

ANTARCTIC SCIENCES DIVISION

QUESTIONS and REPORT TEMPLATE for FY 2009 NSF COMMITTEE OF VISITOR (COV) REVIEWS

Guidance to the COV: The COV report should provide a balanced assessment of NSF's performance in two primary areas: (A) the integrity and efficiency of the **processes** related to proposal review; and (B) the quality of the **results** of NSF's investments 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. Discussions leading to answers for Part A of the Questions will require study of confidential material such as declined proposals and reviewer comments. *COV reports should not contain confidential material or specific information about declined proposals.* Discussions leading to answers for Part B of the Questions will involve study of non-confidential material such as results of NSF-funded projects. The 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. Since material from COV reports is used in NSF performance reports, the COV report may be subject to an audit.

We encourage COV members to provide comments to NSF on how to improve in all areas, as well as suggestions for the COV process, format, and questions. For past COV reports, please see <http://www.nsf.gov/od/oia/activities/cov/covs.jsp>.

FY 2009 REPORT TEMPLATE FOR NSF COMMITTEES OF VISITORS (COVs)

Date of COV:
Program/Cluster/Section:
Division: Antarctic Sciences Division
Directorate: Office of Polar Programs
Number of actions reviewed:
Awards:
Declinations:
Other:
Total number of actions within Program/Cluster/Division during period under review:
Awards:
Declinations:
Other:
Manner in which reviewed actions were selected:

FY 2009/2010 Antarctic Sciences Division Committee of Visitors Report

Executive Summary

The FY 2009/2010 Antarctic Sciences Division (ANT) Committee of Visitors (COV) included nine scientists with expertise and experience covering much of the broad and diverse research portfolio supported by the Antarctic Sciences Division (ANT) within the NSF Office of Polar Programs (OPP). The COV met at NSF on 26-28 October 2009 to review and assess ANT activities and to specifically address the issues called out in the COV Report Template. The template was modified by OPP to include questions related to the International Polar Year (IPY).

The Committee's overall assessment of ANT activities and their management is positive. The Division and OPP have been appropriately responsive to the needs of the US Antarctic science community on most of the important issues and priorities. ANT has much strength, few weaknesses and is now facing a global environment that offers significant opportunities as well as serious challenges.

- Key Strengths
 - Diverse, innovative, relevant and inclusive research portfolio
 - Demonstrated commitment to fostering complex multidisciplinary projects as evidenced by establishment of Antarctic Integrated System Science Program (AISS)
 - Well managed and effective proposal review process
 - Exemplary management of IPY programs
 - Excellent collaborative working relationship with Antarctic Infrastructure and Logistics Division (AIL)
- Weaknesses
 - Excessive (perceived) and growing (factual) workload pressures for program directors
 - Constrained NSF travel budgets that compromise division director and program director interactions with the scientific community
 - Inadequate plans for addressing challenges facing long-term observational programs, which continue to emerge as climate change becomes a central research focus
- Opportunities
 - Importance of polar regions in addressing climate change issues is widely recognized and appreciated (e.g. climate and ecological impacts of vanishing sea ice, ice sheet contributions to sea level rise)
 - International political landscape is now more conducive to collaboration on environmental issues
 - IPY catalyzed significant expansion of international research support capacity in Antarctica
- Challenges
 - Global economic crisis and Federal budget deficit could constrain OPP funding
 - Aging ships, heavy-lift aircraft and on-site facilities in Antarctica are becoming much more expensive to maintain and/or replace
 - Lack of long-term strategic plans for infrastructure and an absence of associated funding commitments could compromise future science support and decision-making

Recommendations: Based upon our review and assessment, we offer the following recommendations to help ensure that the US Antarctic Program is able to take full advantage of the opportunities currently available and is best positioned to address emerging opportunities and challenges in the years ahead.

Proposal Solicitation, Review and Award Management

1. Evaluate current program director workloads and add staff as justified

Research Data and Long-Term Measurements

2. Ensure data sets from past, current and future ANT projects are in the public domain and are readily accessible
3. In collaboration with other mission-oriented Federal agencies, ensure key long-term observations in Antarctica are continued and are adequately supported

Strategic Planning and International Collaboration

4. Implement rigorous strategic planning process to set short-, mid- and long-term objectives for infrastructure and science support in Antarctica
5. Aggressively explore and exploit international collaborations to expand research opportunities for US investigators in Antarctica

Antarctic Sciences COV Membership

- Chester S. Gardner (Chair), University of Illinois at Urbana-Champaign
- Terry Wilson (Office Advisory Committee Representative), Ohio State University
- Mahlon C. Kennicutt II, Texas A&M University
- Mark Fahnestock, University of New Hampshire
- Erik Brown, University of Minnesota, Duluth
- Carol Finn, US Geological Survey, Denver
- Amy L. Walton, NASA and JPL
- Sally Oey, University of Michigan
- Donal T. Manahan, University of Southern California

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

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

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

Provide comments in the space below the question. Discuss areas of concern in the space provided.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCESS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE ¹
<p>1. Are the review methods (for example, panel, ad hoc, site visits) appropriate?</p> <p>Comments: The review methods varied for the proposals we examined. Mail reviews, panel reviews or more commonly a combination of both were employed. In a few isolated cases the program director simply made the funding decision (e.g. SGER proposals). The methods employed were appropriate and the process was generally well managed across all programs.</p> <p>We did find one relatively large award that was based on only four external reviews and that was not taken to panel. While we recognize that NSF policy was met, and we understand that there are many other factors that are taken into account by program directors when formulating a recommendation, we believe that closer scrutiny via external review is appropriate for large and expensive projects such as this.</p>	Yes
<p>2. Are both merit review criteria addressed</p> <p>a) In individual reviews? Variable</p> <p><u>b)</u> In panel summaries? Yes</p> <p><u>c)</u> In Program Director review analyses? Yes</p> <p>Comments: The issues that were raised in the 2007 COV report about the evaluation of the broader impacts criterion have mostly been addressed. The depth of discussion of broader impacts varied across proposals, with the least emphasis in individual reviews. However, the situation has improved since the 2007 COV examined the issue in the fall of 2006. We are pleased to see such improvements and encourage ANT program directors to continue to give this topic attention.</p>	Variable/ Yes/ Yes

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

<p>3. Are IPY review criteria (as set forth in the solicitation) addressed</p> <p>a) In individual reviews? b) In panel summaries? c) In Program Director review analyses?</p> <p>Comments: Most IPY proposal reviewers explicitly addressed the IPY criteria. While several reviewers did not do so in detail, for those cases the program directors commented on the IPY criteria in their review analyses.</p>	<p>Mostly, Yes</p>
<p>4. Are reviewers effective at identifying strengths and weaknesses of disciplinary as well as interdisciplinary and multidisciplinary proposals?</p> <p>Comments: Most reviewers were able to identify strengths and weaknesses of these types of projects. Some had difficulty, but with few exceptions, reviewers recognized the unique challenges and opportunities of multi/interdisciplinary research projects. The panels and the program directors, worked collaboratively during the review process to make certain that multidisciplinary proposals were fairly evaluated so that exemplary projects could be funded.</p>	<p>Yes</p>
<p>5. Do the individual reviewers provide substantive comments to explain their assessment of the proposals?</p> <p>Comments: In most cases, the reviewers exercised significant and careful effort.</p>	<p>Yes</p>
<p>6. Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)?</p> <p>Comments: Most panel summaries provided value-added insight that enhanced the decision process, although the level of detail varied. We commend the special efforts that panel members made to address the merits of 'outlier' reviews and criticisms. However, there were other cases where panels simply reported that they concurred with the mail reviews of a specific project without further elaboration. Although, the proposals had received consistent mail reviews (usually for awarded proposals), simply reporting that the panel concurs only marginally enhances the review process. Panelists should be encouraged to express and document their own views based upon the sum total of all material provided to them for assessment, rather than just simply confirming what the mail reviews said.</p>	<p>Yes</p>
<p>7. Does the documentation in the jacket provide the rationale for the award/decline decision?</p> <p>Comments: Informed substantive justification of funding decisions is provided in most jackets in the form of the program director's review analyses and comments. In most instances, the review analyses were comprehensive, informative and provided guidance to the proposers.</p>	<p>Yes</p>

<p>8. Does the documentation to the PI provide the rationale for the award/decline decision?</p> <p>Comments: In many cases it was unclear exactly what was communicated to the PI. Some explanations were brief (they referred to proposal reviews, which were included), but it was not clear how much of the formal review analysis was transmitted to the PI. The mail reviews and panel summaries are mostly sufficient, but based upon our examination of the eJackets, we believe documentation of PI communications could be improved. All communications with the PI should be clearly documented and labeled in the eJacket for ease of review by the next COV.</p>	<p>Data Not Consistently Available</p>
<p>9. Does the documentation to the PI provide the information on logistical factors that influenced the award/decline decision?</p> <p>Comments: We found an absence of information on logistical details in the proposals, review materials and other documentation. In contrast to the 2007 COV, we did not find many proposals that were declined because of logistical challenges. Logistics documentation was not consistent across programs and it was difficult to evaluate. For example, it was unclear how the 2007 COV obtained information to conclude that 60% of highly regarded (for the science) proposals were declined for logistics reasons.</p>	<p>Not Enough Information</p>
<p>10. Is the time to decision appropriate?</p> <p>Comments: The time to decision is getting longer but we recognize there are many extenuating circumstances. The Division of Antarctic Sciences (ANT) supported the large, complex and time constrained IPY program with no new staff increases. Fortunately, personnel from other NSF divisions were available to assist. Continuing federal budget resolutions when they occur, constrain the amount of program funds that NSF program directors can commit in a given fiscal year. Quite appropriately award decisions were delayed this year because of the potential of receiving additional funding through ARRA. Coordinating the growing number of international collaborations adds additional delays, while many Antarctica based projects must negotiate a 2-step process in which science and then logistics demands are evaluated and negotiated.</p> <p>The six-month NSF target might be unrealistic for ANT projects given the special demands that multidisciplinary, international projects involving challenging logistical support, place on the program directors. What has been accomplished in this challenging environment is commendable. However, paperwork demands and delays continue to grow. Perhaps OPP and the Office Advisory Committee (OAC) could explore longer-range solutions to this problem. We believe the program directors are doing a remarkably effective job, given the challenges. Nevertheless, growing delays can compromise scientific progress so ANT should continue to strive to reduce the time to decision.</p>	<p>Not really, but there are extenuating complexities</p>
<p>11. Additional comments on the quality and effectiveness of the program's use of the merit review process:</p>	

Comments: We are pleased to observe greater uniformity and effectiveness in the use of both mail reviewers and panels than was noted by the 2007 COV. The concern expressed by the 2007 COV about the Antarctic Ocean and Atmospheric Sciences Program has been addressed. Reviewers are drawn from a broad range of institutions including other Federal agencies and international institutions. Scott Borg apprised us that he reads all the review analyses, all panel reports and most reviews associated with every proposal. We commend Dr. Borg and the programs directors for doing an excellent job of ensuring that proposals are evaluated fairly and that appropriate (for Antarctica) high quality research is supported.

A.2 Questions concerning the selection of reviewers. Provide comments in the space below the question. Discuss areas of concern in the space provided.

SELECTION OF REVIEWERS	YES , NO, DATA NOT AVAILABLE, or NOT APPLICABLE ²
1. Did the program make use of reviewers having appropriate expertise and/or qualifications?	Yes
<p>2. Did the program use reviewers balanced with respect to characteristics such as geography, type of institution, and underrepresented groups?</p> <p>Comments: These are statistical questions, which should be evaluated for the entire set of proposals processed by ANT since the last COV (e.g. all proposals and awards during the past three years). The data made available to us was too limited to draw definitive conclusions. Also, demographic data is self-reported, with only about 25% of reviewers reporting this information. During our evaluation of the 96 eJackets reviewed, it was difficult to identify underrepresented groups, but four-year colleges and significant female participation were noted.</p> <p>In the future, the data provided to the COV should be disaggregated by year for all awards and declines and comparison data for all of NSF should be provided. Future COVs can then assess whether or not OPP and ANT are doing an adequate job of encouraging diversity of participation in Antarctic research and education programs. We recommend that the Office of Polar Programs and ANT collect and summarize these data for subsequent COVs in advance of their meetings (see C.5).</p>	Data Not Available
3. Did the program recognize and resolve conflicts of interest when appropriate?	Yes

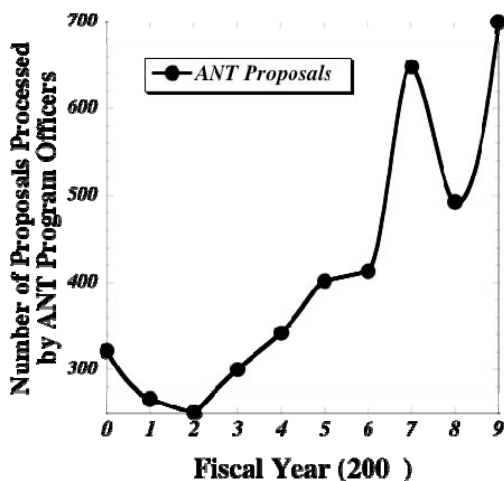
² If "Not Applicable" please explain why in the "Comments" section.

Comments: Our analysis shows that program directors are appropriately sensitive to this issue and they address their responsibilities seriously and effectively.

4. Additional comments on reviewer selection:

Comments: The program directors do an outstanding job of selecting knowledgeable reviewers (and panel members) and they manage the review process effectively, often exceeding NSF guidelines. There was an excellent example, presented by one of the program directors, of ongoing efforts to improve the mail review return rate as well as the quality, depth and breadth of the review panels. We commended ANT for these important efforts.

The proposal data provided to the COV during its meeting illustrate this significant effort on the part of the six ANT program directors who in FY 2009 processed an average of more than 100 proposals apiece, involving 600-700 reviewers. In fact, we have concerns about workload as proposal pressure has grown steadily during this decade (more than doubled, see graph), while the number of program directors has remained constant. The following example illustrates the perceived workload issue. In FY 2000, six program directors processed 322 proposals by requesting 2055 mail reviews and evaluating 1187 actual mail reviews plus 1051 panel reviews (2238 total reviews). In FY 2009, six program directors processed 700 proposals by requesting 3960 mail reviews and evaluating 2409 actual mail reviews plus 724 panel reviews (3133 total reviews).



We are surprised that ANT management has been able to perform so well given the growth in proposals and the special challenges presented by the IPY program and ARRA funding. We are concerned that ANT may not be able to continue responding effectively to growing pressures from the scientific community without appropriate staff increases at the program director level. We recommend that ANT carefully evaluate current program director workloads and add additional staff as justified. (C.1 Recommendation #1).

A.3 Questions concerning the resulting portfolio of awards under review.

Provide comments in the space below the question. Discuss areas of concern in the space provided.

RESULTING PORTFOLIO OF AWARDS	APPROPRIATE, NOT APPROPRIATE ³ , OR DATA NOT AVAILABLE
<p>1. Overall quality of the research and/or education projects supported by the program.</p> <p>Comments: The Antarctic Sciences Division supports highly regarded projects that explore significant research questions that can best be addressed in Antarctica. ANT supports a diverse portfolio in aeronomy and astrophysics, earth sciences, glaciology, integrated system science, ocean and atmospheric sciences and organism and ecosystems. The collective research portfolio represents exceptional breadth and includes an appropriate balance of high risk but potentially transformative projects. For example, teams are exploring signal problems as diverse as the origins of the universe and contemporary sea level and ecosystem response to a warming climate.</p>	Appropriate
<p>2. Does the program portfolio promote the integration of research and education?</p> <p>Comments: Many awards included substantive educational (graduate and undergraduate) and outreach activities (K12 and general population). We also identified excellent efforts that leverage existing large outreach projects or dedicated EPO projects (such as those sponsored by ANDRILL and CReSIS).</p>	Appropriate
<p>3. Was research and education effectively integrated in IPY grants?</p> <p>Comments: The majority of awarded IPY projects had effective outreach plans and materials. The extent of resource commitments varied.</p>	Appropriate
<p>4. Are awards appropriate in size and duration for the scope of the projects?</p> <p>Comments: Qualitatively, we believe that projects were funded at appropriate levels and durations. Past COVs have expressed concern that negotiated budget reductions may have deleteriously influenced graduate student involvement. We do not see evidence for this being a significant problem for the projects that we reviewed.</p>	Appropriate
<p>5. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Innovative/potentially transformative projects? 	Appropriate

³ If “Not Appropriate” please explain why in the “Comments” section.

<p>Comments: The program directors clearly recognize the importance of providing support for high-quality high-risk projects, both small and large. See also our response to question A.3.1.</p>	
<p>6. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Inter- and Multi- disciplinary projects? <p>Comments: By their nature, OPP and ANT are leaders in facilitating interdisciplinary science. Collaborations with other NSF programs outside OPP provide tangible evidence of this commitment and balance. Examples of co-funding with other NSF programs include the LTER programs and the South Pole telescope. We commend the ANT and OPP leadership for creating AISS to further facilitate interdisciplinary projects within ANT.</p>	Appropriate
<p>7. Does the program portfolio have an appropriate balance considering, for example, award size, single and multiple investigator awards, or other characteristics as appropriate for the program?</p> <p>Comments: The program portfolio contains a broad and appropriate mix of projects.</p>	Appropriate
<p>8. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Awards to new investigators? <p>Comments: Based upon data provided to the COV during our meeting we make the following observations. During the 3-year period FY 2007-2009 the Antarctic Program received 436 proposals from new investigators and funded 71 for a success rate of 16%. Proposals from new investigators comprised about 29% of the total while their success rate is about half the rate for all investigators (32%). These statistical measures have not varied significantly within the Antarctic Sciences Division during the past decade. NSF-wide comparisons should be made.</p>	Appropriate
<p>9. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Geographical distribution of Principal Investigators? <p>Comments: There appears to be an appropriate balance in geographical distribution of PIs among the proposals submitted. During FY 2007-2009, every state was represented among proposal submissions. This same data for the portfolio of supported research programs was not available so we cannot judge how effective the ANT was in achieving geographical balance among awarded projects. NSF-wide comparisons should be made.</p>	Data Not Available
<p>10. Does the program portfolio have an appropriate balance of:</p> <ul style="list-style-type: none"> • Institutional types? 	Appropriate

<p>Comments: There is a good diversity and balance among institutional types represented in the eJackets that we examined. NSF-wide comparisons should be made.</p>	
<p>11. Does the program portfolio have an appropriate balance:</p> <ul style="list-style-type: none"> • Across disciplines and sub disciplines of the activity? • Across programs within the division? <p>Comments: Qualitatively, the program portfolio is distributed over a wide and exciting range of disciplines and sub disciplines.</p>	<p>Appropriate</p>
<p>12. Does the program portfolio have appropriate participation of underrepresented groups?</p> <p>Comments: Based upon data provided to the COV during our meeting we make the following observations. During the 3-year period FY 2007-2009, the Antarctic Sciences Division received 71 proposals (~5% of the total) involving significant participation by minorities (i.e. PIs). ANT funded 21 for a success rate of nearly 30%, which is statistically identical to the success rate for all investigators (32%).</p> <p>During this same period, ANT received 460 proposals (30% of the total) submitted by female PIs and funded 88 for a success rate of 19%, a bit more than half the 32% success rate for all investigators and only slightly higher than the 16% success rate for new investigators. The lower success rate for female PIs is somewhat surprising and so we encourage ANT and the next COV to explore this issue in more detail to confirm that the proposal review and award processes are free of gender bias.</p> <p><i>It would be helpful if similar data could be provided for NSF as whole to assess whether or not the experiences of the Antarctic Sciences Division are consistent with those of the NSF norm and targets (see C.5).</i></p> <p>Although we judge these participation rates to be appropriate, <i>except perhaps for the relatively low success rate of female PI's</i>, we believe that encouraging diverse participation in the research supported by the Antarctic program should continue to be a priority for both senior management and the program directors.</p>	<p>Appropriate</p>
<p>13. Is the program relevant to national priorities, agency mission, relevant fields and other constituent needs? Include citations of relevant external reports.</p> <p>Comments: The Antarctic Sciences Division does an excellent job of addressing national, agency, and multiple science community mandates that are relevant to Antarctica. For example, several projects directly address our gaps in knowledge of climate change cited by the Intergovernmental Panel on Climate Change reports. The IPY program is a substantive response to the "Visions for the International Polar Year", an important National Academy</p>	<p>Appropriate</p>

<p>of Sciences (NAS) report. In addition, the portfolio addresses other NAS climate change reports and the NAS astronomy and astrophysics decadal surveys.</p> <p>The Antarctic research portfolio addresses NSF's missions to promote the progress of science; to advance the national health, prosperity, and welfare; and to secure the national defense (see Section B). Without question ANT has been responsive to national priorities and constituent needs (related to polar regions and Antarctica) and is highly relevant to addressing many of those priorities and needs.</p>	
<p>14. Does the division's award portfolio appropriately address division goals and NSF-wide strategic goals?</p> <p>Comments: The award portfolio clearly furthers the division's goals: to expand fundamental knowledge of the Antarctic, to foster research on global and regional problems of current scientific importance, and to use the region as a platform from which to support research. The research portfolio addresses NSF Strategic Goals: supporting <i>discovery</i> at the frontiers of science, <i>learning</i> through education and outreach, <i>research infrastructure</i> by supporting and maintaining equipment needed for both research and logistics, and <i>stewardship</i> of our nation's scientific capacity.</p>	<p>Appropriate</p>
<p>15. Additional comments on the quality of the projects or the balance of the portfolio</p> <p>Comments: We commend the OPP and ANT senior management and the ANT program directors for their proactive work with the community to build the US scientific program in Antarctica. Their efforts have facilitated large complex projects and fostered interdisciplinary cooperation on an international scale for the efficient and effective use of resources that is advancing an important scientific agenda.</p> <p>This broad portfolio represents a substantial public investment to acquire the data needed to address a wide range of important scientific questions. <i>We recommend that OPP and ANT management take steps to safeguard this significant data legacy by ensuring that data sets from past, current and future projects are in the public domain and is readily accessible (C.1 Recommendation #2).</i></p> <p>Many, though not all, science communities have developed guidelines for their data (including setting standards for formats and completeness for measured data and gridded products) to facilitate access and simplify the archiving process. With the help of the Office Advisory Committee, OPP and ANT should develop and adopt an appropriate data policy for funded projects. The program directors should be responsible for communicating the policy to their PIs and ensuring compliance.</p>	

A.4 Management of the program under review.

Please comment on:

1. Management of the program, [including IPY activity](#).

Comments on Overall program management: The Antarctic Science Division has a complex mission, with a broad and diverse set of stakeholders. ANT program directors have been highly effective in their management of the many research and support activities. Facilitating the diverse portfolio of proposals and funded projects, while dealing with challenging and rapidly changing logistics constraints, has improved significantly since the last COV highlighted concerns about logistics impacts on science. ANT Division Director Scott Borg has provided strong leadership and fostered a collaborative working relationship with the Antarctic Infrastructure and Logistics Division (AIL) that has been important to the success of Antarctic science activities, including IPY. Scott and his team of program directors, with the support of Brian Stone, Acting AIL Director, have been especially successful in managing a demanding proposal evaluation and award process.

Comments on Management of the IPY activity: The US Antarctic component of the IPY was an unusually challenging program with a complicated set of logistical requirements. It was managed well, surprisingly so, given the “last minute” availability of funding.

We believe the IPY experience represents an excellent example of how Antarctic science is evolving. It illustrates an important future pathway for conducting Antarctic research that should influence the future directions of OPP and the NSF. Programs initiated under IPY have fostered new research opportunities and developed productive connections within the international polar science community. Although the initial response by NSF management to the IPY was slow, OPP managers reached across disciplinary boundaries within NSF to involve additional programs in this effort. In addition, the judicious coordination of US Antarctic support by division directors and program directors, with logistical capabilities offered by the large community of international collaborators, ultimately allowed a more robust research opportunity to be realized. This collaborative international approach could be a model for facilitating Antarctic science opportunities in the future (see also responses to A.5.1 and A.5.2 and C.1 Recommendation #5).

In the end, IPY was a great success for the Antarctic science community and for OPP.

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

Comments: The record of responsiveness represented by the eJackets that we evaluated is quite positive (e.g. managing the IPY competition and processing the awards). However, a new model of international collaboration in Antarctica is emerging that requires senior management to assume an even greater leadership role in the future (see responses to A.5.1 and A.5.2 and C.1 Recommendation #5).

3. Program planning and prioritization process (internal and external) that guided the development of the portfolio, [including IPY planning, workshop recommendations and program director interactions with the scientific community.](#)

Comments: The program planning and prioritization process is well-structured and effectively managed for proposal driven science on the shorter time horizons (up to about 5 years). ANT is engaged with the scientific community and is cognizant of the key studies and reports that set overall research priorities. The program directors and their senior managers are responsive to these community driven initiatives.

IPY is an example of how Antarctic research can evolve in productive ways to leverage much greater benefit for both the US and international polar research community. However, fully realizing this potential requires enhanced longer range planning that in turn will require OPP senior management to maintain and expand its leadership role (see responses to A.5.1 and A.5.2 and C.1

Recommendations #4 and #5).

Community interactions with the ANT Division Director and program directors are crucial for communicating national, agency and division priorities to potential PIs, as well as enabling OPP and ANT to better understand emerging scientific questions and the challenges of addressing them. Unfortunately, NSF travel restrictions have seriously limited the ability of the program directors to interact with the science community in a productive, fully engaged manner and the growing proposal and workload pressures exacerbate this problem (see response to A.2.4).

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

Comments: ANT responded positively and decisively to all but one of the key recommendations articulated in the 2007 COV report. In particular, we found no evidence that an excessive number of highly regarded scientific proposals were declined because of intractable logistical challenges. We commend the ANT senior management and program directors and the AIL senior management and staff, who have been notably effective in addressing the problems identified by the 2007 COV. While logistical complexities and cost can sometimes play a role in deciding not to fund a project, ANT and AIL are clearly committed to finding ways to support the best science that has been proposed. The evidence presented in the eJackets demonstrates that they are succeeding in the large majority of cases. We also commend ANT for establishing the Antarctic Integrated System Science program, which was a direct response to another recommendation in the 2007 COV report.

The only recommendation, for which the OPP/ANT response was equivocal, was related to long-term scientific measuring activities. The 2007 COV encouraged ANT and OPP to embrace a commitment to, and establish a budget for, supporting long-term measurements in Antarctica. These issues have not been addressed adequately. ***We concur with the views articulated by the 2007 COV regarding the importance of identifying and supporting key long-term scientific observations and recommend that this issue be addressed in collaboration with other mission-oriented Federal agencies (C.1 Recommendation #3).***

5. Additional comments on program management:

Comments: The Antarctic Science Division has an established record of responding effectively to community driven research initiatives. We are also pleased that senior management within the ANT and the OPP has exercised a leadership role on many issues that affect the international polar community. We believe such proactive roles are entirely appropriate and may be crucial in the coming years for the US Antarctic research program to take full advantage of emerging international opportunities and to successfully mitigate the serious threats to research quality that aging facilities and infrastructure and a weak international economy represent (see responses to A.5.1 and A.5.2 and C.1 Recommendations #4 and #5).

The program directors are the first and most frequent point of contact with the PIs and the science community. While we have been impressed with their accomplishments, we are concerned that increasing proposal pressures and their limited ability to interact with the community outside of NSF (due to lack of travel funds) may compromise their effectiveness in the future. Travel budgets for attending scientific meetings remain inadequate and the doubling of the average number of proposals processed per program director during the past decade is worrisome (see response to A.2.4 and C.1 Recommendation #1).

A5. Joint Questions – Antarctic Sciences and Antarctic Infrastructure & Logistics/Polar Environment, Health & Safety.

<p>Antarctic Sciences and Antarctic Infrastructure & Logistics (AIL)/ Polar Environment, Health & Safety (PEHS)</p>	<p>APPROPRIATE, NOT APPROPRIATE⁴, OR DATA NOT AVAILABLE</p>
<p>1. Are processes in place to ensure alignment of USAP support infrastructure to emerging scientific community requirements within a reasonable timeframe?</p> <p>Comments: Annual planning seems efficient and comprehensive, but longer-term plans are inadequate. We concluded that due primarily to workload constraints, the USAP has had little time to analyze and prepare for strategic alignment between emerging scientific requirements and USAP support infrastructure and cyber-infrastructure. The predominantly “bottom-up” approach to setting priorities tends toward a reactive support model rather than a strategic, forward-looking model of operation. The overwhelming demand of the current projects focuses attention on the near-term out of necessity.</p> <p>Concentration of efforts on short-term needs does not allow for long-term planning and alignment of assets in accordance with future trends in infrastructure demand. Given the long lead-time for major infrastructure procurement and construction, it is especially critical that long-term planning be an important aspect of the overall strategy of OPP. We offer as an example, successful efforts to rebuild the South Pole Station and the long lead time needed to sell the concept, garner a national commitment, and finally implement the plan. In contrast, while the need for reliable ice breaking capabilities has been long argued, it has been difficult to garner the necessary financial support to fund a long-term solution or develop a management strategy to reduce risk. The lack of such a long-term plan puts the overall program at significant risk of failure potentially leading to a major mismatch or shortfall in the alignment of infrastructure and scientific community requirements.</p> <p>To this end it is critical that a robust process be put in place, which includes strategic planning in collaboration with the US Antarctic scientific community. In addition, it will be critical to align infrastructure investments with future directions in science through an iterative and consultative process. A series of grand challenges/ frontiers reports might be an effective manner to engage the Antarctic community in long-range strategic science planning. Other communities, such as astronomy, seem to be effective at community-wide planning and priority setting. Lessons can be learned from those efforts.</p> <p><i>We recommend that a rigorous strategic planning process be developed (and staffed appropriately) that can set short-, mid- and</i></p>	<p>Not Appropriate</p>

⁴ If “Not Appropriate” please explain why in the “Comments” section.

<p>long-term objectives for infrastructure and support that will assure the overall mix of support capabilities is in concert with future directions in Antarctic science and related support needs (C.1 Recommendation #4).</p> <p>Independent mechanisms to conduct such community-wide strategic planning might include the National Science Board, the National Academies (PRB), the Office Advisory Committee, and other organizations in a manner similar to the Augustine Report that led to the redevelopment of the South Pole Station.</p> <p>Have Antarctic Sciences and AIL responded to those emerging requirements within a reasonable timeframe?</p> <p>Comments: In the past, a qualified yes (i.e., the IPY).</p> <p>ANT program solicitations provide evidence of joint efforts by ANT and AIL to accommodate emerging requirements in program solicitations. Community initiatives documented from workshops and emerging science approaches apparent at national science meetings have been incorporated into ANT. For example, an agreement for collection of new types of data (e.g., agreement with the National Center for Airborne Laser Mapping (NCALM; http://www.ncalm.ufl.edu) at the University of Florida to support airborne LIDAR surveys [nsf07549]; creation of a new program to promote new integrative approaches to understanding the polar earth system (the Antarctic Integrated System Science (AISS) program established in 2007 [nsf08535]), and establishment of helicopter-supported deep-field base camps for earth science and glaciology studies (e.g., as called for by the TRANZ-TAM community workshop).</p> <p>Community workshops remain the principal mechanism employed by ANT programs to identify developing community science priorities and requirements. Clearly the ANT Division Director and program directors monitor workshop reports and discuss them with AIL on an <i>ad hoc</i> basis to prepare for emerging logistic requirements. However, we identified no transparent post-workshop processes in place for decision-making on implementation of science support desired by the community. In some cases ANT appears to be ahead of community needs (e.g. LIDAR), whereas in others no enabling action has been taken (e.g., long-range research aircraft).</p>	
<p>2. Have Antarctic Sciences and AIL been effective in developing appropriate partnerships to provide logistics and infrastructure support</p> <ul style="list-style-type: none"> • With other federal agencies? <p>Comments: The effectiveness of interagency collaborations is dependent on leadership in both organizations and the desire to collaborate. There are a number of effective cooperative programs including long duration balloon launches, UNAVCO for GPS, NASA, and others. The experience of the COV members is that on a proposal-by-proposal basis cooperation between agencies can be effective but more efficient mechanisms are needed if NSF OPP is to rely more heavily on agency partnerships to accomplish its missions.</p>	<p>Appropriate</p>

One aspect of agency cooperation is support for essential long-term scientific monitoring efforts that might be seen as standard or routine measurement. Maintenance of long-term observations is critical to modern Antarctic science and climate change studies but complicating this issue is the realization that long-term commitments are incompatible with normal funding cycles. Might these programs be more effectively managed by mission-driven agencies producing greater long-term stability and sustainability?

- **With other national Antarctic programs?**

Comments: Antarctic science and research has a long and distinguished history of international collaboration, but the paradigm is changing. The international prioritization of climate change is likely to drive major scientific initiatives, in which the US should play a leading role. One legacy of the IPY is enhanced global capacity to conduct and support research in the Antarctic region including stations, ships, inter- and intra-continental access, and improved logistical and scientific capabilities. Estimates of worldwide IPY investments range into the billions of dollars much of which was used to expand, improve, and enhance the infrastructure that supports science. Budgetary realities and the costs of conducting science in remote and hostile environments have increased the urgency for Antarctic nations to act in partnership to accomplish increasingly complex scientific operations. The emergence of an increasing number of major Antarctic nations provides unparalleled opportunities to leverage individual national investments through international partnerships. Many emergent national programs have invested in infrastructure and logistics capabilities that exceed their current national need, creating excess capacity. The US Antarctic Program is well-positioned to promote and facilitate international partnerships by developing mechanisms to allow US scientists to avail themselves of opportunities created by other national programs during and beyond the IPY.

International partnerships provide an added dimension for meeting US demands that exceed US capacity without requiring investments in infrastructure. Many national Antarctic programs implement “top-down” scientific research priorities. This allows those national programs to commit resources to long-term strategic directions based on agreed national priorities. In contrast, in the US a “bottom-up” scientific community-driven process sets national scientific priorities. The year-to-year budget process and a reactive approach driven by proposal pressure hamper the setting of long-term science directions and infrastructure investments by the US Antarctic Program. This disadvantages the US Antarctic Program in developing and sustaining long-term, strategic arrangements with international partners.

We recommend that OPP/ANT management assume an expanded leadership role to more actively and aggressively pursue program-to-program partnerships that encourage and allow US utilization of excess capacity being developed by other national programs (C.1 Recommendation #5). The lack of such mechanisms threatens US leadership in some of the most promising areas of Antarctic research being developed at the international level. OPP should speak and negotiate for the distributed US Antarctic scientific community with foreign entities to ensure that the US not only participates but actively influences future directions in

<p>international Antarctic science. International partnerships should be seen as a valued effort and an essential ingredient in accomplishing US Antarctic Program scientific objectives and goals. Cost savings, access to new and differing capabilities and engagement of intellectual expertise beyond US borders is critical to advancing US Antarctic science. IPY demonstrated that answers to the most pressing scientific questions being addressed in Antarctica are often unobtainable by individual investigators, projects, or even national programs in isolation. International partnerships must be an intrinsic element of future US plans for Antarctic science and administrative barriers to such collaboration should be minimized to facilitate such partnerships.</p>	
<p>3. Was the review of logistics requirements and subsequent allocation of logistics resources conducted expeditiously?</p> <p>Comments: Electronic jacket resources made available to the COV do not present data on the speed of logistic review, nor, in general, on whether the logistic review process was a factor in the lengthening average dwell time for awards and declines.</p> <p>The “Annual Proposal Review” documentation provided on the CD shows that logistic assessment of science proposals with high ranking for funding was completed in a timely manner. In 2006 it was approximately 5 months from panel review to completed “Annual Proposal Review” and this decreased to about 2.5 months in 2007 and 2008.</p> <p>Inevitably, however, inter-program ‘competition’ for shared logistic assets mandates multiple rounds of revised logistic scoping, reassessment, and negotiation. This is particularly true for projects with large and complex logistic programs. It appears that these repeated assessment cycles are an ongoing source of long ‘dwell times’ for OPP proposals involving fieldwork, although we have little documentation for this. The “Allocated Resource Summary” documentation provided on CD does show that a few proposals with international partnerships and/or unusual logistics remained pending for over a year after submission.</p> <p>We concluded that ANT and AIL work well together on specific proposals. AIL requirements reviews are good and they ensure that adequate logistical support is available to support science in most cases in an expeditious manner.</p> <p>Competition for resources between programs seems to be adequately managed and overall capabilities are managed <i>in toto</i>. But longer-term views of future needs are not routinely evaluated. It can be expected that on a go-forward basis, continued growth in budgets is unlikely and current logistical activities will increase in cost resulting in overall erosion of logistics capabilities. Who will make the hard decisions about allocations amongst projects? Will science drive the logistics budget or will the logistics budget limit the science that can be performed? These will be difficult and controversial decisions and it is imperative that an open, transparent, and consultative process be in place to develop consensus agreement on priorities. We believe that addressing these strategic issues now, while the</p>	<p>Appropriate But Data Unclear</p>

program is relatively financially healthy will be much less painful than addressing the issue once resources have become a major limiting factor on the science that will be performed (see C.1 Recommendations #4 and #5).

PART B. RESULTS OF NSF INVESTMENTS

The NSF mission is to:

- promote the progress of science;
- advance national health, prosperity, and welfare; and
- secure the national defense.

To fulfill this mission, NSF has identified four strategic outcome goals: Discovery, Learning, Research Infrastructure, and Stewardship. The COV should look carefully at and comment on (1) noteworthy achievements based on NSF awards; (2) ways in which funded projects have collectively affected progress toward NSF's mission and strategic outcome goals; and (3) expectations for future performance based on the current set of awards.

NSF investments produce results that appear over time. Consequently, the COV review may include consideration of significant impacts and advances that have developed since the previous COV review and are demonstrably linked to NSF investments, regardless of when the investments were made.

To assist the COV, NSF staff will provide award "highlights" as well as information about the program and its award portfolio as it relates to the three outcome goals of Discovery, Learning, and Research Infrastructure. The COV is not asked to review accomplishments under Stewardship, as that goal is represented by several annual performance goals and measures that are monitored by internal working groups that report to NSF senior management.

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

B.1 OUTCOME GOAL for Discovery: *"Foster research that will advance the frontier of knowledge, emphasizing areas of greatest opportunity and potential benefit and establishing the nation as a global leader in fundamental and transformational science and engineering."*

Comments: The recent national and international prioritization of global climate change positions OPP and ANT at the forefront of this initiative, establishing the US as the undisputed leader in this global endeavor. However, ANT supported science is broad and diverse. Examples of fostering research that advances the frontiers of knowledge in areas of great importance, including climate change are:

- **Opportunities for research (SGER's), now mainstreamed and competitive in regular programs, For example:**
 - **0741428 SGER: Science-of-opportunity aboard Icebreaker *Oden* — Antarctic bacterial remineralization** - Yager, Patricia (University of Georgia). This proposal focuses on the remineralization of particulate organic matter in the water column of the Ross Sea and Amundsen Sea, and takes advantage of a platform of opportunity, the transit of the Icebreaker *Oden* from Punta Arenas, through the Amundsen Sea and Ross Sea, to McMurdo Station

- **0741428 - SGER: Science-of-Opportunity Aboard Icebreaker *Oden* — Phytoplankton Global Change Experiments and Vitamin/Iron Co-Limitation in the Amundsen and Ross Seas** - Hutchins, David (University of Southern California) – this research emphasizes use of an opportunistic research platform to address two questions about present day and future controls on Antarctic margin phytoplankton communities
- **Creation of the Antarctic Integrated System Science Program (AISS)** as a new program to foster interdisciplinary and transformative research that cross-cuts other programs
- **International Trans-Antarctic Scientific Expedition (ITASE)** - Researchers will continue studies of the last 200 years of environmental history of East Antarctica by means of ice coring and data collection along a traverse route from Taylor Dome to South Pole
- **Long-term ecological research (LTER)** - Two sites in Antarctica —the McMurdo Dry Valleys and the marine environment on the west coast of the Antarctic Peninsula— are among 26 NSF-sponsored LTER sites dedicated to understanding ecological phenomena over long temporal and large spatial scales (most of the other sites are in the continental United States)
- **0632161**, Johnson, U MT; **0631973**, Joughin, U WA; **0732946**, Steffen, U CO-Boulder; **0732921**, Scambos, U CO-Boulder; **0732467**, Domack, Hamilton C; **0732983**, Vermet, UC-San Diego/Scripts; 0632282, Jacobs, Columbia U - Ice shelf (**LARSEN Ice Shelf System, Antarctica LARISSA and work under the Pine Island Glacier tongue “Ocean-Ice Interaction in the Amundsen Sea”**) and glaciology projects supported by the International Polar Year Program, which leverage large and diverse international research efforts in Antarctica to study recent rapid ice sheet response to climate, including ocean forcing of ice sheet flow changes, and associated impacts on sea level
- **The West Antarctic Ice Sheet (WAIS) Divide Drilling project and ANDRILL (ANTarctic geological DRiLLing)** which are acquiring deep ice and sediment cores to provide a southern hemisphere counterpart to the invaluable climate record extracted at Summit, Greenland, capturing records of rapid climate changes in the recent past, as well as longer-term studies in paleo-climatology, in addition to providing information relevant to ice dynamics and cryobiology
- **Southern Ocean Global Ocean Ecosystems Dynamics (SO GLOBEC)** project which is developing regional models for ecosystem responses to climate change
- **0638937 - 10 m South Pole telescope observations** which are being used to address fundamental questions about the origins of the universe and the nature of Dark Energy [Carlstrom, U Chicago; 0742818, Kovac, Cal Tech]
- **0632359 IPY: A Metagenomic Investigation of Adaptation to Prolonged Cold and Dark Conditions of the Lake Vostok Microbial Community** - Lanoil, Brian (University of California, Riverside) - This project brings together researchers with expertise in molecular microbial ecology, Antarctic and deep sea environments, and metagenomics to address the overarching question: how do ecosystems dominated by microorganisms adapt to conditions of continuous cold and dark over evolutionarily and geologically relevant time scales?
- **0632125 - Collaborative Research: IPY — GAMBIT, Gamburtsev Aerogeophysical Mapping of Bedrock and Ice Targets** Multiple PIs - Fahnestock, Mark – (University of New Hampshire) - This award supports an aerogeophysical study of the Gamburtsev Subglacial Mountains (GSM), a Texas-sized mountain range buried beneath the ice sheets of East Antarctica
- **0632136 - Collaborative Research: IPY — POLENET-Antarctica — Investigating Links between Geodynamics and Ice Sheets** - Multi-PIs, Nyblade, Andrew (Pennsylvania State University)- This project constructs POLENET a network of GPS and seismic stations in West Antarctica to understand how the mass of the West Antarctic ice sheet (WAIS) changes with time.
- **0632389 - IPY: Bacterioplankton Genomic Adaptations to Antarctic Winter** - Murray,

Alison (University of Nevada, Desert Research Institute) This project will characterize the winter bacterioplankton genome, transcriptome, and proteome and identify those features (community composition, genes up-regulated, and proteins expressed) that are essential to winter bacterioplankton survival and livelihood

- **0701911 Population Genomics of Cold Adaptation in Polar Environments** - Olson, Matthew (University of Alaska, Fairbanks)- The Marine Advanced Technology Education (MATE) Center is a national partnership of community colleges, high schools, universities, informal educational organizations, research institutions, marine industries, and working professionals
- **0732665 - Collaborative Research IPY: Comparative Genomic and Proteomic Survey of Major Antarctic Marine Phytoplankton — A Foundation for Polar Phytoplankton Genomics** - Saito, Mark (Woods Hole Oceanographic Institution) - The research project will create a foundation for polar marine phytoplankton genomics and proteomics, by surveying three major taxa common to Antarctic waters using primarily expressed sequence tags libraries (EST)
- **0537532 - Collaborative Research: Norwegian-U.S. IPY Scientific Traverse—Climate Variability and Glaciology in East Antarctica** - Multi – PIs, Liston, Glen (Colorado State University) This award supports a project of scientific investigations along two overland traverses in East Antarctica: one going from the Norwegian Troll Station (72deg. S, 2deg. E) to the United States South Pole Station (90deg. S, 0deg. E) in 2007-2008; and a return traverse starting at South Pole Station and ending at Troll Station by a different route in 2008-2009

B.2 OUTCOME GOAL for Learning: “Cultivate a world-class, broadly inclusive science and engineering workforce, and expand the scientific literacy of all citizens.”

Comments: Examples of fostering scientific learning and literacy of all citizens include (many other examples could be provided):

- **Extensive participation of graduate students and post-doctoral researchers in most ANT projects**
- **Extensive learning and outreach activities associated with IPY projects** (see B.1), **ANDRILL** (<http://www.andrill.org/about>) and **CRISIS, Center for Remote Sensing of Ice Sheets** (<https://www.cresis.ku.edu/>)
- **OPP sponsored Antarctic Writers and Artists Program**
- **OPP sponsored Post-doctoral Fellowships In Polar Research Program**
- **0610122 - Penguin Science**, Ainley, David (H.T. Harvey & Associates) - This project produced an educational 30-minute DVD/TV film and interactive website with classroom materials about climate change and its effects on biota by presenting past and current research on the Adelie penguin, Antarctica's most accessible indicator species.
- **0632175 IPY: Engaging Antarctica** - Farrell, J Michael (University of Nebraska-Lincoln) - "IPY: Engaging Antarctica" is an informal science education project designed to increase public awareness of Antarctic geological research and discovery during the International Polar Year. Submitted through NET Television, the project will produced a PBS one-hour television documentary for air on NOVA in fall 2008 (w.t. "Antarctica's Icy Secrets") complemented by a multi-faceted outreach effort.
- **0632219 IPY: Live from the Poles** — A Multimedia Educational Experience Linder, Christopher (Woods Hole Oceanographic Institution) - This project brings together polar researchers, science centers and broadcast media reporters to tell the story of four polar research expeditions to the general public, teachers and students.
- **0632262 POLAR-PALOOZA** Haines-Stiles, Geoffrey (Geoff Haines-Stiles Productions) -

This project uses three complementary strategies to engage, inform and inspire large audiences. (1) A national tour called "Stories from a Changing Planet" that will include in-person presentations and hands-on activities by Polar scientists at science centers, museums, libraries and schools across the country. (2) the "HiDef video Science Story Capture Corp" team of professional videographers HD footage will be made available as public domain materials accessible to government research agencies, universities, science centers and others. (3) Video and Audio podcasts distributed through iTunes, google, Yahoo and IPY websites. The project will have front end, formative and summative evaluations.

- **0632324 Fostering Collaborative, Interdisciplinary Relationships Among the "New Generation" of Polar Researchers Participating in the IPY** Weiler, C. Susan (Whitman College) - The goal of the Next Generation Polar Research (NGPR) Symposium is to bring together past, current, and "new" polar investigators from diverse natural, physical and social science disciplines and to cultivate crossdisciplinary interactions during the International Polar Year 2007 (IPY).
- **0632360 IPY-ROAM: International Polar Year Research and Educational Opportunities in Antarctica for Minorities** - Tweedie, Craig (University of Texas at El Paso) - This proposal actively involves minority undergraduates, graduate students and K-12 teachers in hands-on research in Antarctica and provides a comprehensive mentoring program for the participants.
- **0632401 - IPY: PolarTREC (<http://www.polartrec.com/>) — Teachers and Researchers Exploring and Collaborating** Warnick, Wendy (Arctic Research Consortium of the U.S.) - "PolarTREC (Teachers and Researchers Exploring and Collaborating)" is a three-year teacher professional enhancement program that will advance polar science education by bringing K-12 educators and polar researchers together in hands-on field experiences in the Arctic and Antarctic
- **0732945 IPY STEM Polar Connections** Neill, Christopher, (Marine Biological Laboratory) - IPY STEM Polar Connections is a curriculum development and professional development program. It includes residential summer institutes with academic year online communication for in-service teachers who are involved in professional development of their colleagues.
- **0733048 - Ice Stories: A Public Educational Resource for IPY** - Miller, Mary, (Exploratorium) - Ice Stories proposed by the Exploratorium strives to create public awareness of the International Polar Year (IPY) and the multi-disciplinary range of IPY research, increase public understanding of the process of scientific research and stimulate an enhanced relationship between IPY research and public outreach activities

B.3 OUTCOME GOAL for Research Infrastructure: *"Build the nation's research capability through critical investments in advanced instrumentation, facilities, cyber infrastructure and experimental tools."*

Comments: Examples of building the nation's research infrastructure include (many others could be provided):

- **Redevelopment of the South Pole Station**
- **Construction of the IceCube Neutrino Observatory at South Pole** - the world's largest neutrino detector, which—after 6 years of work—will occupy a cubic kilometer of ice beneath the South Pole Station on Antarctica, deploying 4,800 photomultiplier tubes into holes that a hot water drill will make in the ice
- **Ongoing support of the Center for Remote Sensing of Ice Sheets (CReSIS) activities in Antarctica**
- **Ten-meter telescope.** Construction of the 10-meter telescope, or South Pole Telescope (SPT), was completed as planned with the first light achieved in February 2007

- **Developing long-duration ballooning capabilities in collaboration with NASA**
- **Ice Coring Drilling Services.** This project, one of the technical services in support of Antarctic science, provides ice core drilling to the U.S. Antarctic Program and NSF's Arctic Research Program.
- **0638937-** Carlstrom, U Chicago; 0742818 - Kovac, Cal Tech] Development of engineering and transport technologies for the extreme thermal conditions in Antarctica and modular construction necessitated by transport limitations, as demonstrated, for example, by the South Pole Telescope project
- **0233246 - Antarctic Mapping, Geodesy, Geospatial Data, Satellite Image Mapping, and Antarctic Resource Center Management** Mullins, Jerry (United States Geological Survey)
- **0440679 - Science Management Office for the U.S. Component of the International Trans Antarctic Expedition (U.S. ITASE SMO)** — A Collaborative Program of Research from Taylor Dome to South Pole - Mayewski, Paul (University of Maine) - This award supports the science management office (SMO) for a series of collaborative science proposals that are part of the U.S. contribution to the International Trans-Antarctic Scientific Expedition (US ITASE). It supports the science administration and the coordination of logistics needed in order to accomplish the research.
- **0631951 - IPY: Towards an Arctic Observing Network — An array of Ice-Tethered Profilers to Sample the Upper Water Properties** During the International Polar Year - Toole, John M. (Woods Hole Oceanographic Institution) - Funds are provided to initiate massive sampling of the Arctic Ocean water properties during all seasons.
- **0632161 - Collaborative Research: IPY, The Next Generation — A Community Ice Sheet Model for Scientist and Educators** - Johnson, Jesse V. (University of Montana)- This award supports a project to create a "Community Ice Sheet Model (CISM)". The intellectual merit of the proposed activity is that the development of such a model will aid in advancing the science of ice sheet modeling.
- **0632177 - IPY (Collaborative Research): Cloud Properties Across the Arctic Basin from Surface and Satellite Measurements — An Existing Arctic Observing Network -** Walden, Von P. (University of Idaho) - This research will increase the fundamental understanding of both temporal and spatial variability of Arctic clouds. Knowledge of Arctic cloud properties is important for understanding the overall energy balance of the Arctic, and how Arctic climate interacts with the global climate system.
- **0632354 - IPY: The International Polar Year Data and Information Services** - Parsons, Mark (University of Colorado, Boulder) - This effort will establish a central Data Coordination Office for the International Polar Year (IPY) to develop and promote the international relationships necessary to ensure accessibility, sharing, and long-term preservation of data produced by IPY projects.
- **0732752 - IPY: Polar Hydrobot Simulator** - McLain, Brad, (Space Science Institute) Space Science Institute (SSI) is conducting an International Polar Year project in partnership with the Marine Advanced Technology Center (NSF-funded MATE, Monterey, CA) and the Challenger Learning Center of Colorado (CLCC) to produce and disseminate an online simulation of scientific explorations by the latest generation of Antarctic underwater remotely operated vehicles (ROV).
- **0619457 - Development of a Polar Multidisciplinary Airborne Imaging System** for the International Polar Year 2007-2009 -Bell, Robin (Lamont-Doherty Earth Observatory, Columbia University).This project develops a system of airborne instruments to explore the polar ice sheets and their underlying environments. The instrument suite includes an ice-penetrating radar, laser altimeter, gravimeter and magnetometer.

PART C. OTHER TOPICS

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

In general, our assessment of ANT activities and their management is positive. The Division has been appropriately responsive to the scientific community on most of the important issues and priorities. The portfolio of research projects is diverse, innovative, relevant and inclusive. However, the global political, economic and scientific environments are changing and those changes will affect OPP's and ANT's ability to address its mission in the future. We offer the following recommendations to help ensure that the US Antarctic Program is able to take full advantage of the opportunities currently available and is best positioned to address emerging opportunities and challenges in the years ahead.

Proposal Solicitation, Review and Award Management

Recommendation #1: Proposal pressure has more than doubled during the last decade while the number of ANT program directors has remained constant at six. We are concerned that ANT may not be able to continue responding effectively to growing pressures from the scientific community without appropriate staff increases at the program director level. We recommend that ANT carefully evaluate current program director workloads and add additional staff as justified. (See A.2.4 response for additional comments)

Research Data and Long-Term Measurements

Recommendation #2: The diverse portfolio of research projects in the Antarctic program represents a substantial public investment to acquire the data needed to address a wide range of important scientific questions. We recommend that OPP and ANT management take steps to safeguard this significant data legacy by ensuring that data sets from past, current and future projects are in the public domain and are readily accessible. (See A.3.15 response for additional comments)

Recommendation #3: The FY 2007 COV encouraged ANT and OPP to embrace a commitment to, and establish a budget for, supporting long-term observations in Antarctica. These issues have not been adequately addressed. We concur with the views articulated by the 2007 COV regarding the importance of identifying and supporting key long-term measurements and recommend that this issue be resolved in collaboration with other mission-oriented Federal agencies. (See A.4.4 and A5.2a responses for additional comments)

Strategic Planning and International Collaboration

Recommendation #4: Annual planning seems efficient and comprehensive, but longer-term plans are inadequate. In order to maintain excellent program performance it is imperative that capabilities be created within OPP and ANT to conduct long-term strategic planning for infrastructure development and maintenance. Infrastructure investments should be aligned with future directions in science through an iterative and consultative process. We recommend that a rigorous strategic planning process be developed (and staffed appropriately) to set short-, mid- and long-term objectives to assure that the overall mix of infrastructure capabilities is in concert with future directions of Antarctic science. To be most effective, strategic planning should be an ongoing effort and so we recognize that to address this recommendation, OPP may need to add permanent staff to assist the senior management. (See A.5 responses for additional comments)

Recommendation #5: IPY demonstrated that answers to the most pressing scientific questions being addressed in Antarctica are often unobtainable by individual investigators, projects, or even national programs in isolation. International partnerships should be an intrinsic element of future US plans for Antarctic science. Administrative barriers to international collaborations should be minimized to facilitate partnerships. We recommend that OPP/ANT management assume an expanded leadership role in actively and aggressively

pursuing international program-to-program partnerships that encourage and allow US utilization of excess capacity being developed by other national programs. (See A.4.1b and A.5 responses for additional comments)

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.

No comment

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

Travel budgets for attending professional meetings are inadequate. Community interactions with the ANT Division Director and program directors are crucial for communicating national, agency and division priorities to potential PIs, as well as enabling OPP and ANT to better understand emerging scientific questions and the challenges of addressing them. Unfortunately, NSF travel restrictions have seriously limited the ability of the program directors to interact with the science community in a productive, fully engaged manner and the growing proposal and workload pressures exacerbate this problem. This issue was raised by the FY 2007 COV and remains unresolved.

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

We found the joint sessions with the Antarctic Infrastructure and Logistics COV to be especially helpful for formulating our responses to the logistics questions. We encourage OPP to continue this approach for future COV reviews.

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

The preparation and organization of the information provided for the COV to review could be improved by more effectively aligning the background information with the questions being asked. In addition to providing copies of the previous COV report and the OPP/ANT response, ANT staff should prepare and distribute statistical summaries, in an accessible (i.e. easy to interpret) format, of the data needed to address questions A2.1 and A3.8-12. For some of the questions, NSF-wide comparison data are needed to assess whether or not ANT experiences are consistent with the NSF norm or targets. Finally, the COV members should be provided with information, also in a readily accessible format, that would allow them to definitively address questions A3.13 and B.1-3. PowerPoint slides that simply listed program acronyms without definition and without a statement of scientific goals and achievements, were not particularly helpful.

In many cases it was unclear exactly what was communicated to the PI as correspondence was minimal and in a few cases it was missing from the eJacket system. All communications with the PI should be clearly documented and labeled in the eJacket for ease of review by the next COV.

In the end we believe we acquired the information we needed to provide a creditable assessment of ANT science activities, but it required considerable effort to do so.

SIGNATURE BLOCK:

Antarctic Sciences Division
Committee of Visitors
Dr. Chester S. Gardner, Chair