



The great majority of mail reviews provided high quality, in-depth evaluations of proposed research from scientists with relevant expertise. The level of insight provided by the mail reviews would be impossible to replicate with only panel review. In 2011-2013, the annual average numbers of mail reviews in DEP programs ranged from 5.5 to 8.0. The range of mail reviewers was typically an excellent match to the proposed project, demonstrating canny selection and tenacity on the part of the POs. Only 60-70% of requested reviews were returned, so a sufficient number of high quality reviews required a great deal of PO effort. Almost all reviews addressed both intellectual merit and broader impacts criteria, although evaluations of broader impacts were typically much briefer. Reviewer definitions of quality in broader impacts varied substantially.

Panel summaries typically reflected in-depth and fair discussion of proposed projects. Panel discussion is essential because it provides synthesis of reviewer comments, a broader perspective, and a consistent evaluation across the proposal pool. Panels also play an important role by educating panelists about the proposal review process and its transparency. This function is particularly important for the early career principal investigators (PIs) who serve on DEP panels for one-year terms. The number of panelists who read proposals varies among programs. For example, 3 panelists read each proposal in CH, 5-6 in PH (3-4 for co-reviewed proposals), and all non-conflicted panelists in ES and CD. Nonetheless, well-reasoned decisions prevailed in all programs. DEP programs have moved to a practice of jointly convening to discuss co-reviewed proposals, deepening panel analysis and removing the threat of “double jeopardy.”

The level of PO insight and care in reaching final funding decisions was in general outstanding. Panel evaluations, supported by mail reviews, were clearly a primary consideration in PO decisions. However, POs also considered a variety of factors in reaching decisions, including the impact of funding on PI careers, programmatic balance, and workforce diversity. We concur that these factors were weighed appropriately. The rationales for funding decisions were typically documented in PO review analyses, and were often, but not always, clearly communicated to PIs. A few exceptions in CD and ES are described in the subcommittee reports for these programs.

*Recommendation 1:* The exemplary three-part review process employed in DEP (mail reviews, panels and PO analyses) should be continued, and enough PO and support staff positions should be allocated to make this process sustainable.

*Recommendation 2:* The PO review analyses were a revelation and gave us great insight into funding decisions. The depth of thought and information in these review analyses is a very valuable resource for PIs. Some POs shared significant portions of their review analyses (redacted to remove confidential information) with PIs, but this practice was not uniform. We recommend more consistently providing PIs with the content of PO review analyses.

*Recommendation 3:* We recommend that POs continue their efforts to educate reviewers, panels and PIs about broader impacts. The range of activities required for high quality broader impacts apparently remains a source of confusion, as was also noted by the past

two COV reports. Further clarifying this issue would aid PIs who otherwise may face moving targets of expectation when they submit proposals to different programs. In particular, top-notch work in graduate and/or undergraduate education is one path to excellence in broader impacts. Other types of activities (e.g. K-12 education, public outreach, media work) are also valuable broader impacts, but should not be viewed as necessary to achieving a high ranking.

### ***Program Planning and Management***

DEP POs manage their programs with great skill, insight and commitment. These traits have become even more essential due to limited program funding and the demands on PO time from programs and initiatives outside of core DEP programs. Over the review period, budgets in all programs except CD were flat in 2011-2012, and decreased in 2013. The CD budget increased in 2012, but no new proposals were accepted in 2013 because the program was being phased out.

DEP POs are very active in seeking co-funding for proposals, including co-funding from programs outside of EAR and GEO. This work is essential in light of constrained program budgets, and in some programs added funding equal to 15%-25% of the program budget for a given year; it also supports trans-disciplinary science.

The DEP POs carefully consider the scope of the research funded by their programs, how it reflects and enhances trends in their disciplines, and its potential for breakthroughs and transformative science. The COV concurs with the prevailing DEP philosophy of allowing the PI community to define program directions, while enhancing this process through workshops and community-based science initiatives (e.g. CIDER, CIG, COMPRES, and DEFORM). One aspect of this philosophy is to maintain broad definitions for the research funded by the PH, CH and TE programs, so that these programs can be responsive to emerging trends. The ES and CD programs by their nature have more focused definitions. Some program solicitations were revised over the review period, and others are in the process of revision. Program names were also reconsidered, and the decision was made to maintain existing program names. This process has addressed several recommendations of the 2008-2010 COV, and the current COV considers its outcome to be appropriate.

DEP POs identified two funding trends that are of particular concern.

First, large observational projects with budgets of ~\$1M are becoming increasingly difficult to fund given flat or declining program budgets. This problem is particularly acute for projects involving geophysical data collection, where data acquisition costs tend to be higher and cutting-edge methods are pushing for larger sensor arrays. The problem has become more acute with the termination of the CD program, a longstanding home for large observational projects in DEP, and the planned end of ES in 2018 heightens concern. Maintaining capabilities for large data acquisition campaigns is a critical need for DEP science, and indeed for all of the Geosciences Directorate.

Second, the current funding climate has compromised continuous support for many labs with experimental and analytical instrumentation. Gaps in funding take a particularly heavy toll on the technical personnel who play an essential role in many of these labs. Once lost to a lab, the expertise provided by technical personnel can be very difficult to replace. The long-term consequence of this trend will be a decline in U.S. capabilities for experimental and analytical science.

*Recommendation 4:* DEP should continue to seek solutions for funding large observational projects and for sustaining experimental and analytical labs and the expert personnel they require. Increasing funding to DEP programs is one obvious solution that should be actively pursued, but coordinated strategies and new support models in DEP and across EAR should also be explored. For example, CH has been investigating joint planning with the EAR Instrumentation and Facilities program.

### ***The DEP Workforce***

In 2011-2013, the percentages of “new PIs” (PIs without prior NSF support) among all PIs submitting proposals to the four ongoing DEP programs (PH, TE, CH and ES) ranged from 16% to 24%. The COV viewed this level of new PI participation as healthy. The percent of new PIs in the CD program (2011-2012) was lower (6%), but this result is unsurprising given the large, multi-disciplinary nature of CD projects. The percentages of new PIs who received funding were lower than the funded percentage of all PIs (Table 1). Given the relative lack of experience that new PIs have with the NSF proposal process, this result is not cause for concern. DEP POs typically take great care to provide new PIs with helpful feedback. One program, PH, has also measured the percentages of success among early career PIs (<10 years post-PhD). These PIs are funded at a percentage closer to the overall PI pool.

Table 1. Percentages of PIs who were funded (2011-2013)

	All PIs	New PIs	Female PIs	Minority PIs
CH	54%	41%	57%	46%
CD	34%	14%	32%	60%
ES	40%	15%	37%	14%
PH	57%	41%	58%	44%
TE	44%	34%	46%	36%

The percentages of women in the PI pool for each DEP program ranged from 18-23% in 2011-2013. These figures are comparable to the percentage of women among AGU members in 2010 (20%) (Holmes et al., EOS, 2011). The percentages of women who received funding is roughly equal to the successful percentages of all PIs (Table 1). By these measures, women appear to be participating and achieving success in DEP programs at levels equivalent to their representation in the field and the PI pool, respectively.

Underrepresented minority PIs make up 3-4% of the PIs who submit proposals to DEP programs. However, these percentages rely on self-reporting, and anecdotal information suggests that minority PIs are undercounted. Of the identified minority PIs, the percentages who obtained funding are lower than the funded percentages among all PIs in CH, PH and TE, while higher in CD (Table 1). Because these statistics are based on small numbers, we aggregated PI numbers across all programs to get a more robust measure. For all DEP programs in 2011-2013, the percentage of funded PIs among all PIs is 48%, and the percentage of funded PIs among minority PIs is 40% (17 out of 43). We note that the aggregated numbers of minority PIs are still fairly small. For example, if 3-4 more minority PIs were funded, the funded percentage would equal that in the total PI pool. Nonetheless, this gap in proposal success should be more closely examined.

*Recommendation 5:* DEP programs should develop strategies to more accurately measure participation of minority PIs and their success with funding relative to the total pool of PIs. Should a gap in success still be apparent, its causes should be studied and addressed. DEP programs should also continue their wider efforts to enhance diversity in the research community, including attention to this issue in proposal broader impacts.

### ***CAREER Proposals***

DEP POs are very supportive of early PIs, through standard proposals and CAREER awards. DEP programs (with the exception of CD and ES) have seen a steady rise in the number of CAREER proposals submitted and awarded, continuing the trend noted by the previous COV. We strongly support and encourage this allocation of resources as a means of building future leadership in the DEP research community. The feedback offered by POs to unfunded PIs was excellent and undoubtedly resulted in better resubmissions. During 2011-2013, 53 CAREER proposals were submitted and 29 were funded. The balance between CAREER awards to men versus women roughly reflects submission statistics; 37% of PIs were women, and 35% of awards went to women. We were disappointed to see repeated comments in the mail reviews suggesting that CAREER projects, in particular their educational components, were not a valuable use of either a young faculty member's time or NSF funding. The program officers have done a very good job in promoting submission of CAREER proposals, and continuing these efforts should gradually eliminate the minor stigma surrounding these awards among some in the community. While panels appeared to be supportive of CAREER proposals, it was obviously challenging to evaluate the broader impacts of most projects, especially given the widely varying educational applications. Finally, while several programs clearly work hard to foster CAREER grants, the COV was perplexed by the apparent disparity in handling of CAREER awards between DEP programs. For example, highly rated proposals were not awarded in some programs, while lower-rated proposals were awarded in others.

*Recommendation 6:* Because education and outreach are a major component of CAREER proposals, we recommend that program officers solicit at least one mail review from a geoscience researcher with deeper than usual expertise in education. CAREER proposers

should also be encouraged to seek pre-submission advice from experts in geoscience education.

*Recommendation 7:* To eliminate uneven treatment of CAREER proposals, and to encourage sharing of best practices between programs, we recommend that DEP POs jointly develop criteria for funding CAREER proposals. If timing permits, jointly examining all CAREER proposals following panel meetings should also be considered.

### ***NSF-wide Issues***

DEP POs have taken on leadership roles in programs and initiatives outside of core DEP programs, and these responsibilities are very time-consuming. These activities also bring back benefits to DEP, sometimes including co-funding, but nonetheless make it more challenging to manage DEP programs.

*Recommendation 8:* Before committing to any new initiative within NSF, an assessment should be made of the person-hours it requires and the demands that are likely to be made on PO efforts to run their core programs. When a PO's time is allocated to a new initiative, new PO positions should be added to help manage the PO's prior programs.

Many NSF information systems are antiquated and make it more difficult for POs to find reviewers, identify conflicts of interest, and otherwise manage the review process and awards.

*Recommendation 9:* Improved information systems should be aggressively pursued. Great potential exists to save time spent on routine tasks, thus better enabling POs to manage their extensive responsibilities within and beyond their home programs.

### ***DEP Response to the 2008-2010 COV Report***

DEP programs have addressed the recommendations of the 2008-2010 COV report. DEP POs have continued their efforts to educate PIs, reviewers and panels about broader impacts. Re-naming of DEP program names was considered, program scopes and solicitations were reviewed, and some solicitations were revised. A decision was made to not provide the 2011-2013 COV with access to jackets prior to meeting at NSF, but this did not hamper our work. Recommendations of the 2008-2010 COV specific to individual DEP programs are addressed in the reports of the program subcommittees.

### ***The Impact of DEP Science***

The research funded by DEP programs is essential to U.S. science on several levels.

Although the internal thermochemical structure, dynamics and evolution of our planet have been coming into better focus, fundamental questions remain, many of which are described in *New Research Opportunities in the Earth Sciences* (National Research Council, 2012). Research in DEP programs is at the forefront of answering these

questions, and new methods are rapidly evolving, combining cutting edge observational arrays, laboratory experiments, analytical studies, and computation-intensive modeling.

In addition to being fascinating from a basic science perspective, DEP research has key implications for a range of national priorities. Here we name just a few. Through advances in understanding earthquakes, tsunamis, landslides and volcanic eruptions, DEP science informs mitigation of natural hazards. For example, the recent revolution in illuminating the full spectrum of fault slip behavior (e.g. slow slip events, low frequency earthquakes), and innovative modeling of the slip and rupture histories of recent great earthquakes, are causing a fundamental re-evaluation of fault behavior and hazard potential. Volcanism and tectonics are inextricable components of the climate system, and understanding these interactions is key to modeling climate change. Increasing sophistication in modeling seismic wave propagation through better-resolved Earth structure is improving nuclear weapons monitoring. Pioneering research in Earth material properties and dynamics at high pressure supported by DEP is advancing knowledge about superhard, superconductive and composite materials with a myriad of technological applications.

Students and post-docs supported by DEP funding go on to a wide variety of careers. These include academia (where they contribute to the education the U.S. workforce), the exploration industry, the U.S. Geological Survey, and numerous other government agencies (where they contribute to better use of natural resources and mitigation of natural hazards).

*Recommendation 10:* We recommend that DEP program budgets grow. Improved funding will prevent loss of U.S. capabilities in observational, experimental and analytical science, enable transformative research, address key national priorities, and develop the careers of the next generation of the geoscience workforce.

**FY 2014 REPORT TEMPLATE FOR  
NSF COMMITTEES OF VISITORS (COVs)**

The table below should be completed by program staff.

<b>Date of COV: August 12-14, 2014</b>
<b>Program/Cluster/Section: Deep Earth Processes</b>
<b>Division: Earth Sciences</b>
<b>Directorate: Geosciences</b>
<b>Number of actions reviewed: 181 proposals (97 projects)</b> <b>Awards: 60 proposals (37.5 projects)</b> <b>Declinations: 121 proposals (59.5 projects)</b> <b>Other:</b>
<b>Total number of actions within Program/Cluster/Division during period under review: 2831</b> <b>Awards: 720 proposals</b> <b>Declinations: 1385 proposals</b> <b>Other: 726 proposals</b>
<b>Manner in which reviewed actions were selected:</b>  <b>Reviewed proposals were selected from Fall 2012 proposals for the Tectonics, Geophysics, EarthScope and Petrology and Geochemistry programs, and from 2011 proposals for Continental Dynamics. Proposal selection strategies are described in more detail in the individual program subcommittee reports.</b>



### COV Membership

	Name	Affiliation
<b>COV Chair or Co-Chairs:</b>	<b>Dr. Karen M. Fischer</b>	<b>Brown University</b>
<b>COV Members:</b>	<b>Dr. Steven M. Day</b> <b>Dr. James P. Evans</b> <b>Dr. Anke M. Friedrich</b> <b>Dr. Edward J. Garnero</b> <b>Dr. Peter J. Hudleston</b> <b>Dr. Mary L. Leech</b> <b>Dr. Charles E. Leshner</b> <b>Dr. Carolina R. Lithgow-Bertelloni</b> <b>Dr. Calvin F. Miller</b> <b>Dr. Michael P. Poland</b>	<b>San Diego State University</b> <b>Utah State University</b> <b>Ludwig Maximilian University of Munich</b> <b>Arizona State University</b> <b>University of Minnesota, Twin Cities</b> <b>San Francisco State University</b> <b>University of California, Davis</b> <b>University College London</b>  <b>Vanderbilt University</b> <b>Hawaiian Volcano Observatory, USGS</b>

## 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.

### Tectonics (TE)

The Tectonics (TE) subcommittee consisted of Peter Hudleston (chair), James Evans, Anke Friedrich, Mary Leech, and Calvin Miller, who shared reading of TE proposal jackets. NSF made available proposal jackets for the Fall 2012 panel review. This panel handled 86 proposals, of which 80 proposals were submitted to TE and 6 were handled jointly with other programs (Geophysics, Petrology and Geochemistry, EarthScope, and Geomorphology and Land Use Dynamics). Three additional proposals were jointly reviewed by TE and another program, but jackets for these were not directly available and were not asked for. Of the 86 proposals, we selected 20 unique jackets/projects, including all four CAREER proposals for which TE was the lead program. The selection also included the highest and the lowest ranked proposals in each category (“fund”, “fund if possible”, and “do not fund”), and all (ten) proposals with disagreements in the ranking among the ad hoc (mail) reviews, the panel, and/or the final decision by the POs. Of these ten, in five cases the final decision of the PO did not follow the unanimous recommendation of the mail-in reviews and the panel; one collaborative research proposal was chosen where the lead proposal was funded, but the associated proposal was declined; five proposals were chosen based on discrepancies between the mail review and the panel ranking.

**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
<p><b>1. Are the review methods (for example, panel, ad hoc, site visits) appropriate?</b></p> <p>The combined use of ad hoc mail reviews and panel review provides an impressively thorough and fair review of proposals. This provides a sound base of information to the POs for making their decisions. This works so well because of the attention give by POs to the choice of ad hoc reviewers and panel members.</p> <p>The average number of reviews per proposal ranged from 5.8 to 6.1 over 2011-2013 (a 60% - 65% return rate). 8-9 panelists (with 1-2 early career) discussed 85%-95% of the proposals.</p>	Yes

<p><b>2. Are both merit review criteria addressed</b></p> <p><b>a) In individual reviews?</b>  The collective attention given in the individual mail reviews to merit based on intellectual content and impact was thorough in all the jackets sampled, giving substance to the reviewers’ numerical ratings. In a very few cases the reviews were brief and unhelpful. The evaluation of broader impacts was addressed in virtually all individual reviews for each proposal. The interpretation of the meaning of “broader impacts,” however, was not consistent; for example some reviewers interpreted broader impact as simply being contribution to the scientific discipline. Discussion of broader impacts was usually relatively brief.</p> <p><b>b) In panel summaries?</b>  Panel summaries provided uniformly clear, accurate and reflective summaries of the mail reviews. They also provided succinct summaries and reviews of the broader impacts. Panels were not asked to review the lowest ranked proposals based on individual reviews, and thus did not provide summaries for these.</p> <p><b>c) In Program Officer review analyses?</b>  PO summaries and analyses of the individual reviews and of the panel were uniformly comprehensive, addressing well both intellectual merit and broader impacts.</p>	<p>Yes</p> <p>Yes</p> <p>Yes</p>
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<p><b>3. Do the individual reviewers giving written reviews provide substantive comments to explain their assessment of the proposals?</b></p> <p>Yes, almost invariably (but, as expected, the substance can vary widely/wildly from reviewer to reviewer). They also provided succinct summaries and reviews of the broader impacts. The tone of most of the external reviews was consistently professional and helpful. We estimated that over 80% of the external reviews examined were detailed - meaning there were several detailed paragraphs devoted to intellectual merit, and questions being asked, methods, research schedules, etc., were all addressed in a fair and well-reasoned manner. The previous COV expressed concern about the uneven quality of the ad hoc reviews. While a few of the reviews in the pool we examined lacked useful content, most were thorough, and in every jacket there were sufficient substantive reviews to provide useful guidance to the panel and the POs.</p>	<p>Yes</p>
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<p><b>4. Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)?</b></p> <p>The panel summaries generally provided succinct and accurate summaries of the mail reviews and clear statements of and reasons for any disagreement with the mail reviews. They also provided additional perspectives to the mail reviews, reflecting the valuable expertise of the panel members. In a few cases, the panel summaries were somewhat perfunctory and not very informative. Panel summaries were appropriately guarded, given that they are not intended to imply a decision. The panel was not asked to review a number of very low-ranked proposals (based on individual reviews and POs’ discretion) and thus panel summaries were not provided for these.</p>	<p>Yes</p>
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<p><b>5. Does the documentation in the jacket provide the rationale for the award/decline decision?</b></p> <p>The review summaries and analyses provided by the POs were very thorough and informative, and they provide a clear rationale for the decisions made. This is especially true in cases where the PO had gone against the ranking of the reviewers and/or the panel. Reasons for this included whether the PI was early career and/or at a vulnerable point in their career, whether or not the PI had other NSF support, and the involvement of underrepresented minorities in the research. Overall, the PO summaries reflected a strong concern for fairness and openness with the PIs, especially in cases that were difficult to decide. The documentation provided in the jackets indicates that the POs provide good context for the entire flow of the proposal under consideration, and the context of the work is well stated.</p>	<p>Yes</p>
<p><b>6. Does the documentation to the PI provide the rationale for the award/decline decision?</b></p> <p>Although the rationales for the decisions were clear in the jackets, in a very few cases the reasons for declining a proposal may have been frustratingly fuzzy to proposers. In these cases, including more material from the PO review analysis – without compromising the anonymity of reviewers and panelists – would rectify this issue. We recommend that this be done.</p>	<p>Yes</p>
<p><b>7. Additional comments on the quality and effectiveness of the program’s use of merit review process:</b></p> <p>The number of individual reviews averaged just under 6 for the period under review, and this did not change much from year to year. For the 20 jackets selected for individual review, the minimum number of reviews returned was 3, and maximum 7.</p> <p>Most people (ad hoc reviewers, panelists and POs) involved in the review process addressed both intellectual merit and broader impacts criteria, with varying degrees of intensity. As has historically been the case, most reviewers and the panel focused on the research aspects of proposals, but broader impacts were addressed at all levels, and it is our impression that broader impacts were addressed more thoroughly than in previous COV reviews.</p> <p>Overall, the merit review process, refined over time, is of very high quality and provides a comprehensive and fair review of all proposals submitted to the program.</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,
<p><b>1. Did the program make use of reviewers having appropriate expertise and/or qualifications?</b></p> <p>The program officers are to be commended for consistently identifying reviewers with substantial knowledge and expertise in the subject matter of each proposal. The level of detail and insight provided by the reviews attest to this. This is an outstanding element of the review process.</p>	Yes
<p><b>2. Did the program recognize and resolve conflicts of interest when appropriate?</b></p> <p>This was not always easy to tell, but where where COIs were revealed, they were treated effectively by the POs.</p>	Yes
<p><b>Additional comments on reviewer selection:</b></p> <p>The POs obviously work hard at finding appropriate reviewers, and coordinate with POs in other programs in an effort not to overburden individual reviewers with requests. They continually work to identify new reviewers to add to the “pool.” The number of reviews per project requested (7-9) and the return rate of 60-65%, which were fairly constant over the review period, ensured that each proposal had sufficient ad hoc reviews from experts in the field of the proposal.</p>	

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

<b>MANAGEMENT OF THE PROGRAM UNDER REVIEW</b>	
<p><b>1. Management of the program.</b></p> <p>During the period of review, the Tectonics (TE) program had two full-time POs, David Fountain and Steven Harlan. These two individuals have managed a remarkably efficient and healthy program that supports research across all areas of tectonics. This research area, by its nature, is highly interdisciplinary, and this results in the program receiving proposals from PIs and co-PIs with a wide range of disciplinary backgrounds. The program supports many collaborative projects involving several PIs from within a single institution or across two or more institutions. The dedication the POs give to their task is a large reason for the success of the program. Particularly challenging during the period of review, both POs had heavy responsibilities directing other programs; despite this there was no evidence in TE for loss of “momentum” in the work of reviewing proposals and managing the program.</p> <p>Overall, the program is very well managed, especially considering the demands on the POs’ time beyond managing the TE program. The review process is handled very effectively, as discussed in Parts I and II. The POs communicate closely with their colleagues in other programs within EAR and GEO, and seek out opportunities for supplemental funding from other sources within EAR, GEO and more broadly within NSF, such as International Activities and EPSCoR. In 2011-2013, co-funding from outside of EAR was equal to ~17% of the TE budget. POs also collaborate with their colleagues outside TE in identifying potential reviewers and in making sure individual reviewers are not overburdened with requests. More detail is covered in questions 2-4 below.</p>	
<p><b>2. Responsiveness of the program to emerging research and education opportunities.</b></p> <p>The POs work at having the pulse of the community by attending, as they can, key scientific meetings. They indicated that the ability to respond to emerging research opportunities is highly valued, and has led them to maintain breadth in the program solicitation. They work to identify trends within submitted proposals (e.g. linkages between deep processes and surface uplift, application of novel geochronology/thermochronology, incipient plate boundaries, and more).</p> <p>POs also assess emerging research directions through community workshops. TE has increased support for workshops overall (6 were funded in 2011-2013), and workshops focused on new directions are being planned. DEFORM, focused on the needs of the rock deformation community, is in development with PH and Instrumentation and Facilities. TE is also working with EarthCube on digital tools for rock deformation and structural geology.</p> <p>Work is underway on a new program solicitation that will more clearly define program goals and scope, while remaining broad enough to be open to unforeseen trends. A “Tectonics Collaboratories” track is being added to catalyze new research directions.</p>	

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

Through reading proposals, attending scientific meetings and workshops, and communicating with colleagues in other EAR and GEO programs, the POs are knowledgeable about developments in the field, and encourage proposals that take advantage of these developments. This is addressed further under the next question.

**4. Responsiveness of program to previous COV comments and recommendations.**

In addition to the DEP-wide recommendations, the 2008-2011 COV provided recommendations specific to the TE program. The prior COV recommended that TE POs enhance their work with the tectonics community to define emerging research trends. Funding workshops and increasing communication between POs and the tectonics community were suggested.

TE POs have responded to these suggestions, and to DEP-wide recommendations, by increasing the number of funded workshops, developing a new program solicitation, and developing community initiatives (e.g. DEFORM) and resources (collaboration with EarthCube on digital tools). See question III.2. The new program solicitation will more clearly define program goals and scope. For example, it will make clear that multi-PI interdisciplinary awards are not favored over single-PI projects.

To address comments from the prior COV related to Broader Impacts, TE has enhanced feedback to PIs in PO comments and has improved panel training.

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

<b>RESULTING PORTFOLIO OF AWARDS</b>	APPROPRIATE, NOT APPROPRIATE, OR DATA NOT AVAILABLE
<p><b>1. Does the program portfolio have an appropriate balance of awards across disciplines and sub-disciplines of the activity?</b></p> <p>The balance is appropriate, to the extent we can judge by the set of proposals for which we were provided access. These proposals reflect the research efforts of the community across a broad range of activities. Much current research in tectonics is collaborative and interdisciplinary, and this is reflected both in the types of proposals submitted and in the awards made. At the same time, an appropriate number of individual investigator proposals are funded. In short, the overall portfolio is well balanced.</p>	Appropriate
<p><b>2. Are awards appropriate in size and duration for the scope of the projects?</b></p> <p>Yes, from the set of funded proposals (10 proposals, 5 projects) we reviewed. The typical award is about \$100,000 per year. Our impression overall is that the POs do an excellent job of setting budgets within the constraints of the overall program budget (and reviewers, panels, and POs provide good recommendations to PIs where proposals are overly ambitious).</p>	Appropriate
<p><b>3. Does the program portfolio include awards for projects that are innovative or potentially transformative?</b></p> <p>Few proposals of those selected for individual review could be described as transformative, but several were highly innovative in the tools or approaches proposed and have the potential to affect how others conduct their research.</p>	Yes



<p><b>4. Does the program portfolio include inter- and multi-disciplinary projects?</b></p> <p>Tectonics by its nature involves cross-disciplinary work. The program portfolio includes numerous examples of inter-disciplinary projects, with 12 of 84 proposals being considered by the Fall 2012 TE panel also considered by other programs within GEO. Many of the other projects evaluated in this round involve single proposals from PIs in different sub-disciplines within a department or proposals from individuals in different disciplines at different institutions. Fewer proposals involved disciplines outside of those in DEP programs.</p> <p>The level of co-funding from other programs within EAR and from other directorates within NSF is another measure of the amount of inter-disciplinary and multi-disciplinary research supported by TE. This funding totaled a little more than \$1.6 million in 2012, and nearly \$4.7 million in the 3-year period under review. As is appropriate, TE supports other programs within the directorate, to the benefit of all programs.</p>	<p>Yes</p>
<p><b>5. Does the program portfolio have an appropriate geographical distribution of Principal Investigators?</b></p> <p>During 2011-2013, the geographical distribution of funded proposals was highly uneven, with many awards in California and Texas, and 6-10 awards in a smattering of other states. This distribution did not simply reflect the proposal pool, in the sense that funding rates varied widely by state (for example 40% in NY, 39% in MA, 30% in CA, 25% in TX, and 16% in FL). However, it may reflect the concentration of PhD-granting institutions. In any case, the geographical distribution of awards was not seen as a cause for concern.</p>	<p>Appropriate</p>
<p><b>6. Does the program portfolio have an appropriate balance of awards to different types of institutions?</b></p> <p>Over 80% of 2011-2013 TE awards went to PhD-granting institutions, and more than 65% of awards went to the top 100 research institutions. However, TE awards were less dominated by the top 100 than were other DEP programs. This balance is a strength.</p>	<p>Appropriate</p>

<p><b>7. Does the program portfolio have an appropriate balance of awards to new investigators?</b></p> <p>New PIs were responsible for about 25% of the proposals submitted in the period under review, and received about 20% of the awards. These numbers are both somewhat higher than in DEP as a whole. The percentage of new TE PIs funded (34.1%) is lower than the percentage of all PIs funded (43.5%). The lower success rate of new PIs compared to all PIs is to be expected, given the limited experience of new PIs. The number of new co-PIs (new involvement) funded (37) is somewhat higher than the number of new PIs funded (28) and the success rates of new PIs and new co-PIs are similar. Overall, the numbers of new PIs and co-PIs submitting proposals to TE, and the success rate of these proposals, is healthy and encouraging for the future of the program.</p>	<p>Appropriate</p>
<p><b>8. Does the program portfolio include projects that integrate research and education?</b></p> <p>Essentially all do to some extent – in that nearly all involve training of graduate students or undergraduates in research, which is of fundamental importance to the success and health of the program. In most cases the integration (beyond training of students) is not given much attention in the proposals. A few projects engage in educational outreach in creative ways.</p>	<p>Yes</p>
<p><b>9. Does the program portfolio have appropriate participation of underrepresented groups<sup>2</sup>?</b></p> <p>Women were 20% of the PIs submitting proposals to TE in 2011-2013. These numbers are similar to those for the other programs in DEP. The percentage of women PIs funded (46%) is slightly higher than the percentage of all PIs funded (44%); the percentage of women co-PIs funded (44%) is equal to the percentage of all PIs funded.</p> <p>Minorities were 3% of the PI pool in 2011-2013. The percentage of minority PIs funded (36%) is lower than the percentage of all PIs funded (44%), as is the percentage of minority co-PIs funded (29%).</p> <p>Women are appropriately funded at percentages roughly equal to rates of the entire proposal pool. Minorities are funded at lower percentages than the entire proposal pool, but the numbers are small, and the percentages here suffer from the problem of small number statistics. Continuing efforts clearly need to be made to encourage minority engagement in science, and well-crafted proposals should be encouraged from minority PIs with expertise in tectonics. This issue is discussed further in the <i>DEP Workforce</i> section of the DEP overview.</p>	<p>Appropriate for women.</p> <p>Unclear for underrepresented minorities.</p>

<sup>2</sup> 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><b>10. Is the program relevant to national priorities, agency mission, relevant fields and other constituent needs? Include citations of relevant external reports.</b></p> <p>Tectonics is a highly collaborative and integrative branch of geoscience, and it plays a key role in addressing the goals and priorities of research in the Earth sciences as documented in a number of reports. These include the 2012 report to NSF of the National Research Council, <i>New Research Opportunities in the Earth Sciences</i>. This report emphasizes, like the earlier 2001 report, <i>Basic Research Opportunities in the Earth Sciences</i>, how basic research in the Earth sciences addresses a number of national imperatives. Research carried out under the aegis of TE contributes to at least two of these: discovery, use, and conservation of natural resources; and characterization and mitigation of natural hazards. Tectonics is also closely allied to and in part incorporates related fields of geophysics, and its importance is well documented in the 2009 report submitted to NSF “<i>Seismological Grand Challenges in Understanding Earth’s Dynamic Systems</i>,” and in the 2012 report: “<i>A Foundation for Innovation: Grand Challenges in Geodesy</i>,” supported by NSF, the USGS and NASA. The TE program supports research that addresses goals and opportunities described in all these reports.</p> <p>Also see <i>The Impact of DEP Science</i>, the last section in the DEP overview.</p>	<p>Yes</p>
<p><b>11. Additional comments on the quality of the projects or the balance of the portfolio:</b></p> <p>The quality of the projects submitted in proposals to TE is high, with 47 of the 63 projects submitted for FY2012 deemed worthy of funding, based on the evaluation of the ad hoc and panel reviews. Funding was available to support only 18 of these, an indication of the quality of the research supported.</p>	

## Geophysics (PH)

The Geophysics (PH) subcommittee of the COV consisted of Carolina Lithgow-Bertelloni (chair), Steven Day, Ed Garnero, Charles Leshner, and Michael Poland. The subcommittee examined proposals from the Fall 2012 panel. Of the proposals for which PH was the lead program, the subcommittee selected 25 unique jackets/projects for close reading and review, including 9 CAREER proposals. Each jacket was read by two subcommittee members. The jackets represented a few highly rated projects, the lowest-ranked proposals that were funded, the highest-ranked proposals that were not funded, proposals with discrepancies between mail and panel reviews, and proposals with no panel discussion due to conflicts of interest.

**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.

<b>QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCESS</b>	<b>YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE</b>
<p><b>1. Are the review methods (for example, panel, ad hoc, site visits) appropriate?</b></p> <p>The combination of mail reviews from experts in the area of the proposed work, with context from experts in related areas, plus objective panel reviews and assessment by POs, is essential. It is the best way to ensure quality, fairness and resolution of conflicts and to provide avenues for funding diverse and innovative science. This system provides checks and balances, but also mechanisms for avoiding conservatism and funding high risk/high reward projects.</p> <p>The average number of reviews per proposal ranged from 5.5 to 5.9 over 2011-2013 (a 60% - 65% return rate). Panelists included early career researchers; ~65% of the proposals were discussed.</p>	Yes
<p><b>2. Are both merit review criteria addressed</b></p> <p><b>a) In individual reviews?</b></p> <p><b>b) In panel summaries?</b></p> <p><b>c) In Program Officer review analyses?</b></p> <p>Some reviewers still do not understand the meaning of broader impacts, and sometimes panelists seem unclear as well. The very knowledgeable and fair POs compensate for this deficit in award decisions. POs have gone to great lengths to educate reviewers and panels about broader impacts, and have provided them with specific broader impacts guidelines. This commendable effort should be continued.</p>	<p>Yes, though variable</p> <p>Yes</p> <p>Yes</p>

<p><b>3. Do the individual reviewers giving written reviews provide substantive comments to explain their assessment of the proposals?</b></p> <p>In the proposal jackets examined, reviews were substantive with few (very few) notable exceptions. In these cases, the substandard reviews were balanced for a given proposal by several high quality reviews. This demonstrates careful selection of reviewers by the POs, based on their knowledge of the community.</p>	<p>Yes</p>
<p><b>4. Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)?</b></p> <p>Most panel summaries provide a clear basis for the panel consensus. Only a few were lacking in this area.</p>	<p>Yes</p>
<p><b>5. Does the documentation in the jacket provide the rationale for the award/decline decision?</b></p> <p>Documentation of the basis for the funding decision is excellent. The COV was particularly impressed by the review analyses of all PH POs, including those who are rotators. The review analyses effectively summarized reviews, the proposal, and decisions, and they justified the decisions in every case. Decisions weighted panel consensus and reviews heavily, but also took other factors into account, when necessary (e.g. career stage, total PI funding, demographics, etc.). POs have an overarching view of the program that is needed and that the panel sometimes may lack. PO efforts are outstanding given the range of disciplines, number of proposals and time pressures that they juggle. POs go out of their way to fund the science that should be funded.</p>	<p>Yes</p>

<p><b>6. Does the documentation to the PI provide the rationale for the award/decline decision?</b></p> <p>Reviews, panel summaries and PO comments to the PI are thorough in every case. In particular, PO comments provide adequate justification for the decision, along with feedback needed for resubmission. This is especially true in the case of CAREER proposals and with early career PIs.</p>	<p>Yes</p>
<p><b>7. Additional comments on the quality and effectiveness of the program's use of merit review process:</b></p> <p>The three-step review process is powerful, as is PO knowledge of the community and its expertise. The latter enables them to bring in top-notch reviews (along with their powers of persuasion) and to select expert, broad-thinking and fair-minded panelists. POs are also able to steer the panel in the right direction if discussions go off course, as reflected in the review analyses, which are exceptionally thorough and well-reasoned.</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><b>1. Did the program make use of reviewers having appropriate expertise and/or qualifications?</b></p> <p>Reviewer expertise is an excellent match to the proposals, almost without fail. Reviewers are an impressive group. The subcommittee found one case where the comments of an expert reviewer were ignored by the panel, although this had no effect on the outcome.</p>	Yes
<p><b>2. Did the program recognize and resolve conflicts of interest when appropriate?</b></p> <p>POs thoroughly dealt with potential conflicts by not releasing reviews that were conflicted, having panelists leave the room when necessary, and not having panelists participate in a panel when they had a proposal in that round. Possible conflicts and their resolution were clearly documented.</p>	Yes
<p><b>Additional comments on reviewer selection:</b></p> <p>Reviewer selection is excellent. POs make good use of their high level of engagement with the community, as well as their own backgrounds and expertise, to select reviewers (including international reviewers) who span the disciplines of the proposal being evaluated.</p>	

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

<b>MANAGEMENT OF THE PROGRAM UNDER REVIEW</b>	
<p><b>1. Management of the program.</b></p> <p>In 2011-2013, the PH program was managed by Robin Reichlin (PO since 1995), Eva Zanzerkia, Benjamin Phillips (2011), Raffaella Montelli (2012-2013), and Zheng-kang Shen (2013).</p> <p>Program management has been excellent. Not only are award decisions based on top-notch evaluation of the science, they also are humane, i.e. when necessary they take into account the overall health and needs of the PI community (e.g. early career, tenure, soft money, etc.). The POs have provided means for getting excellent science done in the face of a difficult funding climate. POs have an excellent overarching view of the whole program, write outstanding review analyses, provide helpful feedback to PIs, select expert reviewers and panelists, and stay highly engaged with the community through conferences, workshops, and the development of community science initiatives. They set a high standard of professionalism. Honestly, we cannot praise them enough!</p>	
<p><b>2. Responsiveness of the program to emerging research and education opportunities.</b></p> <p>PH is a broad, large and nimble program. It is capable of responding to emerging trends because the POs work closely with the PI community (interacting through meetings, white papers, as well as the proposal process). POs work hard to support the best emerging science directions and address research concerns, through regular proposals but also as reflected in the numerous PH EAGER/RAPID and workshop awards (15 and 20, respectively). POs are also very pro-active about seeking co-funding for PH proposals. For example, in 2011 and 2012, co-funding from outside of EAR was equal to 22%-28% of the PH budget. The most experienced PO has done a fabulous job of cultivating these characteristics in the next generation of POs. PH has also been very successful in increasing CAREER proposal submissions and funding (14 awards). CAREER awards contribute to leadership building and should pay off for the community in the future (i.e. potential National Science Board members, high level medalists, etc.). These efforts speak to a long view of the PH program and DEP science.</p>	



<p><b>3. Program planning and prioritization process (internal and external) that guided the development of the portfolio.</b></p> <p>Given their well-established community engagement, knowledge of community needs, and expertise with NSF and its initiatives, PH POs are very well-equipped to plan and prioritize. Examples include DEFORM (a new rock mechanics initiative), CIDER, CIG, MYRES, and the transformation of CHiPr to COMPRES. The most senior PO transformed the mineral physics community with her proactive planning and prioritization.</p>	
<p><b>4. Responsiveness of program to previous COV comments and recommendations.</b></p> <p>The prior COV expressed concern that PH POs had heavy commitments to programs and initiatives outside of their core responsibilities. PO workloads remained high in 2011-2013, although this issue was addressed to some degree by the end of the FESD program in FY 2013, and a back-up position when a permanent PO was detailed to EarthCube. PH POs also revised their solicitation by moving to a target date. Changes to other DEP program solicitations clarified differences between programs, allowing the description of PH scope to remain unchanged.</p>	

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

<b>RESULTING PORTFOLIO OF AWARDS</b>	APPROPRIATE, NOT APPROPRIATE, OR DATA NOT AVAILABLE
<p><b>1. Does the program portfolio have an appropriate balance of awards across disciplines and sub-disciplines of the activity?</b></p> <p>Awards include a broad range of observational and modeling approaches, with data and methods that span the various sub-disciplines of geophysics.</p> <p>One major concern is that large observational projects (e.g. projects with budgets of ~\$1M) are becoming increasingly hard to fund. They simply take up a significant fraction of the program budget and therefore are subjected to heightened scrutiny. This problem has worsened with the end of the CD program. Such projects are critical to progress in geophysics, and this issue is of great concern to the COV.</p>	<p>Appropriate with concern about future</p>
<p><b>2. Are awards appropriate in size and duration for the scope of the projects?</b></p> <p>Overall, award sizes and durations are a reasonable match to the scope of funded projects. However, there was an anecdotal perception, based on reading the jackets, that proposal durations for standard (non-CAREER awards) have decreased. Average award duration as expressed in the PH proposal statistics provided to the COV has decreased from 3.2 to 2.4 years. However, because these numbers represent the actual duration of projects, as opposed to their awarded durations, their significance for the trend picked up in the jackets is difficult to evaluate.</p>	<p>Appropriate</p>
<p><b>3. Does the program portfolio include awards for projects that are innovative or potentially transformative?</b></p> <p>Among the 25 project jackets read for PH, 4-5 projects were truly innovative, and 1-2 were potentially transformative. Some of these were funded despite relatively low mail reviews. This demonstrates that checks and balances in the review system are working when it comes to recognizing high risk/high reward science.</p>	<p>Yes</p>

<p><b>4. Does the program portfolio include inter- and multi-disciplinary projects?</b></p> <p>The field is becoming more inter-disciplinary by nature, so almost all proposals touch upon more than one field. However, only a fairly small proportion of the projects whose jackets were read involved real intertwining of multiple disciplines in the proposed analyses. Taking a broader view, the large degree of co-funding is evidence of high inter-disciplinarity in proposals submitted and funded by the PH Program.</p>	<p>Yes</p>
<p><b>5. Does the program portfolio have an appropriate geographical distribution of Principal Investigators?</b></p> <p>The geographical distribution of proposals is uneven, and the distribution of awards is broadly similar to the proposal pool. This pattern was not of concern.</p>	<p>Appropriate</p>
<p><b>6. Does the program portfolio have an appropriate balance of awards to different types of institutions?</b></p> <p>More than 95% of PH awards go to PhD-granting institutions, and &gt;85% of awards go to the top 100 research institutions. Given the other efforts of PH POs to maintain diversity in their PI community, this bias to research institutions likely reflects the PH PI community more than anything else.</p>	<p>Appropriate</p>

<p><b>7. Does the program portfolio have an appropriate balance of awards to new investigators?</b></p> <p>New PIs made up 16% of the PH PI pool in 2011-2013. The percent of new PIs who received funding was 41%, compared to 57% in the total PH PI pool. In PH, early career PIs (&lt;10 years post-PhD) varied from 36% to 56% of the PI pool in 2011-2013, and early career PIs are funded at percentages closer to the 56% for the overall PI pool. PH is commended for their tracking of early career PIs in addition to new PIs. This participation and level of success among younger PIs is healthy. PH POs also provide excellent feedback to younger PIs.</p>	<p>Appropriate</p>
<p><b>8. Does the program portfolio include projects that integrate research and education?</b></p> <p>In the sense that training and supporting graduate students represents integration of research and education, nearly all proposals accomplish this goal. Some proposals include innovative new approaches to blending research and education, but not many. CAREER proposals are the exception, and in general they are very good in this area. Additional comments on CAREER proposals are provided in the DEP overview.</p>	<p>Yes</p>
<p><b>9. Does the program portfolio have appropriate participation of underrepresented groups<sup>2</sup>?</b></p> <p>Women made up 18% to 22% of the PH PI pool in 2011-2013, depending on how they are counted, and these percentages are comparable to the 20% of women in the American Geophysical Union (Holmes et al., EOS, 2011). 58% of female PIs were funded, on par with the percentage of all PIs who were funded (57%).</p> <p>Taken at face value, only 3% of PH PIs are underrepresented minorities (9 out of 327). However, because these numbers rely on self-reporting, actual levels of minority participation may be higher. 44% of minority PIs were funded, a figure that is lower than the 57% of all PIs. Please see further discussion of this issue in the <i>DEP Workforce</i> section of the DEP overview.</p>	<p>Appropriate for women. Unclear for underrepresented minorities.</p>

<p><b>10. Is the program relevant to national priorities, agency mission, relevant fields and other constituent needs? Include citations of relevant external reports.</b></p> <p>Please see <i>The Impact of DEP Science</i>, the last section in the DEP overview.</p>	<p>Yes</p>
<p><b>11. Additional comments on the quality of the projects or the balance of the portfolio:</b></p> <p>The quality of funded projects is amazing, judging by their impact. Clearly the right people and projects are getting funded, including high risk/high reward science. Over the 3-year period, PH projects produced 98-100 papers in Nature, Science, and PNAS, and more than 100 in JGR, EPSL, etc.</p>	

## Petrology and Geochemistry (CH)

The Petrology and Geochemistry (CH) subcommittee of the COV consisted of Charles Lesher (chair), Karen Fischer, Peter Hudleston, Mary Leech and Michael Poland. The subcommittee examined proposals from the Fall 2012 panel. Of the 92 proposals for which CH was the lead program, the subcommittee selected 20 unique jackets/projects for close reading and review, including 3 CAREER proposals. Each jacket was read by two subcommittee members. The jackets represented a few highly rated projects, the lowest-ranked proposals that were funded, the highest-ranked proposals that were not funded, proposals with discrepancies between mail and panel reviews, and proposals with no panel discussion due to conflicts of interest.

**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.

<b>QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCESS</b>	<b>YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE</b>
<p><b>1. Are the review methods (for example, panel, ad hoc, site visits) appropriate?</b></p> <p>CH has established a very thorough and comprehensive review process involving ad hoc (mail) reviews, panel review and final program office review and synthesis. (The average number of reviews per proposal ranged from 5.6 to 6.3 over 2011-2013.) This process has been in place for a long time, albeit refined over the years. It has resulted in a fair, balance and trusted (by the community) evaluation process, and has led to excellent decision-making. The POs do retain their authority to make the final decision based on mail and panel input, overall review criteria (intellectual merit/broader impacts), programmatic balance, budgets and career considerations. For the latter, in most cases we examined, decisions were well documented and justified.</p>	Yes
<p><b>2. Are both merit review criteria addressed</b></p> <p><b>a) In individual reviews?</b></p> <p><b>b) In panel summaries?</b></p> <p><b>c) In Program Officer review analyses?</b></p> <p>It is a general observation that ad hoc and panel reviewers do an excellent job of evaluating the proposed science, although due consideration of broader impacts is often lacking. POs make a good effort to insure that the panel addresses both intellectual merit and broader impact review criteria.</p>	<p>Yes, though variable</p> <p>Yes</p> <p>Yes</p>

<p><b>3. Do the individual reviewers giving written reviews provide substantive comments to explain their assessment of the proposals?</b></p> <p>Overall, reviewers for CH are found to take their task very seriously and provide thorough evaluation and constructive input. It is also clear that the panel members read these reviews closely and appropriately weigh numeric ranking versus the actual content of the review.</p>	<p>Yes</p>
<p><b>4. Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)?</b></p> <p>Panel summaries by and large provide very good synthesis of the panel's discussion, identify strengths and weaknesses, and voice overall support/lack of support for the proposed research. In a few cases, panel summaries were not substantive and therefore would not have been helpful to the proposer. We wish to note that very often the PO review provides even more context and detail regarding the panel discussion leading up to and influencing the PO final decision. We found the documentation by the PO very valuable in evaluating the review process. We also wonder if it might not be possible to transmit more of the information provided in the PO review directly to the PI (minus, of course, any confidential information). Finally, we applaud the panel for their effort (in at least two cases among jackets we reviewed) to provide thorough and constructive advice to young investigators who were not funded on how to prepare more competitive proposals. This is a great service to these young investigators, and the community as a whole.</p>	<p>Yes</p>
<p><b>5. Does the documentation in the jacket provide the rationale for the award/decline decision?</b></p> <p>The documentation is very complete at all stages.</p>	<p>Yes</p>

<p><b>6. Does the documentation to the PI provide the rationale for the award/decline decision?</b></p> <p>Yes, for reasons provided in questions in I.1-I.4.</p>	<p>Yes</p>
<p><b>7. Additional comments on the quality and effectiveness of the program's use of merit review process:</b></p> <p>We would like to reiterate our strong support for the current three-step process used by CH. While this is obviously more time-consuming for already over-worked POs and requires considerable engagement by the community of reviewers, the results are the quintessence of "peer-review" that is a hallmark of NSF.</p>	





















































