

**FY2006 REPORT FROM THE
OFFICE OF POLAR PROGRAMS ARCTIC SCIENCE
COMMITTEE OF VISITORS**

**Office of Polar Programs
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**FY 2006 REPORT FROM THE OFFICE OF POLAR PROGRAMS ARCTIC
SCIENCE
COMMITTEE OF VISITORS (COV)
6-7 NOVEMBER 2006**

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NSF Committee of Visitors (COV) Reviews

An NSF Committee of Visitors (COV) is asked to provide “a balanced assessment of performance in two primary areas, the integrity and efficiency of the *processes and management* related to proposal review, and the quality of the *results of investments* in the form of outputs that appear over time. The COV also explores the relationships between award decisions and program/NSF-wide goals in order to determine the likelihood that the portfolio will lead to the desired results in the future. It is important to recognize that reports generated by COVs are used in assessing agency progress in order to meet government-wide performance reporting requirements, and are made available to the public....”

The COV was guided by the FY 2007 set of Core Questions and the COV Report Template for use by NSF staff when preparing and conducting COVs during FY 2007. Specific guidance for NSF staff describing the COV review process is described in Subchapter 300-Committee of Visitors Reviews (NSF Manual 1, Section VIII) that can be obtained at <www.inside.nsf.gov/od/oia/cov>. COVs tasked with reviews of NSF Divisions, Directorates and Offices in 2006 were asked to respond to a set of Core Questions organized within the following major categories:

- A.1. Questions about the quality and effectiveness of the program’s use of merit review procedures.
- A.2. Questions concerning the implementation of the NSF Merit Review Criteria (intellectual merit and broader impacts) by proposal reviewers and program officers.
- A.3. Questions concerning the selection of proposal reviewers.
- A.4. Questions concerning the resulting portfolio of awards in the program under review.
- A.5. Management of the program under review.

- B.1 NSF Outcome goal for people
- B.2 NSF Outcome goal for ideas
- B.3 NSF Outcome goal for tools
- B.4 NSF Outcome goal for excellence

- C.1 – C.5 Other issues that the COV feels are relevant to the review

NSF Office of Polar Programs FY 2006 COV Review of the Arctic Science Section

Executive Summary

The 2006 COV met at the National Science Foundation on November 6 and 7. The committee reviewed 80 proposal jackets and addressed a series of questions put forth in the FY 2007 set of Core Questions and the COV Report Template. The COV found that OPP Arctic Sciences (OPP-AS) is effectively managed, and many things are being done very well. The COV focused discussion on issues where needs were ongoing. The following major recommendations were based on the November 6 and 7 meeting along with follow-up discussion by the COV.

In general, the COV felt that many concerns from the 2003 COV remained in 2006. While some of the issues brought up by the 2003 COV could not be addressed easily, it was not clear what progress had been made in the 3-year interim. It would be useful to future COVs to have the OPP-AS Section Head discuss progress on all recommendations from the previous COV at the start of the meeting.

There was considerable discussion about the state of the Arctic Natural Science (ANS) program. The COV believes that the ANS program is in need of additional funding. However, the COV did not feel this additional funding should come at the expense of the other programs in OPP-AS, and that further study of ANS funding is warranted as a high priority.

Insufficient data was available to address many of the questions presented to the COV, particularly with respect to management of OPP-AS. While some of the needed data may be available, the COV believed that there was a greater need for data collection and management. One mechanism for this was proposed.

For future COVs, it would be useful for the committee to better understand the programmatic context in which selected proposal jackets were reviewed. It would be helpful for each program officer to prepare a formal presentation that addresses the elements in the COV template, the overall context and objectives of the program, and the state of the program since the last COV, including what recommendations were adopted and how.

In summary, the COV found OPP Arctic Science to be well managed overall, with proposal solicitation and review addressing both major review criteria in place and generally well-implemented by the end of the FY 2004-2006 review period. While the broader impacts criteria continue to be interpreted somewhat differently by different reviewers, progress has been made since the last review. Importantly, the results of OPP-AS's investments are of high quality, and OPP-AS's management of the program is effective and efficient. In particular, the COV wanted to commend Arctic Logistics for allowing logistics to be led by science.

FY 2006 OPP Committee of Visitors

Dr. Karl Erb, Director of the Office of Polar Programs, appointed a Committee of Visitors (COV) comprising: Tim Boyd (Oregon State University), Robert Edson (ANSER), Jennifer Francis (Rutgers University), Deanna Kingston (Oregon State University), Melinda Laituri (Colorado State University), Tad Pfeffer (University of Colorado), Jackie Richter-Menge (Cold Regions Research and Engineering Laboratory), and Daniel White (University of Alaska Fairbanks). The committee was chaired by Daniel White, with Deanna Kingston representing the Office of Polar Programs Office Advisory Committee (OAC). The Committee of Visitors (COV) is an *ad hoc* subcommittee of the OAC. The areas of expertise represented on the FY 2006 COV spanned most specialty areas in the OPP's Arctic Science Division.

Agenda and Work plan of the FY 2006 Committee of Visitors

The FY 2006 COV met at the National Science Foundation over two days from November 6-7, 2006.

An opening session was convened with the COVs of both the Arctic and Antarctic Sciences. Dr. Erb provided an introduction and welcome to the committees. Dr. Michael Van Woert presented the charge to the FY 2006 COV. Tom Wagner and Brian Midson addressed the plenary to summarize the review process and the electronic jacket formats, respectively. The plenary then split according to Arctic and Antarctic Sciences. The meeting of the OPP-AS commenced with overview presentations by Drs. Simon Stevenson, Anna Kerttula, and William Wiseman.

During the following one and a half days, the COV considered data from these presentations along with a total of 80 proposal jackets. The 80 proposal jackets were selected by NSF staff prior to the COV meeting. In an effort to provide adequate disciplinary coverage for the ANS program, 65% of the jackets reviewed (52 proposals) were selected from the ANS portfolio. The remaining 35% of the jackets were selected from the Arctic System Science portfolio (25%; 20 proposals) and Arctic Social Science Program (10%; 8 proposals). Within each of the three programs under review, 50% of the jackets were drawn at random, while the remaining 50% were drawn equally from the pool of highly rated declines and poorly rated awards. The goal in this selection was to help the committee understand not only how NSF was meeting its mission by funding excellent proposals, but also how it addressed its mission by funding proposals in new directions and how proposals declined for funding were handled. Although the committee also had at its disposal other documentation as it addressed NSF Core Questions, most of the discussion was based on the proposal jackets that the committee reviewed. The balance of the first day was spent with each COV member reviewing 10 proposal jackets. The second day was spent addressing all of the NSF Core Questions. Also on the second day, Dr. Neil Swanberg addressed the committee with respect to the Arctic System Science program.

During the entire COV meeting, at least one program manager was present with the committee to address questions. The committee found this very helpful.

Sources of information and data for the period FY 2004-2006

Responses to Core Questions together with summary comments and recommendations provided below were based on the following sources of information:

1. Program officer briefings and questioning.
2. 80 proposal jackets (proposal, mail reviews, panel reviews, program manager statements, correspondence, award letters, annual reports, etc. Note some jackets were incomplete.).
3. Office of Polar Programs and NSF Electronic Information System (EIS) spreadsheet data.
4. Additional information was solicited from, and provided by, Program Officers throughout the meeting.
5. Reference material available at the web site, http://www.nsf.gov/od/opp/gpra/cov_materials/cov_documents06.jsp, was used as a source of information, particularly the Arctic Sciences GPRA highlights documents and the strategic plan.

Review of proposal jackets

Proposal jackets provided the major source of information used by the COV in addressing the NSF Core Questions. The committee examined a total of 80 proposal jackets from the period FY 2004-2006 during its survey.

Forty (40) jackets each fell within the “awarded” and “declined” categories, respectively. Each COV member reviewed 10 proposal jackets, 5 awarded, 5 declined. Initially, proposal jackets were assigned to COV members by Mike Van Woert. However, some jackets were traded between committee members to eliminate any potential conflicts of interest. Each COV member addressed all questions in the COV template based on their review of 10 proposal jackets.

In its review of jackets and other material, the COV addressed the nearly 40 Core Questions provided in NSF’s standard guidance to COVs. Given the consistency of the material on which we based our conclusions, we believe these comments are unlikely to be affected by either a more exhaustive examination of the available proposal jacket sample or by consideration of a larger jacket sample.

Responses to NSF Committee of Visitors Core Questions

The following sections present committee responses to specific core questions.

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

A.1 Questions about the quality and effectiveness of the program's use of merit review procedures.

1. Is the review mechanism appropriate? (panels, ad hoc reviews, site visits)

Yes. OPP-AS uses both mail reviews and panel reviews to evaluate proposals, most often together. No proposals were reviewed for which site visits were conducted. The absence of site visits was appropriate, since the proposals examined by the COV were not for centers or institutes.

Using their particular expertise and experience, mail reviewers provided detailed evaluations of individual proposals. Panels provided collective evaluations and comparisons among several proposals, synthesizing reviewer assessments using the collective experience and expertise of the panel members. Panel review reports did not appear to contain as much detail as three or more mail reviews collectively. The committee felt the panel reviews likely reflected the direction of the program better than the mail reviews, as the panel could discuss the goals of the program with the program officers at the time of review.

The committee felt that the best results were obtained when both mail reviews and panel reviews were employed together. For example, the Arctic Natural Sciences Program, which formerly used primarily mail reviews, now uses both panel reviews and mail reviews. The committee felt this was a significant improvement.

Recommendation: Given the special strengths of combined mail and panel reviews, we believe that OPP program managers should continue to employ both review mechanisms.

2. Is the review process efficient and effective?

Generally yes. The review process and subsequent communication of decisions to principal investigators was found to be generally good. The committee found a general increase in dwell time over the period reviewed (from 6 to 8 months). We believe this was the result of staffing changes within OPP-AS combined with agency-wide budget uncertainties. We believe that completion of staffing changes will help reduce dwell time

In some cases, it appeared that mail reviews were tardy. While generally thorough, mail reviewers occasionally failed to address both merit review criteria. We recognize that this

may be difficult as reviewers are busy and it is a volunteer activity. In requesting reviews of journal articles, editors are now requesting that reviews be provided within 3 weeks, in some cases. This has improved the dwell time for journal articles, and seems to be well received by the community. A stated review deadline forces the reviewer to make a more realistic evaluation of his/her ability to accomplish the review. The committee debated whether or not shorter review times for mail reviews would reduce the dwell time or potentially reduce the pool of willing reviewers.

The committee felt that the review process could be improved by including a simple checklist to supplement the standard written review. The checklist would direct the reviewer to address specific issues critical to OPP-AS decision-making and to provide specific information to facilitate a more quantitative basis for evaluating the overall review process.

Recommendation. The COV recommends that the panel and mail review of proposals, include a reviewer checklist for the purposes of gathering data. A possible draft of such a checklist was produced by the committee is included in this report.

3. Do the individual reviews (either mail or panel) provide sufficient information for the Principal Investigator(s) to understand the basis for the reviewer's recommendation?

Generally yes. The overwhelming majority of individual reviews (both mail and panel) provided a considerable amount of specific and useful information to justify the basis for the evaluation. Most proposals were reviewed by at least three external reviewers. A small number of reviews were brief and contained very little substantive information. As suggested in responses to previous questions, the committee felt it would be useful to have a checklist that would provide some consistency to the review process. The checklist would not replace the narrative evaluation of the proposal.

Recommendation: Same recommendation as A.1.2.

4. Do the panel summaries provide sufficient information for the Principal Investigator(s) to understand the basis for the panel recommendation?

Mostly. In most cases, the panel summaries provided sufficient information for the PIs to understand the basis for the panel recommendation. In cases where there was only a panel review, the amount of information available to PIs was less than in cases where there were multiple mail reviews as well. Some summaries were sparse in their details.

Recommendation: The committee felt that consistency in panel summaries would be useful and could be achieved by providing the panel with some good examples of panel reviews and the previously mentioned checklist to supplement the review narrative.

5. Is the documentation for recommendations complete, and does the program officer provide sufficient information and justification (a) for her/his recommendation? (b) for the Principal Investigator(s)?

We could not directly evaluate this question, as in most cases the letter or documentation of other communication (e.g., phone call or email) from the program officer to the PI was not available in the jackets. The jackets did include the program officer (PO) summary (Form 7), which we assumed was used to write the letter to the PI. In some cases, it seemed that insufficient information was provided in the Form 7 to explain when programmatic direction and balance influenced decisions, particularly on highly rated proposals that were not funded.

Recommendation: The decision to decline based on program balance should be conveyed to the PI, particularly if panel or mail reviews rank the proposal uniformly high. OPP-AS should consider sharing examples of exemplary write-ups by program officers across the Office, thereby helping everyone continuously improve the quality, thoroughness, completeness, consistency, and clarity of these documents.

6. Is the time to decision appropriate?

The COV wholeheartedly supports the NSF goal of continuing to reduce the time to decision. This issue was addressed in A.1.2 above.

6. Additional comments

Use of panels for ANS has been a major improvement.

A.2. Implementation of NSF merit review criteria.

1. Have the individual reviews (either mail or panel) addressed both merit review criteria?

Mostly. All mail and panel reviews addressed the intellectual merit and quality of the proposals. For a sampling of proposals reviewed between 2003 and 2006, the interpretation of broader impacts by both reviewers and PIs was inconsistent.

Recommendation: OPP-AS should post examples of suitable broader impact activities on its website for PIs and reviewers.

2. Have the panel summaries addressed both merit review criteria?

Mostly. The answer is the same as for question A.2.1 with the exception that the panels always addressed broader impacts, with the interpretation still being somewhat inconsistent.

3. Have the review analyses (Form 7) addressed both merit review criteria?

Mostly. There was some inconsistency in the Form 7 detail provided by different program officers. Some summaries were much more detailed than others. In some cases, it seemed that insufficient information was provided on the Form 7 to explain the decision to

decline a highly rated proposal in order to obtain programmatic balance or achieve overall program objectives.

Recommendation: The committee felt that review analysis could be improved by supplementing the standard written review with a simple checklist that includes explicit measures, such as the degree to which the proposal was considered innovative or high risk.

A.3. Questions concerning the selection of reviewers.

1. Did the program make use of an adequate number of reviewers?

Generally yes. The number of reviews was generally 3-6 mail reviews plus a panel review. There was, however, at least one proposal jacket reviewed by the committee that only had 2 reviews.

Recommendation: A minimum of 3 reviews should be obtained for all proposals.

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

Mostly. The breadth and depth in the assessment of scientific merit indicated that the program made appropriate use of reviewers with expertise and relevance to the proposals. With respect to broader impacts, not all reviewers appeared to have “appropriate expertise”. The committee felt that it would be useful to have one person on the review panel be an expert in broader impacts and/or outreach to address this issue.

3. Did the program make appropriate use of reviewers to reflect balance among characteristics such as geography, type of institution, and underrepresented groups?

Yes. The geographic distribution of reviewers for proposals appeared to be diverse, including reviewers distributed throughout the United States, and foreign countries. Most of the reviewers were from universities, but some were employees of government, industrial, or other non-educational institutions. The information NSF provided to the COV was not adequate to evaluate distribution of reviewers by gender or ethnicity. However, COV participants’ personal knowledge of the gender of mail reviewers and reports of panel composition indicate broad participation by female reviewers through both the mail and panel review processes.

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

Yes. Conflicts of interest appeared to have been resolved whenever identified by potential reviewers. Documentation of this process was included in some jackets as correspondence from persons asking to be excused for reasons of conflict of interest.

Recommendation: Program Officers should be consistent in noting reviewer’s conflict of interest in the proposal jacket

A.4 Questions concerning the resulting portfolio of awards under review.

1. Overall quality of the research and/or education projects supported by the program.

Generally, projects receiving support were highly rated by all reviewers. We take this as evidence that the projects being supported are of high quality. The COV had a set of jackets specifically selected to represent some projects that did not have the highest ratings, but were funded for reasons of program direction and mission. These were also considered to be high-quality projects.

Recommendation: For future COVs, it would be useful for the committee to better understand the programmatic context in which selected proposal jackets were reviewed. For example, how did proposals rank in the overall program, how many proposals were submitted, what number were funded, what were the total dollar amounts requested, total dollar amounts awarded, and when and by how much were requested amounts reduced in awards? It would be helpful for each program officer to have a formal presentation that addresses the elements in the COV template, the overall context and objectives of the program, and the state of the program since the last COV (what recommendations were adopted and how).

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

Yes. Program officers seemed to take to heart the reviewer’s comments about budgets and time, although these assessments were not consistently made. The previously mentioned checklist should include a question to reviewers regarding award appropriateness. Consistent with the 2003 COV comments, there were concerns that when a budget is cut, student salaries are the first to be eliminated. Data to specifically assess the impact of a budget cut on student support were not available.

Recommendation: It would be useful to request documentation in the budget as to what fraction of the budget is allocated to broader impacts. It would be useful to track numbers of funded students.

Questions A.4.3-12 ask the COV to evaluate the “appropriate balance, appropriate participation or national relevance” of projects funded. Because this COV had a non-random selection of proposals, it was not possible to specifically evaluate balance. Furthermore, the appropriateness of the distribution of funding is relative to the OPP-AS long term goals and strategies. In the absence of additional information, the COV assembled Table A1 to address these questions. The committee recommends that the COV be given data focused on programmatic assessment.

Table A1. This table provides information relating to questions A.4.3-12.

Question A.4. 3-12	Did anything seem unbalanced or was there cause for concern?	2006 COV recommended emphasis	Comments
3. Does the program portfolio have an appropriate balance of innovative/high-risk projects?	There was no cause for concern but this was difficult to assess with available information.	<p>High emphasis should be placed on research considered high risk but also with high potential return.</p> <p>High risk should be interpreted relative to logistical success as well as scientific uncertainty.</p>	<p>OPP is tolerant of risk in programs that they support</p> <p>Not many of this category proposal were included in COV proposal jackets</p> <p>A definition of high risk needs to be established by OPP-AS. What is the OPP-AS target for high risk?</p> <p>Additionally, reviewers should be encouraged to comment on potential risk or lack thereof in proposal reviews.</p>
4. Does the program portfolio have an appropriate balance of multidisciplinary projects?	No cause for concern.	High emphasis should be placed on innovative, interdisciplinary and multidisciplinary projects.	<p>COV needed more information on cross-directorate activities, which are likely interdisciplinary.</p> <p>Not many interdisciplinary proposal jackets were reviewed by COV.</p>
5. Does the program portfolio have an appropriate balance of funding for centers, groups and awards to individuals?	No cause for concern.	<p>A high emphasis should be placed on group projects.</p> <p>Medium emphasis should be placed on individual projects.</p>	Consistent with multidisciplinary goals/aims.
6. Does the program portfolio have an appropriate balance of awards to new investigators?	No cause for concern.	Medium emphasis should be placed on incorporating new investigators.	<p>A check box in a summary sheet checklist indicating a new investigator would be useful to data collection.</p> <p>New investigators were sometimes noted and considered in panel reviews.</p>
7. Does the program portfolio have an	No cause for concern.	Low emphasis should be placed on	

appropriate balance of geographical distribution of Principal Investigators?		geographic distribution of PIs.	
8. Does the program portfolio have an appropriate balance of institutional types?	No cause for concern.	Medium emphasis should be placed on balancing institutional types.	Different types of undergrad colleges and colleges consisting primarily of underrepresented groups should be encouraged.
9. Does the program portfolio have an appropriate balance of projects that integrate research and education?	No cause for concern.	Medium emphasis should be placed on the balance between research and education. High emphasis should be placed on broader impacts.	
10. Does the program portfolio have an appropriate balance across disciplines and subdisciplines of the activity and of emerging opportunities?	It was difficult for the COV to tell.	High priority should be placed on emerging opportunities.	One of the most important recent opportunities in Arctic (and Antarctic) science is IPY. The committee felt that due to funding limitations, OPP was not able to respond early enough or intensely enough to IPY. The United States lagged other nations in IPY planning.
11. Does the program portfolio have appropriate participation of underrepresented groups?	Hard to tell, may be OK (see notes in right column).	High priority should be placed on inclusion of underrepresented groups.	Participation by different underrepresented groups should be encouraged. OPP-AS could improve methods to try to get better data on this subject; maybe encourage PIs and Program Officers to include this information.
12. Is the program relevant to national priorities, agency mission, relevant fields and other customer needs? Include citations of relevant external reports.	No cause for concern.	High priority – Arctic is recognized as becoming more strategically and geopolitically important.	More good work is needed than is being supported. OPP-AS is consistent w/NSF mission

A.5 Management of the program under review.

Table A2 was prepared to address section A.5 questions 1-3.

Table A2. Program Management

Topic	Current situation	Suggested	Comments
1. Management of the program.	Review of process indicates that management of program is reasonably successful in current structure	-Encourage PIs to talk to POs -Develop summary sheet checklist for programmatic management, this is needed as input for management of program.	-Knowledge of programmatic statistics (e.g., success rates and proposal pressures) would provide potential PIs with better knowledge of likelihood of success in a given program.
2. Responsiveness of the program to emerging research and education opportunities.	The ability to respond to emerging opportunities appears to be hampered by limited available resources. With program funding stretched thin, response to emerging opportunities diverts funds away from a core mission that is already under stress. For example, the US response to the IPY to date was minimal and allowed for participation in only several narrow areas of the many areas identified as of interest for the IPY.		
3. Program planning and prioritization process (internal and external) that guided the development of the portfolio.	<ul style="list-style-type: none"> • Neither the plans and priorities nor the process of planning and prioritization is clear given the info available • COV recommends, as a high priority, that OPP-AS evaluate the apparent need for an increased budget for ANS and develop a plan of action that will not negatively affect other program areas. • Anecdotal evidence suggests that the social science community is happy with Arctic Social Science – it has a balanced portfolio, a broadened focus of social science disciplines, and excellent leverage of funds from other NSF Divisions. • The program planning and prioritization process might be improved by conducting an internal annual audit. The COV could address the success of the planning process if goals for each program were clearly described by the Arctic Science Program or OPP in general. 		
<i>General comment:</i> Annual, internal review of data is needed to evaluate management effectiveness.			

Recommendation: A presentation to the COV by the Arctic Section Head and Program Managers describing the formal process of overall and individual program management would be useful. Perhaps an annual internal review from the OAC would be a useful exercises.

PART B. RESULTS OF NSF INVESTMENTS

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

The COV believed that OPP-AS is performing well in its goal for people. The only consideration that may enhance progress in this area is a more thorough description, interpretation, and assessment of broader impact activities. It is believed that broader impacts are still largely an individual effort and the results are not consistently integrated into a coordinated, effective outcome.

The COV had some concern that budget stress in OPP-AS could result in PIs eliminating students from proposals, potentially compromising this goal.

Recommendation: Summaries of successful broader impact activities, as well as resources for assisting individual researchers with broader impacts, organized by topic/category may be useful and could be posted on the OPP-AS webpage.

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

The COV concluded that OPP has performed at a high level in the strategic area of *Outcome Goal for Ideas*. It was agreed that emphasis on broader impacts – getting ideas from OPP-AS into intellectual capital and fundamental knowledge – is of high importance. OPP-AS is at the cutting edge of scientific/intellectual merit and doing the best possible job with available emerging issues given limited available resources. The important role of the polar regions in present-day climate and environmental change makes the science supported by OPP especially important, and puts OPP in a uniquely strong position within NSF to request overall funding increases.

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

The COV concluded that OPP-AS has performed well in the strategic area of *Outcome Goal for Tools* but that more could be done. In particular, OPP-AS could do more to develop/provide tools to facilitate interaction and collaboration among projects, conduct efficient interdisciplinary science, and obtain broader impacts.

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

The COV felt that there are opportunities to collect and use additional data on project assessment and tracking for general management evaluation and improvement. We do

not have evidence to suggest that OPP-AS uses anything but state-of-the-art business practices.

PART C. OTHER TOPICS

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

Concerns were raised throughout the COV meeting with respect to the low and declining funding rate in Arctic Natural Sciences (ANS) despite very high and increasing proposal pressures. The COV believes that OPP-AS should, as a high priority, determine the reasons why this continues to be the case. While the COV is concerned about the situation in ANS, it recognizes the value of the other programs within OPP-AS and recommends that continued strength and viability of the other programs be considered in any solution proposed for the situation in ANS. See attached appendix.

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

A formal presentation by the POs would be very helpful in setting the contextual picture for the different OPP-AS programs. Providing background information from the past three years regarding objectives and goals of the programs with respect to priority setting strategies would be very informative for the COV. The lack of data on management issues made addressing many questions very difficult. In our report we proposed a checklist that we believe would go a long ways in providing data to be used in assessment.

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

The COV thought it might be useful to have information about any OPP self-assessments to more clearly understand and appreciate how the organization is changing and why.

We observe that national funding priorities do not necessarily align with research and educational priorities. NSF is encouraged to continue and further strengthen efforts to help align these priorities at the national level and, hence, improve programmatic responsiveness. OPP is especially well positioned within NSF to pursue this given the present public and scientific attention focused on polar environmental change.

C.4 Please consider the comments/recommendations of the previous COV and assess if possible whether/how these have been addressed or whether they remain a concern.

Table C1. Comments on progress made on 2003 COV report recommendations, including OPP response

Recommendation from 2003 COV	Was	2006 COV Comments
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	recommendation addressed?	
Recommendation: Declination letters, including access to the reviews, should proceed on as fast a track as possible to allow timely submission of revised proposals.	Somewhat	Dwell time has increased during the past three years. This is believed to be a function of staffing and management change.
Recommendation: OPP should consider sharing examples of exemplary write-ups by program officers across the Office, thereby helping everyone continuously improve the quality, thoroughness, completeness, and clarity of these documents.	No	We believe sharing examples of exemplary write-ups would still be useful. As with the 2003 COV, we found that write-ups (Form 7s) differed between programs in OPP-AS.
Recommendation: OPP should continue to expedite decisions, strive to reduce dwell time, and notify PIs promptly. It is especially important to provide reviewer comments to PIs on declined proposals, at least one month before the next proposal deadline (typically semi-annual).	Somewhat	As discussed previously, dwell time increased since 2003.
Recommendation: To provide specific measures of its contributions to NSF's Outcome Goal for People, OPP should try to develop statistics on the total number of undergraduate, graduate, and postdoctoral researchers receiving support from OPP awards, and also on the number of Masters and PhD degrees produced in the course of OPP-funded research projects. Recommendation continues...	No	More statistics are needed, particularly on broader impacts (students – post doc, graduate and undergrad students) A better way to gather statistics would be useful. We understand from the program managers that PIs do not follow the boilerplate annual report. If they did, statistics would be easier to compile.
Recommendation: OPP should continue to be creative and proactive in encouraging the participation of PUI (Predominantly Undergraduate Institutions) in the research process, including encouraging partnering between DRUE/I and other institutions and also use of RUI (Research in Undergraduate Institutions) and REU (Research Experience for Undergraduates) programs.	Somewhat	Efforts were made to liaison between education initiatives, informally at NSF. An ongoing, formal effort to improve relationships with undergrad institutions would be valuable.
Recommendation: The COV encourages OPP to continue to be creative and proactive in this area and attempt to further increase the proportion of underrepresented groups.	Somewhat	This effort needs continued attention.
Recommendation: OPP, perhaps assisted by its	No	A series of questions were

<p>Advisory Committee (OAC), should attempt to answer the following questions, and rectify imbalances or unintended consequences, if they exist. See NOTE at the end of the table for list of questions.</p> <p>Recommendation: That OPP, assisted by its Advisory Committee (OAC), develop answers, and, as appropriate, statistics on the above questions during the next three-year period and provide these data to the next COV committee.</p>		<p>posed by the last COV. Some were out of the scope of the 2006 COV as they address comparisons between Arctic and Antarctic programs. However, the COV did not have answers to these questions and thought they were still appropriate.</p>
<p>Recommendation: OPP should find some way to enable teacher participation in polar research to continue into the future, even as TEA comes to an end. There should also be a mechanism found to continue follow-up support of the existing cadre of TEA teachers.</p>	Yes	<p>NSF created a program modeled on the TEA program to involve teachers.</p>
<p>Recommendation: The Arctic and Antarctic science sections should consider engaging with the community to conduct a series of ‘future workshops’ or ‘think tank meetings’ which focus on the coupling of bipolar science, the integration of polar-derived data with global programs, the elucidation of new cutting edge opportunities between disciplines, involvement with agency-wide initiatives, etc.</p>	Yes	<p>Workshops have occurred in a variety of areas in OPP-AS. It does not appear that there is a lot of pressure from the scientific community to have bi-polar workshops</p>
<p>Recommendation: OPP should seek adequate budgets to support the development of new polar research instrumentation, link polar research instrumentation development opportunities directly to research needs in the Arctic and Antarctic, issue regular solicitations in this area, and increase the number of awards for technological innovation and development.</p>	Yes	<p>An OPP and NSF- wide initiative on infrastructure is putting emphasis on tools and infrastructure – strategic use of instrumentation in specific calls for proposals.</p>
<p>Recommendation: The NSF should standardize its data collecting and reporting procedures at all administrative levels and across all Directorates, Divisions and Offices; ensure that non-sensitive data be available on-line; provide complete indexing and cross-linking for these data; and enable effective graphical formats for such data. Also, NSF should ensure that it collects and makes readily available to the COVs in advance whatever data are needed to answer the questions it sets for COV reviews of Directorates and Offices.</p>	No	<p>An NSF data collection procedure is an on-going need.</p>
<p>Recommendation: The relevant programs within NSF should examine the issue in depth and develop policies and guidelines for dealing</p>	Not addressed by 2006 COV	<p>It did not appear that intellectual property was an issue in any of the</p>

<p>with intellectual property rights associated with indigenous people and local communities.</p>		<p>proposals reviewed.</p> <p>It was noted, however, that Arctic Social Science regularly asks PIs to abide by OPP's Principles for the Conduct of Research in the Arctic, which addresses this issue to some extent.</p>
<p>Recommendation: OPP should consider requiring PIs to summarize their track record in "broader impacts," in the section of the proposal describing prior results. In addition, where it would be beneficial, OPP should seek to ensure that the mail or panel reviewers include individuals with strong qualifications to assess and provide feedback on the broader impacts of a proposal.</p>	<p>Somewhat</p>	<p>In many cases, panels had membership to address broader impacts. This is likely improving interpretation of broader impacts, however, it was considered by the 2006 COV to be a continuing need.</p>
<p>Recommendation: NSF should make final reports from grants available to the public through its Web page. In addition, NSF should study its "core questions for COVs" and determine how to acquire the best information on each question and make this information available for COV use. For example, perhaps each proposal reviewer (mail and panel) should be asked to assess and indicate the innovativeness, riskiness, multidisciplinary of each proposal, and this information could be captured in the statistical data maintained by the agency.</p>	<p>No</p>	<p>The 2006 COV also felt that we needed more information to address the "core questions for COVs". It may be, though, that not all the core questions are needed. Collecting information from reviewers, as suggested in 2003 and again in 2006 would help.</p>
<p>Recommendation: NSF should reduce the number of specific questions it asks of COVs, and emphasize those that are most important to its performance and accountability that are of a type appropriate for COV assessment. In addition, OPP should identify a few areas in which the COV could provide advice and assessment that would be most important and helpful to OPP's management and outcomes, and pose questions/issues in those areas for the COV consideration, along with the standard NSF direction to COVs. This may be a task that a subcommittee of the OAC can help address.</p>	<p>Somewhat</p>	<p>The template for the final report provides good guidance for the COV. Fewer questions may allow the COV to address them in more detail.</p>
<p>Recommendation: OPP should prepare a list of 'non-sensitive' data topics that are deemed central to the COV process, compile and present data and source information for each topic, and organize these as a series of</p>	<p>Somewhat</p>	<p>Advance availability of data was identified by the 2006 COV as a need. While some data were provided, data on</p>

numbered appendices for the COV report. Two other recommendations were included in the 2003 COV that relate to data availability.		management and other themes in the template were not available, perhaps not collected.
Recommendation: NSF should consider the strategic value of standardizing some aspects of basic data collection and the COV assessment, so that the next COV could evaluate selected long term trends within OPP. In fact, assessing trends might be more meaningful than the absolute judgment of “appropriateness,” or “appropriate level” required for some of the core questions.	No	Basic data collection is still needed

NOTE: Management self-assessment questions posed by 2003 COV

- a) Is each program appropriately staffed to balance the workload among programs?
- b) The Arctic and Antarctic programs are organized rather differently. This may be perfectly appropriate, but it raises the question of whether OPP overall is optimally structured?
- c) Given the number and scientific diversity of the proposals submitted to ANS, is its current organization and approach optimized?
- d) Would panels be feasible and valuable for providing a coherent ranking of proposals in ANS? Would mail reviews provide important additional information for panel use in ARCSS?
- e) The proposal success rate appears to be quite variable across OPP programs. Are these differences appropriate or should program allocations be flexible to respond to variations in proposal pressure and quality?
- f) In some cases, OPP requests that PIs adjust their proposals to fit within a budget below that requested. It appeared to the COV in its review of jackets, that budget reductions were disproportionately taken by reducing graduate student support. What is the impact of budget reductions on the research and on the inclusion of graduate students in the research?
- g) It appeared to the COV that proposals with only three mail reviews were more likely to be declined than proposals with larger numbers of reviews and/or consideration by a panel. Is this observation accurate?

Recommendation: A review of the previous COV should be provided by OPP-AS at the opening of the COV meeting so that the COV can gain important insight on OPP-AS’s approach and progress in addressing previous COV recommendations.

Recommendation: Workshops to have undergrad institutions and research institutions are needed to discover ways to collaborate

Recommendation: An appropriate balance of questions should be prepared with relevant data available for the COV to make an assessment

Recommendation: Data is needed to assess OPP-AS processes. Information from an annual retreat that occurred since the 2003 COV would have been helpful to 2006 COV. The annual retreat was discussed in the outbrief of the COV.

C.5 Please provide comments on any other issues the COV feels are relevant.

Repeatedly throughout the two days of discussion, there was a focus on consistency of proposal review and the need for additional data, or means by which the COV could better assess the review process. To collect this information, the COV suggests instituting a **Reviewer Summary Checklist**. The checklist would not replace the existing written narrative. In addition, the program officers could address some specific management questions that would help future COVs understand the goals behind strategic funding decisions. Scientific journals generally approach reviews with a combination of a checklist and a narrative review. The checklist provides the editor with the reviewer's opinion about a variety of issues such as to the importance of the publication, and the appropriateness of the article for the specific journal. Because these sorts of checklists are common with journals, they are accepted and expected by the scientific community. An example checklist is provided below.

Reviewer Summary Checklist

Targeted information

	(yes or high)				(no or none)
	1	2	3	4	5
Reviewer enthusiasm for project	1	2	3	4	5
Innovativeness	1	2	3	4	5
Riskiness 1					
logistical	1	2	3	4	5
theoretical	1	2	3	4	5
financial	1	2	3	4	5
Benefit (potential)	1	2	3	4	5
Relevance to program mission	1	2	3	4	5
Is (are) PI(s) qualified?	1	2	3	4	5
Are requested funds appropriate?	1	2	3	4	5
Interdisciplinarity	1	2	3	4	5
Multidisciplinarity	1	2	3	4	5

Involvement of New PI	Yes	No
PI diversity (under-represented group)	Yes	No
Under-represented institution	Yes	No
Integration of research and education	Yes	No
Are resources dedicated to broader impacts	Yes	No
Does the proposal address an emerging opportunity	Yes	No

Intellectual merit: _____% effort
 Broader impacts: _____% effort

Number of undergraduates funded: _____
 Number of graduate students funded: _____
 Number of post-docs funded: _____

Required fields for written response:

 Scientific merit
 Broader impacts

Checklist for program management:

Proposal relevance to mission	1	2	3	4	5
Relevance to strategic plan:					
people	1	2	3	4	5
tools	1	2	3	4	5
ideas	1	2	3	4	5

Ranking: _____ x of y

C.6 NSF would appreciate your comments on how to improve the COV review process, format and report template.

It would be useful to start the COV process with a discussion as to which recommendations from previous report were acted on, and why or why not. How did OPP-AS use the last report to improve the management of its program?

If possible, a member from the previous COV should be included on the current panel. This would shorten significantly the learning curve and assist in continuity.

The COV should begin with formal presentations by each of the program officers. The presentations should cover their program for the preceding three year period and provide information on planning, prioritization, process, goals, statistics, etc.

Better organized and explained material would facilitate more efficient COV activity. Consideration should be given to developing tabbed reference notebooks of the most important documents, tables, etc.

OPP should consider conducting a self-assessment prior to the COV, answering all of the COV questions, and providing this to the COV when it convenes.

Issues related to previous 2003 COV

Below are some issues that the 2006 COV felt were important but largely unchanged from the 2003 COV. As such, the summary and recommendations from the 2003 COV were copied below in their entirety.

Agency-wide data bases

Accurate and well-organized numerical data are a critical element in meaningful assessment of a program's performance over the three year time frame encompassed by the COV review process. They are also essential should an Office, Directorate or Division, or NSF at large, mandate a survey which links a succession of COV reviews.

Recommendation: The NSF should standardize its data collecting and reporting procedures at all administrative levels and across all Directorates, Divisions and Offices; ensure that non-sensitive data be available on-line; provide complete indexing and cross-linking for these data; and enable effective graphical formats for such data. Also, NSF should ensure that it collects and makes readily available to the COVs in advance whatever data are needed to answer the questions it sets for COV reviews of Directorates and Offices.

Strengthening assessment of and accountability for Broader Impacts

OPP programs send proposals primarily to scientific/engineering peers of the principal investigator, and request their evaluation of the proposal with respect to its intellectual merit and quality and broader impacts. The requirement for researchers to include broader impacts in their proposals helps get both investigators and reviewers to think about them and to be proactive in achieving them. However, these individuals may not be qualified to develop or assess certain aspects of broader impacts, without getting input from experts in a broader-impact area, such as education, policy, international relations, economics, or other fields. Such collaboration can be very useful in the development of a proposal, in the review of a proposal, and in the conduct of the work. Over the past few years, NSF has continuously strengthened and clarified its expectations with respect to broader impacts. Most recently it implemented a requirement in FY2003 that proposals not addressing broader impacts be returned to the PI without review. In a similar way, NSF could phase in an expectation that the PI's and research team's previous accomplishments in "broader impacts" be mentioned in the proposal section that summarizes the results of prior work, so that reviewers can judge the PI's and team's track record in this arena, as well as on their scientific track record.

Recommendation: OPP should consider requiring PIs to summarize their track record in "broader impacts," in the section of the proposal describing prior results. In addition, where it would be beneficial, OPP should seek to ensure that the mail or panel reviewers include individuals with strong qualifications to assess and provide feedback on the broader impacts of a proposal.

Ensuring that information essential for accountability is obtained from the most appropriate source at the most appropriate time

The COV plays an important role in NSF's process of assuring accountability for getting high value from its taxpayer funds. Yet the COV is not the only mechanism available for assuring accountability, and many of the assessments the COV is requested to make cannot be made effectively during the 3-day COV review. Such assessments include judging the innovativeness, risk, and other aspects of the portfolio, when to do so, etc. To achieve this we would have to read and judge each of nearly 200 proposals comprising a random sample of jackets. At the risk of adding more check boxes (and other bureaucracy) to the review process, we make the following recommendation.

Recommendation: NSF should make final reports from grants available to the public through its web page. In addition, NSF should study its "core questions for COVs" and determine how to acquire the best information on each question and make this information available for COV use. For example, perhaps each proposal reviewer (mail and panel) should be asked to assess and indicate the innovativeness, risk, multidisciplinary of each proposal, and this information could be captured in the statistical data maintained by the agency.

The COV process overall

The COV consists of a group of scientists and engineers with expertise generally spanning the disciplines and research areas covered by OPP programs, who spend three days at NSF reviewing the management, proposal “jackets,” and outcomes of OPP’s investments. The work of the COV is guided by “NSF FY2003 Core Questions for COVs.” Most of these questions each focus closely on one specific aspect of the process for reviewing and investing in proposals and the demographics of people engaged in the program. Some of the questions request an assessment of matters the COV is well qualified to judge. Others request assessments, for which the COV possesses no special qualifications. Finally, it is easy given the large number of very specific questions, the requirement to address each one for NSF’s GPRA accountability, and the small amount of time for the COV to “miss the forest for the leaves.”

Recommendation: NSF should reduce the number of specific questions it asks of COVs, and emphasize those that are most important to its performance and accountability that are of a type appropriate for COV assessment. In addition, OPP should identify a few areas in which the COV could provide advice and assessment that would be most important and helpful to OPP’s management and outcomes, and pose questions/issues in those areas for the COV consideration, along with the standard NSF direction to COVs.

Agency-wide software-based COV template

The review of information and data, and writing of a comprehensive report within the span of a three day meeting is no simple task. The development of a standard agency-wide COV software package, such as is used by NSF panels, and in which the template categories or headings are set out in the format of a final report, might make the process more efficient.

Assembly, availability, review and presentation of the OPP data

The 2003 COV examined two large sets of material. The first set consists of the randomly selected proposal jackets representing awarded and declined proposals, in all the major disciplines within the Arctic and Antarctic science sections. This material is strictly protected by confidentiality law and could not have been examined before the COV meeting. The second category of material includes large amounts of statistical information and reports, which are publicly available.

Recommendation: OPP should provide the COV approximately 8 weeks in advance of the meeting with the list of solicitations, a bulleted summary of the evaluation criteria for each solicitation, along the materials routinely sent in advance to COVs and all of the publicly available statistical information related to

NSF's core questions for COVs. The COV chairperson should consider delegating reviewing tasks to individual committee members at that time.

Recommendation: OOP should provide a report that addresses the aims and goals of the program during the last three years. Additionally, the report should address the recommendations from the previous COV and how the previous recommendations were or were not implemented.

Recommendation: OPP should prepare a list of 'non-sensitive' data topics that are deemed central to the COV process, compile and present data and source information for each topic, and organize these as a series of numbered appendices for the COV report.

Recommendation: OPP should collect and maintain data on the total number and diversity of undergraduate, graduate, and postdoctoral researchers receiving support from OPP awards, and also on the number of Master's and PhD degrees produced in the course of OPP-funded research projects each year. The COV recognizes that it will be difficult to obtain such data, and that the community will need to provide it. It would be useful if these data were able to be sorted according to specific programs in both Arctic and Antarctic science sections, reduced to percentages to aid comparisons, and provided to the COV in advance of the review. (See A.4.15)

The long term view

Although the FY2003 COV considered aspects of the 2000-2002 time frame in considerable detail, we did not concern ourselves with pre-2000 records. This was not included in our charge and would probably be made difficult because NSF Core Questions tend to change and evolve over time.

Recommendation: NSF should consider the strategic value of standardizing some aspects of basic data collection and the COV assessment, so that the next COV could evaluate selected long term trends within OPP. In fact, assessing trends might be more meaningful than the absolute judgment of "appropriateness," or "appropriate level" required for some of the core questions.