

**FY 2016 REPORT TEMPLATE FOR  
NSF COMMITTEES OF VISITORS (COVs)**

**Date of COV: May 17 – 19, 2016**

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**Program/Cluster/Section: Antarctic Sciences Section**

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**Division of Polar Programs**

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**Directorate for Geosciences**

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**Number of actions reviewed: 188**

**Awards: 64**

**Declinations: 113**

**Other: 11**

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**Total number of actions within Program/Cluster/Division during period under review:**

**Awards: 194**

**Declinations: 385**

**Other: 36**

**Manner in which reviewed actions were selected: Random sampling**

## COV Membership

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	<b>Name</b>	<b>Affiliation</b>	
	<b>COV Chair</b>	<b>Dr. Susan E. Humphris</b>	<b>Woods Hole Oceanographic Institution</b>
	<b>GEO/AC Liaison</b>	<b>Dr. Gregory W. Sullivan</b>	<b>University of Maryland, College Park</b>
	<b>COV Members:</b>	<b>Dr. Philip J. Bart</b>	<b>Louisiana State University</b>
		<b>Dr. Rebecca Bendick</b>	<b>University of Montana</b>
		<b>Dr. Ted S. Clarke</b>	<b>Exxon Mobil/ Upstream Research Company</b>
		<b>Dr. Janet M. Intrieri</b>	<b>NOAA/Earth System Research Laboratory</b>
		<b>Dr. Paul A. Mayewski</b>	<b>University of Maine</b>
		<b>Dr. Amy L. Moran</b>	<b>University of Hawaii</b>
		<b>Dr. Aaron A. Velasco</b>	<b>University of Texas, El Paso</b>
		<b>Dr. Lara Waldrop</b>	<b>University of Illinois</b>
		<b>Dr. Jeffrey M. Welker</b>	<b>University of Alaska, Anchorage</b>

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## Executive Summary

The Committee of Visitors (COV) was very impressed with the quality, thoroughness, and integrity of the merit review process in the Antarctic (ANT) Section. We found that the combination of ad hoc and panel reviews provides a very effective way of evaluating the relative merit of proposals. This combination allows input from a wide range of experts, both from the specific field under consideration in a particular proposal, and from a broader view of Antarctic science in general. The COV found the Review Analyses prepared by the Program Officers for each proposal are generally of very high quality — informative, succinct, but appropriately detailed.

Overall, the Intellectual Merit component of the review process appears clear and is well executed by the ad hoc reviewers and panels. However, the Broader Impacts review criterion is less well addressed by ad hoc reviewers and in panel summaries. While understanding NSF's desire to define this criterion in the broadest possible terms, there is clearly a lack of clarity among the scientific community as to what activities qualify as Broader Impacts. The consequence of this is generally very brief comments on this criterion. The COV recommends that NSF provide more guidance to the scientific community on this issue.

The COV found that the ANT Section was thorough and attentive in recognizing, documenting, and resolving conflicts of interest. The early identification of conflicts in the ad hoc review process is desirable so that valuable time is not lost in identifying additional reviewers, or wasted in compiling a review that is then deemed in conflict and hence cannot be used in the review process.

The COV was very impressed by the excellent management of the ANT section. This is due in large part to the dedication and expertise of the Program Officers and staff, and to their ability to integrate multiple information streams to come to appropriate and well-founded decisions. Previous COVs had raised concerns about the workload for individual Program Officers, so the 2016 COV was pleased to note that one new Program Officer has been added along with one Science Assistant. This has already resulted in an influx of new energy into ANT, and has had a positive impact on in-house activities.

The COV found that the ANT Section is appropriately responsive to emerging research and education opportunities. It supported both large and small innovative research proposals, as well as those that included emerging technology and cutting-edge educational activities. The COV recognized that the ANT Section encompasses an extraordinarily broad range of disciplines. It found that the planning and prioritization process for developing the portfolio was logical and resulted in an appropriate distribution of projects among different disciplines and subdisciplines.

The COV noted a significant impact — including both advantages and disadvantages — to the ANT Section arising from its new position within the GEO Directorate. Foremost among the advantages is the increased potential for co-funding with other GEO programs. Disadvantages include possible decreased potential for co-funding outside of GEO, more complex negotiations with appropriate management levels in other directorates, and especially more complicated negotiations external to the NSF with other U.S. federal agencies and international entities. The COV expressed some concern that the current programmatic breadth — encompassing not only earth sciences but also biology, astronomy, astrophysics and particle physics — might not be adequately supported by rotating GEO Division Directors.

Finally, the COV identified several agency-wide issues that affect the ANT Section. These included more clearly and widely communicating what constitutes Broader Impacts, streamlining the system for tracking the ad hoc review process, increasing the involvement of underrepresented groups, and addressing NSF travel restrictions.

## Summary of Recommendations

**Recommendation 1:** The COV recommends that the combination of ad hoc and panel review methods be maintained due to the very effective and equitable nature of this process, and that the use of in-person versus virtual panels should be at the Program Officers' discretion.

**Recommendation 2:** The COV recommends that the Program Officers consider providing a template to both ad hoc reviewers and to panel members with specific questions to be addressed. This may provide more structure and consistency in the level of detail documented in both types of evaluations.

**Recommendation 3:** The COV recommends that NSF provide additional guidance to the scientific community (both proposers and reviewers) as to what constitutes potential activities or aspects of the project that have Broader Impacts. The COV also recommends that more detailed guidance be provided directly to panelists regarding the identification of potential Broader Impacts and their evaluation as a merit criterion. One approach might be a brief orientation at the start of each panel that illustrates the diversity of potential impacts.

**Recommendation 4:** The COV suggests that the Program Officers explore options for 1) restructuring the web review form to solicit comments on each of the five NSF Review Elements; and 2) refining the proposal rating system such that reviewers rank different aspects of the proposal, and then provide a final overall summary rating and a brief justification.

**Recommendation 5:** The COV recommends that NSF impress upon panelists the need to clearly document key discussions leading to their final recommendation. This is particularly important for proposals with a broad range of ad hoc review ratings, or for which consensus is difficult to reach.

**Recommendation 6:** While documenting every communication with Principal Investigators is impractical, the COV suggests that, at a minimum, phone or e-mail discussions that relate to budget, scope of work, or logistics, be followed up by an e-mail that documents the exchange of information and summarizes the final agreement to those changes by both the Principal Investigators and NSF.

**Recommendation 7:** The COV recommends that the Program Officers provide Principal Investigators with as much of the Review Analysis content as practical, even in those cases where an award is recommended.

**Recommendation 8:** Recognizing that the pool of qualified reviewers in Antarctic research is relatively limited, the COV encourages the program to continue to broaden its reviewers to include non-Antarctic researchers addressing similar scientific questions in other geographic areas.

**Recommendation 9:** The COV recommends that additional information be provided in the "review request" email that would allow a reviewer to readily identify potential conflicts of interest. The limited-disclosure information in the email request should include names of all co-PIs and their institutions, as well as authors/affiliations of any letters of support.

**Recommendation 10:** The COV recommends adding a checkbox to the Conflict of Interest section of the ad hoc review form in FastLane where reviewers identify the type of conflict they have. This checkbox would be picked up automatically by the jacket system and require clearance by a Program Officer prior to release. This may streamline the process of identifying and processing conflicts of interest in ad hoc reviews.

**Recommendation 11:** The COV recommends that the ANT Section continue to be proactive in recruiting new investigators and early career researchers into the programs, in particular by reinstating the Antarctic new investigator workshop that has been held in the past.

**Recommendation 12:** The COV recommends that the Antarctic Integrated System Science program relax informal and formal geographic constraints on proposals to better facilitate studies that explore the margins of the polar region and teleconnections between the Antarctic and lower latitudes.

**Recommendation 13:** The COV sees the infusion of rotators as positive for keeping new perspectives incorporated in the ANT Section, but recommends that the balance of rotators versus permanent program staff be continually reviewed in order to keep budgetary and programmatic continuity intact.

**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.

<b>QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCESS</b>	<b>YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE</b>
<p>1. Are the review methods (for example, panel, ad hoc, site visits) appropriate?</p> <p>Comments:</p> <p>The COV felt that the combination of ad hoc and panel reviews provides a very effective way of evaluating the relative merit of proposals. The ad hoc reviews provide input from the community on individual proposals, while the panels afford a means to discuss and compare the proposals collectively. Panels have the additional benefit of allowing discussion of any highlights or concerns with the ad hoc reviews in the presence of the Program Officer. The combination of the two provides input from a wide range of expertise, both from experts in the specific field under consideration in a particular proposal, and a broader view of Antarctic science in general. The COV felt the practice of using both methods should be continued.</p> <p>In a few cases, there were jackets with only two written reviews from non-panelists. The COV recognizes the difficulty in obtaining at least three ad hoc written reviews for the large number of proposals submitted during the 2013-2015 evaluation period, but the Committee suggests that a minimum number of ad hoc reviews should be adhered to as much as reasonably possible.</p> <p>The COV specifically discussed the relative merits of in-person versus virtual panels. Several COV members felt that in-person panels are in some ways more effective, but all members agreed that the benefits of virtual panels, including less travel, reduced expense, and a wider pool of available</p>	<p>Yes</p>

participants, made them an important option that should be maintained to allow flexibility in the process. One of the important benefits of in-person panels is the ability of early career investigators to meet others in their community and their Program Officer(s).

The COV did not review any jackets that involved site visits so has no comment on that aspect of the review process.

**Recommendation 1:** The COV recommends that the combination of ad hoc and panel review methods be maintained due to the very effective and equitable nature of this process, and that the use of in-person versus virtual panels should be at the Program Officers' discretion.

**Data Source: EIS/Type of Review Module**

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2. Are both merit review criteria addressed

Yes, although Broader Impacts are addressed less well

a) In individual reviews?

Most reviews addressed both merit review criteria, although Intellectual Merit comments tended to be more substantive. Some reviewers used the five Review Elements for their comments, which provided helpful structure to their reviews.

The depth to which reviewers addressed the Broader Impacts criterion was highly variable, but comments on Broader Impacts were generally relatively brief. In some cases, this reflected the lack of depth in the discussion of Broader Impacts in the proposal, but more generally, it likely reflected the diversity of opinions about what activities and outcomes qualify as Broader Impacts. Whether the proponent took the tack of explaining relevance of the research to broader scientific goals and to society, or included educational/curriculum material development or increased participation of under-represented groups, comments by reviewers were often very general and hence not very nuanced (e.g., "meets the criteria", "standard activities").

b) In panel summaries?

Panel summaries were variable in quality. Some were very detailed, reflecting both mail reviewer comments and panel discussion. Others were extremely brief and provided little information on the panel discussion. It wasn't clear to the COV whether this was due to the high workload on a particular panel, or to individual panelist's writing preferences.

Because the panel summary is the only documentation of the panel effort on any given proposal, the COV suggests that panel summaries should be consistent in providing a concise yet complete record of the discussion. This is particularly important for those proposals that fall in the middle between highly competitive and clearly not competitive, or that have a wide range of rankings

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in the ad hoc reviews. For proposals that were clearly rated as noncompetitive early in the process, the COV felt that foregoing panel discussion, as happened in several instances, was acceptable.

The lack of a detailed justification suggests that either the panel accepted the recommendations of the ad hoc reviewers, or the summaries did not record the panel discussion. In several cases, the final recommendation of the panel was not reported on the panel summary sheet.

Broader Impacts comments by the panel tended to very succinct and, in the majority of cases, the panel comments matched those of the ad hoc reviewers.

**c) In Program Officer review analyses?**

The COV felt that the Program Officers' analyses and associated ability to balance the value of both merit criteria is of crucial importance. The Review Analyses are generally of extremely high quality – informative, succinct, but appropriately detailed. Those with a list of items to be addressed to improve the proposal are the most useful to the PI. The COV noted that the Review Analyses provide a very important record of the Program Officer's overall evaluation of the ad hoc and panel review and, in particular, the assessment of any mismatches in the ad hoc reviews between the letter ranking and written comments of a particular reviewer.

In several cases, the Program Officer's discussion of the Broader Impacts criterion presented a more balanced critique of the proposed Broader Impacts activities than provided by the panel. In a few isolated cases, the Program Officer noted that the scope of Broader Impact activities was limited but awarded a grant because the Intellectual Merit was excellent. Occasionally, a Program Officer's decision to recommend an award was clearly influenced by the high value of the Broader Impacts of a particular proposal.

**Comments:**

We note that our comments are very similar to those from the 2013 COV report, which included a recommendation for the use of templates for ad hoc reviews and panel summaries.

A lingering issue remains the considerable confusion concerning the NSF view of Broader Impacts and the community's perception as to what should be expected for this criterion.

**Recommendation 2:** The COV recommends that the Program Officers consider providing a template to both ad hoc reviewers and to panel members with specific questions to be addressed. This may provide more structure and consistency in the level of detail documented in both types of evaluations.

**Recommendation 3:** The COV recommends that NSF provide additional guidance to the scientific community (both proposers and reviewers) as to what constitutes potential activities or aspects of the project that have Broader Impacts. The COV also recommends that more detailed guidance be provided directly to panelists regarding the identification of potential Broader Impacts and their evaluation as a merit criterion. One approach might be a brief orientation at the start of each panel that illustrates the diversity of potential impacts.

**Data Source: Jackets**

<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 COV finds that ad hoc reviews were generally substantive and valuable, but somewhat mixed in quality. Often, reviewers gave in-depth comments that were consistent with their qualitative ranking, but there were occasional mismatches between the comments and rankings. A small number of reviewers provided only a few sentences insufficient to constitute substantive assessment. Especially brief analyses were often provided by reviewers who were serving as panelists or who reviewed multiple proposals.</p> <p>The committee further expressed concerns that some ad hoc reviewers were hesitant to give ratings of Excellent, instead substituting Excellent/Very Good or Very Good, despite strongly positive written comments. In addition, ratings are not consistently applied among reviewers. In most, if not all, cases, these situations were recognized by the Program Officer or the panel.</p> <p>The assessment of Broader Impacts is problematic insofar as reviewers and PIs often differ in their definition and valuation of relevant activities as discussed throughout this report.</p> <p>The COV recognizes that variability in ad hoc review quality and rating is not easily controlled by program management. Some members of the COV thought that changes to the rating system, in particular allowing different ratings for different aspects of the evaluation criteria (e.g. Intellectual Merit, Broader Impacts, or others), along with an overall summary rating and its brief justification, would facilitate more nuanced reviews. The COV discussed other options for structuring reviews, such as revising the web review form to solicit comments for each of the five NSF Review Elements.</p> <p><b>Recommendation 4:</b> The COV suggests that the Program Officers explore options for 1) restructuring the web review form to solicit comments on each of the five NSF Review Elements; and 2) refining the proposal rating system such that reviewers rank different aspects of the proposal, and then provide a final overall summary rating and a brief justification.</p> <p><b>Data Source: Jackets</b></p>	<p>Yes for Intellectual Merit comments ; generally No for Broader Impacts comments</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>Consensus amongst the panel members is difficult to ascertain from the contents of the jackets. There is not always a record in the panel summary of</p>	<p>Not always</p>

<p>the diversity of opinions and ensuing discussions among the panelists. Given that only a small number of panel members usually sign off on concurring with the written summary, assessment of whether and how consensus was reached is not possible if the panel discussion is not documented.</p> <p>The issue of consensus is of particular concern for proposals with a broad range of external reviews (e.g., from F to E/VG), especially when the final recommendation is Competitive/Highly Competitive. It is important that the reasons the panel decided on the different relative weighting of the ad hoc reviewer ratings to arrive at their final recommendation be documented.</p> <p><b>Recommendation 5:</b> The COV recommends that NSF impress upon panelists the need to clearly document key discussions leading to their final recommendation. This is particularly important for proposals with a broad range of ad hoc review ratings, or for which consensus is difficult to reach.</p> <p><b>Data Source: Jackets</b></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 COV commends the Program Officers for their extremely thorough and insightful utilization and analysis of ad hoc and panel reviews in developing their Review Analyses. In the majority of jackets reviewed by the COV, the Program Office Review Analysis provided a very complete and balanced portrayal of the rationale behind an award/decline decision. This often required balancing contrasting or poorly substantiated ad hoc reviews and panel summaries to arrive at a decision.</p> <p>In many cases, complete logs of email and phone exchanges between Program Officers and PIs were included in the jacket. In a small number of cases, phone discussions were not always summarized completely enough to assess the impact of the discussions on award/decline decisions or changes to project scope and budget.</p> <p>No site visit reports were included in the proposals reviewed by the COV. This is likely a consequence of federal policy that financially restricts the travel expenditures by Program Officers.</p> <p><b>Recommendation 6:</b> While documenting every communication with Principal</p>	<p>Yes</p>

Investigators is impractical, the COV suggests that, at a minimum, phone or e-mail discussions that relate to budget, scope of work, or logistics, be followed up by an e-mail that documents the exchange of information and summarizes the final agreement to those changes by both the Principal Investigators and NSF.

**Data Source: Jackets**

6. Does the documentation to the PI provide the rationale for the award/decline decision?

Generally  
yes

[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.]

**Comments:**

The rationale for award decisions was generally communicated to the PIs clearly, though the depth of the feedback varied between programs as well as between individual jackets within a given program. Declines typically offered a more detailed justification than awards. In many cases, the incorporation of constructive criticism into the decision rationale was commendable and likely serves to reduce the proliferation of uncompetitive resubmissions. The COV considers detailed and specific feedback from the Program Officers to be very valuable to the Principal Investigators, particularly when decisions are based on considerations beyond those conveyed in the ad hoc reviews or panel summaries.

**Recommendation 7:** The COV recommends that the Program Officers provide Principal Investigators with as much of the Review Analysis content as practical, even in those cases where an award is recommended.

**Data Source: Jackets**

7. Additional comments on the quality and effectiveness of the program's use of merit review process: N/A

The COV was impressed with the thoroughness and integrity of the merit review process. The acquisition of both ad hoc and panel reviews provides different, but complementary, perspectives on the proposed scientific research and its likely impact. The Review Analyses developed by Program Officers are thorough, detailed, and well executed. Information passed to Principal Investigators is generally thorough and professional.

Overall, the Intellectual Merit component of the review process appears solid and is well executed by the scientific community. However, as the previous COV noted, improvements could be made in assessing the Broader Impacts component of proposals. The COV recommends finding effective mechanisms to disseminate information to Principal Investigators, reviewers, and panelists on the broad range of criteria that NSF considers constitutes Broader Impacts.

**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**

1. Did the program make use of reviewers having appropriate expertise and/or qualifications?

Yes

**Comments:**

The COV felt that reviewers were well chosen and highly qualified in the subject area of their assigned proposals. On large multidisciplinary proposals, reviewers generally identified the parts they were not qualified to review, and limited their reviews to their areas of expertise. In other cases, a reviewer proceeded to attempt to review parts of the proposal in which they were not expert. However, this was generally noticed by either the panel or the Program Officer and the information treated appropriately.

**Recommendation 8:** Recognizing that the pool of qualified reviewers in Antarctic research is relatively limited, the COV encourages the program to continue to broaden its reviewers to include non-Antarctic researchers addressing similar scientific questions in other geographic areas.

**Data Source: Jackets**

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2. Did the program recognize and resolve conflicts of interest when appropriate?

Yes

**Comments:**

Overall, the program was thorough and attentive in recognizing, documenting, and resolving conflicts of interests. Program Officers consistently provided information in the Review Analysis on whether or not any conflicts existed during panel meetings, who the conflicts were with, and the actions taken (usually noted as "leaving the room during discussion"). The COV found no instances in the jackets reviewed where a conflict was identified and not appropriately dealt with, and no COIs had "slipped through the cracks".

The COV found that some ad hoc reviewers who agreed to provide a review found a conflict once the entire proposal document was made available to them. These conflicts were often either related to a Co-PI or Co-PI institution, a sub-

award, or in the letters of support. In cases where a COI was identified once the reviewer perused the document, and hence a review was not submitted, valuable time needed to identify additional reviewers was lost. In other cases, where conflicts were not identified until a review had been completed and submitted, time was wasted in compiling a review that could not be used in the review process. Hence it is important that conflicts of interest be identified as early as possible in the merit review process.

**Recommendation 9:** The COV recommends that additional information be provided in the "review request" email that would allow a reviewer to readily identify potential conflicts of interest. The limited-disclosure information in the email request should include names of all co-PIs and their institutions, as well as authors/affiliations of any letters of support.

**Recommendation 10:** The COV recommends adding a checkbox to the Conflict of Interest section of the ad hoc review form in FastLane where reviewers identify the type of conflict they have. This checkbox would be picked up automatically by the jacket system and require clearance by a Program Officer prior to release. This may streamline the process of identifying and processing conflicts of interest in ad hoc reviews.

**Data Source: Jackets**

Additional comments on reviewer selection:



**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:**

The COV was very impressed by the excellent management of the ANT Section. This is due in large part to the dedication and expertise of the Program Officers and staff, and to their ability to integrate multiple information streams to come to appropriate and well-founded decisions.

Previous COVs had raised concerns about the workload for individual Program Officers, and the current COV was pleased to note that one new Program Officer has been added along with one Science Assistant. From our discussion with Program Officers, this addition of new staff has already brought an influx of new energy into the ANT Section, and has had a positive impact on in-house activities, including the preparation of materials utilized by the COV.

The government shutdown that occurred during period under review highly impacted science projects, as field seasons were lost. From discussions with Program Officers, a significant effort was made to minimize the impact of the shutdown, and the program should be commended for their efforts to preserved funded science projects.

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

**Comments:**

The COV found that the ANT Section is appropriately responsive to emerging research and education opportunities. It supported both large and small innovative research proposals, as well as those that included emerging technology and cutting-edge educational activities.

The portfolio reviewed by the COV included funding for two EAGER and two RAPID awards, which highlighted emerging research opportunities. It also included several CAREER, REU and RUI awards, each of which included significant support for education-based activities. In addition, a high number of standard awards included support for hands-on training opportunities in the field both on shore and at sea, and in the lab, at the undergraduate through post-doc levels that integrated research objectives and education as part of the Broader Impacts activities.

Based on discussions with Program Officers, the COV concluded that a paucity of travel funds limits the number of face-to-face interactions between NSF staff and the scientific community at conferences, planning workshops, etc. This can impact the ability of the program to be aware of, and address, emerging opportunities in a timely fashion.

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

Comments:

The COV recognized that the ANT Section encompasses an extraordinarily broad range of disciplines. It found that the planning and prioritization process for developing the portfolio was logical and resulted in an appropriate distribution of projects among different disciplines and subdisciplines. The primary source of information for the COV came from the presentations to the COV by the Program Officers, and these presentations gave clear evidence of a balanced process that promotes equity in supporting the diverse fields represented in ANT.

The COV also found clear evidence of support for Broader Impacts goals in the planning and prioritization process, particularly in the review summaries from those Program Officers who gave detailed descriptions of how Broader Impacts affected the award/decline recommendation. Support of Broader Impacts was also demonstrated through successful CAREER, REU, and RUI proposals. The COV was pleased to see a continuing emphasis on the representation of female PIs among proposed and funded projects, but noted that rates of participation by new (to Antarctic research) investigators are low, and participation by underrepresented minorities even lower. The COV was pleased to see that the relative success rates for these groups are comparable with the overall success rates in the ANT Section. The extent to which demographic information was used to balance the portfolio was not clear to the COV. We encourage the NSF to continue to explore better ways of collecting the information and data necessary to facilitate ANT, and NSF more generally, to consider ways to promote diversity in the sciences.

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

Comments:

The COV found that the program was responsive to the issues raised by the 2013 COV report. While some matters remain unresolved, the COV recognizes the difficulty inherent in responding at the programmatic level to agency-wide issues, such as clearer guidance for the assessment of Broader Impacts, and streamlining tracking of ad hoc reviewer requests and responses.

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

**ANT SPECIFIC**

1. Does the program portfolio have an appropriate balance of awards across disciplines and sub-disciplines of the activity? *How should the COV define/assess "appropriate"?*

The budgets allocated to each program are typically close to the average (\$8.3M), with exceptions being the \$4.5M budget for AISS and the \$11.5M for AAGS. In particular, AAGS has a larger share of the total budget coupled with a significantly smaller number of proposals competed than the other programs. This apparent imbalance likely reflects the nature of the large, multi-institution instrument deployments and field investigations that are often needed to support research in that discipline. However, a more complete assessment of overall program portfolio balance would benefit from access to more varied presentations of award and submission statistics for all ANT programs which better reflect the diversity of projects in the portfolio (e.g., the # of collaborative proposals competed, the average # of PI institutions per proposal, the award size per PI, etc.)

Each program presented the distribution of awards (and for most programs, the submissions) across various sub-disciplines for FY2013 – 2015. The COV considers the distribution of awards by sub-discipline to be fair and balanced over this time frame, reasonably reflecting the overall proposal submission pressure to each program. The COV notes that submission statistics do not, and should not, provide the sole basis for portfolio allocation, and views strategic and logistic considerations as contributing to an appropriate balance of awards among sub-disciplines.

The COV commends the obviously collegial cooperation among the various ANT disciplines regarding co-funding of interdisciplinary projects. While the incorporation of the ANT Section into GEO appears to have facilitated co-funding and co-review of GEO-relevant proposals among GEO programs, it appears to have somewhat hindered such cooperation between ANT and programs outside of GEO, particularly with MPS/AST. The COV encourages the ongoing pursuit of opportunities for co-funding outside of GEO as they arise.

2. Are awards appropriate in size and duration for the scope of the projects?

While the 3-year average duration of awards was extremely consistent across disciplines, the average annual \$ amount per award varied from \$93K in AES to \$218K in AAGS, with an average award size of \$142K. Overall, the allocation of funding appropriately reflected the scope of the projects, and the documentation in several jackets demonstrated that the Program Officer played an active role in ensuring a good match between award size and duration and project scope, whether through de-scoping projects or revising budgets.

3. Does the program portfolio include awards for projects that are innovative or potentially transformative? *How does OPP define innovative or transformative?*

Potentially transformative and innovative projects are well represented in the current program portfolio. The COV identified examples of proposals whose potential for transformative scientific results or incorporation of innovative methodologies was deemed to outweigh potential risks to successful project outcomes. High-risk, high-reward proposals were generally viewed favorably and

supported through appropriate means such as EAGER awards, while low-risk, foundational research that had the potential for broad, transformative impact were also highly competitive. Several awards also featured innovation in the proposed scientific approach, in establishing industry partnerships for instrument development, and in educational and outreach activities.

**4. Does the program portfolio have an appropriate balance of awards to new investigators and early career researchers?**

New investigators constituted 9% of submitted proposals and the success rate was 30%, which is identical to the overall success rate for the ANT Section (30%). The COV feels this is appropriate. However, by sub-discipline there are some differences: for example, in AOE, the overall proposal success rate is 18% while the rate for new investigators is 24%. In AES, the overall success rate is 36% while the success rate for new investigators is 21%. Overall, there appears to be neither a direct and consistent advantage to being a new investigator nor a hindrance.

The program's portfolio balance with regards to early career researchers was not fully provided in the summary tables available to the COV. For example, the total number of CAREER applications was not summarized as a fraction of existing awards, nor was there any indication as to their submission rate and success. It is also likely that many early career and new researchers enter the field through either post-docs or as co-PIs on a more senior PI proposal. The COV had no data to assess these entry paths.

**Recommendation 11:** The COV recommends that ANT continue to be proactive in recruiting new investigators and early career researchers into the programs, in particular by reinstating the Antarctic new investigator workshop that has been held in the past.

**5. Does the program portfolio include projects that integrate research and education?**

Antarctica is one of the planet's most recognized locations and ANT has excellent opportunities to leverage US and global interest in this region. ANT should continue to take full advantage of "Antarctic Science" to educate the global community about the full suite of issues from climate change, to ice cores as recorders of climate, to unique organisms and ecosystems, and the role of the southern ocean in ocean circulation.

The COV found significant efforts underway by a number of funded projects to integrate research and education at levels ranging from undergraduate to post-graduate through a variety of activities, including training graduate students in research techniques, providing educators with curriculum development and distance learning opportunities.

**AIL SPECIFIC**

**1. As science projects are being recommended for award, are logistical plans developed in a timely manner? Are the results of the logistics reviews documented adequately in the proposal jackets?**

Logistical plans appear to be developed in a timely manner, incorporating effective interactions among Program Officers, Principal Investigators, and operational staff. This development process and the final operations plans are well documented in the jackets for awarded proposals. However, documentation of logistical assessment contributing to decisions on declined proposals is not

available in the jackets. The COV felt that more transparency in logistics assessment of declined proposals is warranted. The COV noted that, in some cases, strong proposals with large logistical burdens were held into successive funding years until they could be adequately supported. Although this is not ideal in the sense of timely development, the COV concurred that it is a creative strategy for promoting the highest quality science. This strategy was particularly relevant to research affected by the sequestration and shutdown process a few years ago, and appears to have protected the scientific missions to the extent possible.

**2. Does post-award logistics documentation accurately reflect support needed to successfully implement the project? *What is the data source for evaluating this?***

The post-award logistics documentation does reflect the support needed for project implementation. The jacket contents reflect strong coordination among the program officers, Principal Investigators, and logistics staff, and indicate a well-developed process for logistics planning and implementation. In addition, members of the COV noted that logistics are subject to changes throughout project implementation, and these changes appear to be handled effectively and efficiently. It appears that the logistics staff is very well versed in the field science needs and implementation strategies.

The data for evaluating post-award logistics are readily available in the jackets through the correspondence and Diary Notes.

**ANT and AIL**

**1. Are processes in place to ensure alignment of USAP support infrastructure to emerging scientific community requirements within a reasonable timeframe?**

There are numerous examples of alignment of support infrastructure to emerging scientific community requirements. These include: NRC and NAS committees, specialized community workshops, open workshops at national and international venues (e.g., AGU, IPICS), in addition to specialized infrastructure facilities that include scientist input and/or advisory involvement (e.g., NICL, IceCube, IDPO/IDDO, IRIS/PASSCAL). There are always constraints related to the timeframe during which infrastructure can be introduced. ANT appears to be as responsive as possible.

**2. The Antarctic Treaty and the National Environmental Protection Act require that USAP establish a process to evaluate projects intended for support in the Antarctic. These reviews occur in the pre-award phase (Record of Environmental Review) and more comprehensively in the post-award phase, when necessary. Does the environmental documentation found in the jackets demonstrate that a robust process has been established? *What is the data source for evaluating this?***

The necessary environmental documentation was included in the jacket information. Specifically, the Record of Environmental Review (ROER) documents were uploaded into the Diary Notes section of each awarded proposal that included fieldwork in Antarctica. The standardized ROER form provides a comprehensive review of activities and impacts, as required. In addition, there is a dedicated ANT staff member who very effectively oversees this effort.

**3. Have issues raised by the last COV been adequately addressed?**

There were a couple of items posed by the previous COV that this COV also raised. There appear to have been realistic attempts to resolve these issues. However, we have highlighted them again in previous answers and recommendations in the hope that they will be considered further.

## OTHER TOPICS

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

The COV notes a significant impact to the ANT Section arising from its new position within the GEO Directorate. We believe that the ongoing review of this arrangement is warranted, and encourage the NSF to take any necessary actions prompted by that review. Based on the information available to the COV, we find that positioning the ANT Section within GEO has both advantages and disadvantages. Foremost among the advantages is the increased potential for co-funding with other GEO programs. Disadvantages include possible decreased potential for co-funding outside of GEO, more complicated negotiations with appropriate management levels in other directorates, and especially more complicated negotiations external to the NSF with other U.S. federal agencies and international entities.

One further concern related to reorganization is a lack of comparable, broadly interdisciplinary programs within GEO other than those within the Division of Polar Programs. Because ANT encompasses not only earth science but also biology, astronomy, astrophysics and particle physics, the COV had some concerns that the current programmatic breadth might not be adequately supported by rotating GEO Division Directors.

The COV identified a potential gap in ANT and its relationship to other sections or programs based on geographic distinctions. Proposals that seek to compare Antarctic regions to lower latitudes and those that investigate the margins of the polar region appear to have less funding success. At the same time, the inclusion of an Antarctic component may be prohibitively expensive for disciplinary programs or pose organizational barriers. This structural “blind spot” limits critical studies of teleconnections and important differences between polar and non-polar domains.

**Recommendation 12:** The COV recommends that the Antarctic Integrated System Science program relax informal and formal geographic constraints on proposals to better facilitate studies that explore the margins of the polar region and teleconnections between the Antarctic and lower latitudes.

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

The COV feels that the ANT Section has been successful in meeting program-specific goals and objectives as defined by various NSF committees, NAS, NRC and science workshops. What is not quite as clear is how widely this success is recognized by the scientific community and the public. Project highlights are in some cases made available, and new social media communication venues, such as the ANT Facebook site, are commendable. However, the COV is not aware of consistent ways that annual project highlights are communicated. ANT might consider the possibility of asking an ANT intern or science assistant to organize such an effort: this would provide a valuable training exercise for this individual and a service to the community, potential investigators, and a means to increase potential for inter-project interactions within ANT, NSF and beyond. This suggestion is similar to the annual reports required by many large research and federal organizations. In addition,

it would be valuable to publicize annually via a pre-ANT proposal deadline website alert, Facebook, or other medium, specific details essential to proposal preparation (e.g., updated ANT and NSF general guidelines, specific opportunities, special alerts).

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

The agency-wide issues identified by the COV are listed below and have been discussed at length in the preceding sections.

- It would be helpful to more broadly communicate what constitutes Broader Impacts and the assessment of them in the award process.
- The current NSF staff travel limitations need to be addressed at the agency level. These have significant impact on the Program Officers' ability to interact with the scientific community and conduct site visits.
- It would be beneficial to streamline the system for tracking the ad hoc review process. This would help improve both the efficiency and effectiveness of the review process by tracking conflicts of interest, responsiveness of various ad hoc reviewers, number of returned reviews, and sending automated reminders to reviewers.
- The COV encourages NSF to continue to explore ways to increase involvement of under-represented groups. In addition, and although the COV found no evidence of implicit bias, the COV recommends continued vigilance on this important issue.

One issue not discussed previously pertains to management and archive of data and samples. Based on comments in the prior two COV reports (2009 and 2013), the present COV recognizes that significant strides have been made on this item. The COV also recognizes that there is a wide variety of data types acquired in Antarctica, and NSF in general, and archiving such diverse data sets is difficult and complex. Regardless of the difficulty, a continual improvement of the process is warranted because data volumes and the rate at which new data are acquired can be expected to increase in the coming years.

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

The COV discussed the issue of rotating versus permanent Program Officers and agreed that the mix of both has generally been a productive and beneficial structure. However, the mix also presents challenges with continuity and program development of a complex program such as ANT.

**Recommendation 13:** The COV sees the infusion of rotators as positive for keeping new perspectives incorporated in ANT, but recommends that the balance of rotators versus permanent program staff be continually reviewed in order to keep budgetary and programmatic continuity intact.

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

The COV greatly appreciated the comprehensive presentation of jackets and other documentation provided by ANT for this review. This greatly facilitated the review process by allowing detailed preparation prior to the meeting, and efficient use of the 2.5 days at NSF to complete the review.



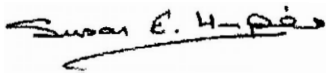
The COV unanimously felt that receiving access to the jackets in advance of the COV meeting was absolutely essential. In future years, it would be helpful to have review assignments as far in advance of the meeting date as possible to allow more preparation for the meeting. The pre-meeting webinar to address questions of access to the jackets was also much appreciated.

The COV would have been able to conduct a more complete assessment of overall program portfolio balance if more varied presentations of award and submission statistics for all ANT programs (e.g., the # of collaborative proposals competed, the average # of PI institutions per proposal, the award size per PI, etc.) had been available.

The COV felt that the report template contained redundant questions, particularly in Section I, and could have been considerably shortened. The intent of some questions was unclear (e.g., Section II, question 4; Section III, question 2) – an issue that was also raised by the 2013 COV.

The COV particularly liked that the agenda included a long discussion period with the Program Officers that followed their initial, brief presentations. We also appreciated that some of their PowerPoint presentations were available to the COV prior to the on-site meeting. The COV would have appreciated access to the spreadsheet describing the sampling strategy of assigned award/decline jackets, which was shown during the webinar.

**SIGNATURE BLOCK:**



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For the COV for the Antarctic Sciences Section  
Susan E. Humphris  
Chair