submitted.</p> <p><u>EAR E&HR</u>. The REU program has as good a distribution as it can be with the limited number of awards. There may be an opportunity for recruiting PI's from non-represented regions. PF was hard to assess with the supplied data.</p>	
<p>6. Does the program portfolio have an appropriate balance of awards to different types of institutions?</p> <p>Comments:</p> <p><u>Geo-ED</u>. The GEO-Ed program awards are dominated by large state universities even though many of these are larger collaboratives involving community colleges and smaller institutions. It would be useful to have a mechanism for more easily deciphering the actual institutions participating in the awards.</p> <p><u>OEDG</u>. We note that Minority Serving Institutions (MSI's) have a lower success rate than non-MSI's. The COV suggests that NSF find creative solutions to engage and support PI's from MSI's, especially in light of heavier teaching loads and not having grant writing support.</p> <p><u>EAR E&HR</u>. Most awards are to public 4 year colleges. A lack of PI's from Two-Year Colleges outside of the ad-hoc grants is noted. Continued mentoring to increase greater representation of diverse institutions is encouraged.</p>	<p>Appropriate.</p>
<p>7. Does the program portfolio have an appropriate balance of awards to new investigators?</p> <p>NOTE: A new investigator is an investigator who has not been a PI on a previously funded NSF grant.</p> <p>Comments:</p> <p><u>Geo-ED</u>. The balance between new and established investigators is</p>	<p>Appropriate</p>

<p>reasonable. Experienced investigators would normally make up the bulk of those who actually submit proposals. The question is why did the total proposal numbers decline in 2012.</p> <p><u>OEDG</u>. The data indicates that there is great representation by new investigators. The program officers are successfully making this a priority for the OEDG program and new PI's have a higher success rate than average. The COV applauds the PO's for their efforts in this area.</p> <p><u>EAR E&HR</u> The nature of the PF leads to all new investigators. REU has good representation, at an overall average of 25%, and there is a good representation in the ad-hoc area as well.</p>	
<p>8. Does the program portfolio include projects that integrate research and education?</p> <p>Comments:</p> <p><u>Geo-Ed</u>. The portfolio has a minimal research component. Most of the awards are concerned with outreach and connecting students, educators at various levels, and community members. Many of the projects are research-related and develop student processing skills. Involving people in actual research is a part of some of the awards, and this aspect could be encouraged. The GEO-Ed solicitation does not give priority to research-based proposals.</p> <p><u>OEDG</u>. The OEDG strategic goals are most strongly focused on education. Many projects include items that expose students to research methods, and some do include participation in active research. Given the aims of OEDG, we think the program has an appropriate balance.</p> <p><u>EAR E&HR</u>. The REU and PF contain appropriate projects involving the mentoring and growth of undergraduate geoscientists to the limits of the solicitations. Both the PF and REU are exemplars as effective integration of research and education. The integration of research and education was less well represented in the ad hoc proposals.</p>	<p>Appropriate.</p>
<p>9. Does the program portfolio have appropriate participation of underrepresented groups¹?</p> <p>Comments:</p> <p>Underrepresented minorities have about 10% of proposals and awards. This is not overwhelming, but is better than most of the science programs in GEO.</p>	<p>Not really</p>

¹ NSF does not have the legal authority to require principal investigators or reviewers to provide demographic data. Since provision of such data is voluntary, the demographic data available are incomplete. This may make it difficult to answer this question for small programs. However, experience suggests that even with the limited data available, COVs are able to provide a meaningful response to this question for most programs.

<p>The program is making commendable effort to encourage proposals from MSIs and minority PIs.</p>	
<p>10. Is the program relevant to national priorities, agency mission, relevant fields and other constituent needs? Include citations of relevant external reports.</p> <p>Comments:</p> <p>In general the programs are highly relevant. The recent report from the NSTC Committee on Science, Technology, Engineering, and Math Education lists four priority areas for the nation: effective K-12 STEM teacher education, engagement, undergraduate STEM education, and serving groups traditionally underrepresented in STEM fields. The OEDG program clearly is responsive to these priorities. The program also has extensive evidence based activities as documented in the recent report from the American Institute for Research. The program also maps the projects to the strategic goals, which link to the Geosciences Directorate vision. The REU and PF programs are most certainly relevant, answering the call from GeoVision (2009), for a broad and diverse cadre of geoscience researchers. The GEO Strategic Plan (2012) specifically calls for “preparing the geoscience workforce of the future.” Additionally, REU and PF programs actualize #T-2 in the NSF Strategic plan in 2011-2016 to “Prepare and engage a diverse STEM workforce motivated to participate at the frontiers.” We applaud the significant support of Two-Year College faculty since the last COV. To increase the actual participation of Two-Year college faculty as PI’s, the modality of such institutions need to be incorporated into solicitations to make them competitive. As a resource, the report from the recent AGU workshop on research in Two-Year Colleges, AURECAS (http://urecas.agu.org), or the Community College Undergraduate Research Initiative (http://www.ccuri.org) could be used to develop a model. AURECAS was funded by OEDG #1201578. REU and PD have been redesigned to reflect changing national priorities.</p>	<p>Appropriate.</p>
<p>11. Additional comments on the quality of the projects or the balance of the portfolio:</p> <p>We are extremely pleased at the overall composition of the portfolio, and the progress that has been made since the last COV. Gains have made, but there remain opportunities to expand, particularly in the realm of URM PIs, MSIs and Two-Year Colleges. Excellent progress has been made toward developing the geoscience workforce of the future.</p>	

George M. Hanbury