2014 Committee of Visitor's Report on the Integrative Programs Section of the Ocean Sciences Division of the Geoscience Directorate

Submitted: July 8, 2014

Committee of Visitors Review Process

The Committee of Visitors (COV) met June 24-26, 2014 at the National Science Foundation to review the Oceanographic Centers, Facilities, and Equipment programs of the Integrative Programs Section (IPS) within the Ocean Sciences Division (OCE) of the Geosciences Directorate (GEO). The specific programs reviewed include: Ship Operations (SO); Submersible Support (SS); Oceanographic Instrumentation (OI); Oceanographic Technical Services (OTS); Shipboard Scientific Support Equipment (SSSE); and Ship Acquisition and Upgrade (SAU). The charge to the COV is to provide NSF with external expert judgments in two areas: (1) assessments of the quality and integrity of program operations and program-level technical and managerial matters pertaining to proposal decisions, and (2) the degree to which the outputs and outcomes generated by awardees have contributed to the attainment of the NSF's mission, strategic goals, and annual performance goals.

The COV session began with opening remarks regarding the state of the division by Deborah Bronk, Acting Division Director of OCE, followed by a welcoming statement by Marge Cavanaugh, Deputy Director of GEO. We also heard presentations from various Program Directors, including the Ocean Observatory Initiative by Jean McGovern (an MREFC project, not under review here); the R/V *Sikuliaq* acceptance and trials by Bauke Houtman; about SO, including ship utilization by Rose Dufour; about OTS, OI, and SSSE by James Holik, and we received an overview of SS as well as general IPS activities by Brian Midson.

Individual panel members focused on each of the particular programs under review, using summary materials provided to the COV, discussions with the Program Directors, and by examining the relevant e-jackets. Findings for specific programs from the three year period spanning 2011 through 2013 are integrated into this report under Findings, Recommendations, and Reviews. The COV Report Template, tailored to more traditional proposal-driven research programs, was not always a direct fit for this review.

We thank Brian Midson (IPS), Bauke Houtman (IPS Section Head), and the other Program Directors for providing materials in advance and during the meeting and for their prompt and cooperative help in facilitating our review. We especially appreciated their willingness to meet with us on an ad hoc basis throughout our review. A special note of appreciation is extended to Jasmine Owens, who provided significant assistance before and during the meeting to facilitate our travel and preparation for participation in the COV.

Context for Findings and Recommendations

Access to oceanographic measurement, data, and samples from seagoing vessels and submersibles is an essential need for current and future NSF-funded research. In addition, the Ocean Observatories Initiative brings evolving platform needs for specific components (e.g., fixed arrays, gliders, cables) as well as access to the Academic Fleet. This is an exciting time for ocean investigators and educators as new platforms (air/surface/sub-surface) and innovative technologies are developed and fielded.

Oceanographic Centers, Facilities, and Equipment programs of the Integrative Programs Section support the infrastructure necessary for NSF-funded research and training of the oceanographic community. Facility examples include ships, submersibles, shipboard equipment, shared-use instruments, and seagoing technical support. Many of these facilities receive partial, complementary support from other federal agencies, state and local governments, and private sources. The University-National Oceanographic Laboratory System (http://www.unols.org/) (UNOLS) coordinates scheduling of these facilities and expeditionary programs funded by NSF. NSF also participates in the Interagency Working Group on Facilities and Infrastructure (IWG-FI), which advises on policies, procedures, and plans relating to oceanographic facility use, upgrades, and investments and other matters pertinent to national oceanographic assets. These collaborations continue to be very effective in maximizing the capabilities and use of the academic research fleet.

Infrastructure needs (IPS-supported facilities, IODP operations and management, and other infrastructure) currently account for ~50% of total funding in the OCE budget for the past three years. Of the six programs constituting Oceanographic Centers, Facilities, and Equipment under review, 60-70% of the funding is for ship operations. This indicates the central and sustained importance of facilities support in accomplishing scientific expeditions across the entire OCE division.

One area of concern is fleet utilization, and the necessity of matching funded science requiring ship time to the appropriate platforms in geographically logical (i.e. cost-effective) sequences. Funded ship time days have declined over the last three years. Utilization concerns directly impact perceptions of the right size for the Academic Research Fleet at a time when NSF and the community are engaged in ongoing efforts to modernize and replenish the inventory of vessels. These are clearly crosscutting issues further focusing attention on the relative allocation of support between facilities and science programs.

Comments and Observations: Overall Program Assessment

This COV was very impressed with the IPS Program Directors and the leadership within the OCE Division. It is clear that Program Directors communicate well and are highly collaborative, working as a team both within IPS and with other divisions of the Geoscience Directorate to support science programs as efficiently as possible. In many

cases the Program Directors have been proactive in reducing costs, increasing efficiency, and modernizing operations and equipment in all aspects of science support operations from technical support to the design and building of new ships. It should also be noted that the Program Directors continue to go above and beyond in the administration of their individual programs. Examples include moving technicians from retiring vessels into a technician pool and redistributing much needed equipment from retiring vessels to ships in need.

Major accomplishments during the three year period reviewed by this COV include: the rebuild of the *Alvin* submersible, the R/V *Sikuliaq* launch, development of a pilot-project to create a seagoing technician pool, further expansion of the shared-use equipment pool, and the renegotiation of NSF support for the Academic Fleet on a ship by ship basis.

In light of increasing budgetary stress over the past three years, and expected projections into the future, efforts to continue to provide a thoughtful balance within the IPS programs as well as relative to overall science funding must remain a high priority. With decreasing science allocations, IPS and the community need to cooperate to ensure that ship and submersible platforms are fully utilized and that facility-supporting programs are made as efficient as possible (Figure 1).

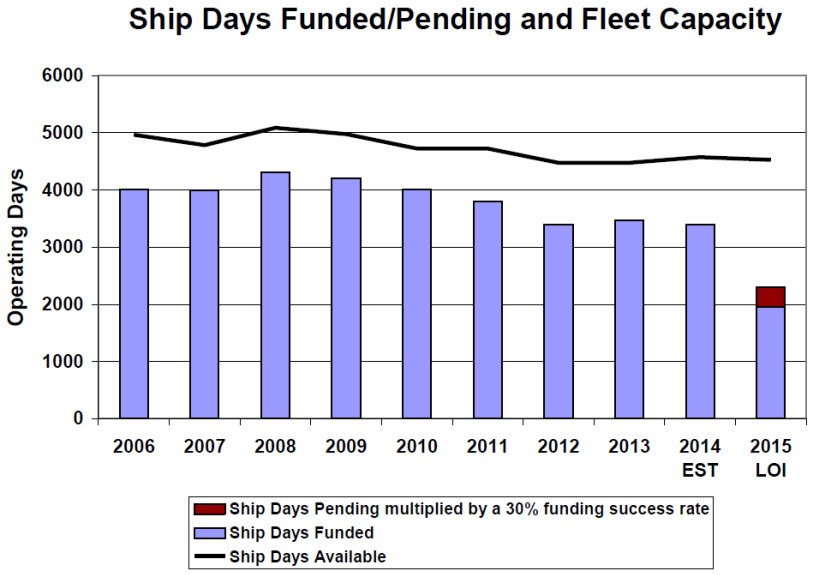

Figure 1. Ship days funded versus ship days available. Note that from 2011-2013, average ship utilization is ~ 75%. Over the same time period, ship day requests average ~ 6500 days/year with the number of proposals averaging ~ 575 proposals/year.

Within IPS, important programs are experiencing reductions in spending in order to support other programs (Figure 2). Ocean Instrumentation is nearing a lack of viability as funds are being moved from OI into OTS. Given observed trends the COV is concerned that SSSE could experience a similar fate. Nevertheless, the COV supports the ability of the relevant Program Director to shift funds between these programs as necessary to keep all the components operational. While efficiencies can be found by

increasing reliance on shared use instruments and through the SSSE, greater ship utilization (a major goal) may negate the ability to simultaneously support multiple expeditions while sharing a smaller suite of cross-platform instrumentation. Clearly, the programs need to plan for future needs as delayed spending cannot be sustained indefinitely, and ship operations will be impacted if equipment becomes unreliable or inoperative.

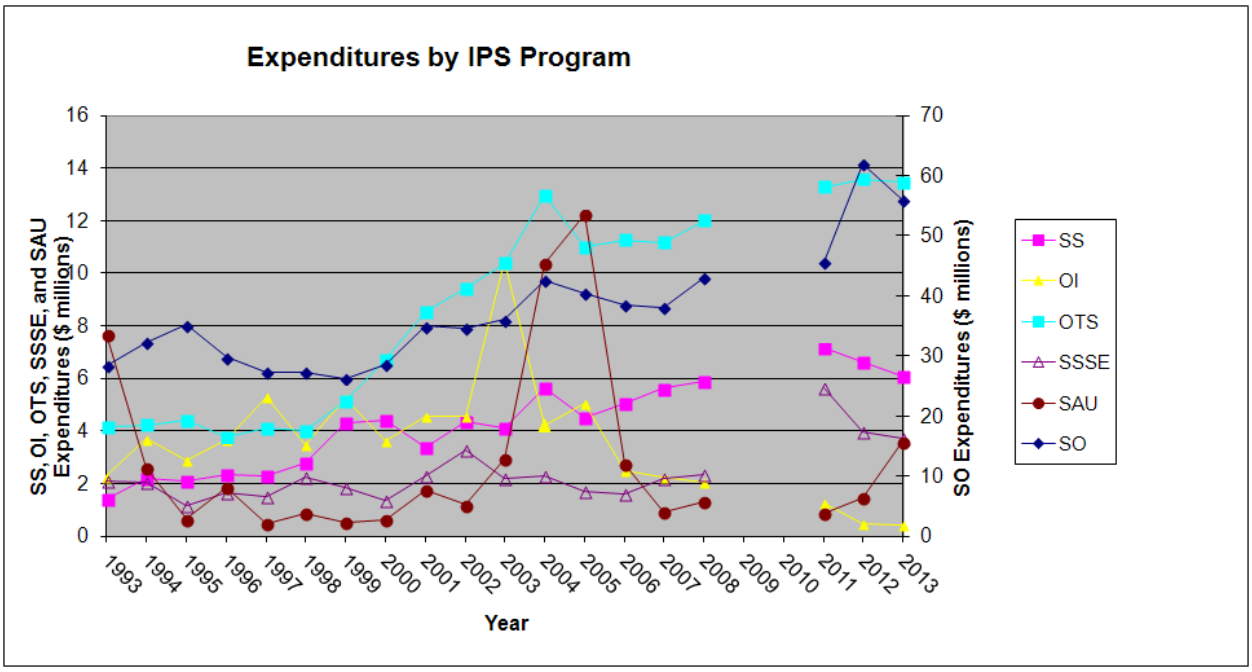

Figure 2. Expenditures by IPS Program. Note that years 2009 and 2010 were removed due to artificial increases associated with stimulus funding (ARRA).

Given the above considerations, the COV has a number of general recommendations for IPS. Specific program comments are detailed in the following sections.

1. While we appreciate the efforts of IPS to ensure that all funded science is fielded, the program as a whole should carefully consider efficiencies in ship utilization, technical support, and instrumentation/equipment. It may be necessary to delay funded proposals to achieve maximum utilization of these assets. IPS will need to be proactive in *managing expectations* within the science user population

2. IPS should consider combining the SSSE and OI programs and administering these together under one Program Director. In the future, this may permit combining SSSE and OI proposals to better facilitate availability of equipment needed for deployment to the academic fleet.

3. Increasing efficiencies within OTS may temporarily alleviate some cost pressures, but rising personnel costs (~80% of the OTS budget) will require the management of expectations regarding the level of technical support that can be provided, given the current level of funding. This COV supports conceptual plans

by the Program Director to move toward a minimization of institution-specific seagoing technicians while standing up a shared pool of same who can move amongst the academic fleet.

4. With shared pools of personnel, instrumentation and equipment, and reduction in OI and SSSE support, novel ways to handle future purchases, servicing and management of increasingly complex instruments -- such as small unmanned vehicles, both airborne and on-/sub- surface -- must be considered from a holistic view point.

General Observations Regarding Reviews of Proposals

Upon review of the jackets, the COV encourages:

1. More substantive reviews (although this is a broader general issue with external reviews through NSF).
2. More consistent, detailed panel summaries that justify funding decisions, particularly when they may be in conflict with reviews.
3. A better balance in panels (including both large and small facility operators, scientists, and other agencies).
4. Enforcement of better quality proposals that follow GPG guidelines. Some proposals are poorly written or fail to follow specific requirements, yet they are funded when the underlying science programs to be supported are deemed essential. This sends an unintended message to facilities proposers that their slack compliance will always be tolerated.

I. Ship Operations (SO)

Summary:

Ship operations provide support for costs arising from the operation and maintenance of academic research vessels. This program further works closely with other divisions to ensure efficient ship utilization and that science ship time needs are being met. As such, SO comprises a significant proportion of the overall IPS budget and has varied from $46 to $60 million from 2011-2013 after a period of prolonged and steady increases. During this period, the number of ship days funded relative to those available continued to remain relatively stable at ~ 75%.

In 2012, proposals were submitted for contract renewals of the current fleet (20 vessels). This provided a unique opportunity for the ship operations program to fully evaluate and compare the costs associated with individual ship operations. The e-jackets provided a wealth of information regarding the operation, maintenance, and day to day costs of each operator. While panel summaries varied in extensiveness, review summaries were detailed and explicit, providing excellent feedback to institutions. The Program Director is to be commended on the extensive review analysis presented.

As ships vary in size, age, and research capabilities, no one standard mechanism of operation or budget model can be used to assess the efficiency of each ship's operation. We therefore commend the Program Director for her careful analysis of individual ship spending and utilization and negotiation of budget reductions based on fleet wide norms (e.g., removal of institutional overhead charges on fuel, etc.). We also commend the program for instituting quarterly reports to ensure that budgetary expenses do not exceed the projected costs by more than 5% and reallocating ship time from more expensive vessels to less expensive vessels whenever possible.

SO1 Finding: While there is concern that ship operation costs will continue to grow and impact science budgets, the COV is satisfied that the SO program is continuing to be streamlined for more effective utilization for the community.

SO1 Recommendation: The Program Director should continue to pay careful attention to the details of individual ship operation expenditures and use business system reviews, cooperative agreement renegotiations, annual reviews, and ship day reallocation to ensure effective management. The Program Director should continue to encourage institutional support and communicate issues associated with widely varying cooperative agreements to the larger community.

SO2 Finding: Ship utilization has remained stable over the past 3 years while ship operation costs have continued to climb.

SO2 Recommendation: While specific ship capabilities are needed for segments of the scientific community, specialized platforms need to be effectively utilized to ensure long term viability. For example, while the R/V *Atlantis* has a high utilization rate, use of the R/V *Marcus Langseth* appears low by comparison.

SO3 Finding: Modernizing the ship's fleet through a combination of ship retirements and more modern vessels should continue to be a major focus. We commend the program for being proactive in this regard. The Program Director has further continued to work closely with other divisions to ensure that proposed science programs are achievable given the community assets, timing, and restrictions.

SO3 Recommendation: Ship utilization should not fall below the current 75% of ship days available and this will require continued careful coordination with science budgets as the mix of platforms in the academic fleet evolves. While we commend the Program Director for "not leaving science at the pier", increasing ship utilization must be a factor in all future allocations even if it means that science cruise scheduling occurs on less than an ideal time frame. It is imperative that IPS as a whole, *manage expectations* of the scientific community as to what is achievable given budgetary realities.

II. Ship Acquisition and Upgrade (SAU)

Summary:

As the Academic Research Fleet platforms age, they require increasing maintenance and investment to keep them technologically relevant and cost-effective to operate. Within the last three years (and over the next couple of years) several of the oldest ships have been, or will be, retired as new vessels join the Fleet. Overlying this process is the ongoing need to monitor science proposal demand, expeditionary needs, and technical enhancements (like autonomous off-board air/surface/and sub-sea sensor platforms), all of which enter the equation for "right-sizing" the future Academic Fleet.

As this COV meets, the R/V *Sikuliaq* has been accepted from the builders and is being loaded out in preparation for her initial delivery and science-trials voyage. NSF has begun the process of design review for the next Regional Class Research Vessel(s) (RCRV). Earlier this summer, the U.S. Navy-funded R/V *Neil Armstrong* was commissioned, and her sister ship, R/V *Sally Ride* will likewise be placed into commission this August. These two ships will enter the Academic Research Fleet as Ocean Class vessels and in most aspects will be capable of performing work now done by the Global Class ships. The two older AGORs they replace will shortly be stricken from the Fleet roster.

The process of Academic Fleet replenishment and selection of candidate vessels for retirement or replacement is challenging, complex, and often painful for institutions and individuals invested in the provision of platforms and science program support for marine science research and education. The relevant program officials within IPS have gone to extraordinary lengths to make this process open, transparent, fair and supported by data and sound economic reasoning.

Drawing upon experience in previous NSF-funded ship acquisition projects, the agency requested proposals for the RCRV project in a manner that added some new elements to the process. The RFP called for a single institution to undertake the design review and initial project management for the eventual construction of as many as three sister ships, with the selection of operator institutions and home-port basing to be determined later on. The solicitation instructions were anything but simple, but, given the potential complexity and cost of the acquisition, such granularity was most likely necessary. Several "off ramps" were built-in, reflecting the uncertainty of future Federal funding support, and they serve the additional utility of reducing the mission creep that inevitably arises in the course of final design definition in ship acquisition projects, be they naval or civilian.

Three institutional teams competed for this award. A thorough review of the proposal jackets leaves one impressed with -- to use a football expression -- the "depth of bench" of talent at the UNOLS oceanographic institutions that expressed interest in undertaking the project. As the reviewers and panels indicated, any of the teams could have performed credibly at performing the tasks of the solicitation, and the selection came

down to choosing the best and most detailed response among the three excellent contenders.

Identifying reviewers for this proposal must have been a challenge, as many of the Academic Research Fleet community's most experienced individuals were involved in one or another of the proposing teams. The Program did an excellent job of identifying well-qualified participants to serve as either reviewers or panelists, including members from the private sector.

It should also be noted that in this IPS element, proposals for the renewal of the UNOLS Office and the IT support for UNOLS were included for COV review. Likewise, the process and manner in which these solicitations were handled, reviewed, and the awards made were consistent with NSF best practices.

SAU1 Finding: It was noted that there was a wide variability in the thoroughness with which reviewers of the RCRV project presented their comments and/or justifications for their rankings. It was clear that some reviewers invested considerable time and thought, while other reviews were perfunctory. (This is not unique to this particular solicitation: members of the COV noted similar disparity among the reviews within the other IPS program elements.)

SAU1 Recommendation: The SAU Program should remind reviewers of the rarity of ship acquisition projects and that reviews should reflect the extensiveness of the proposals submitted. The Program Director may need to consider new models to ensure that reviews are of high quality considering the rarity, importance, and size of the program.

SAU2 Finding: The length of time between a new ship building request and when the ship enters the water is ready for science has exponentially expanded over the past few decades.

SAU2 Recommendation: Given IPS goals of modernizing the Academic Fleet, the SAU Program should make every effort to improve this process by *managing expectations* within our science user population. While the time-honored tradition of seeking broad community input through the definition of science mission requirements (SMRs) should not be abandoned, there needs to be recognition that new ship designs must meet the broadest science needs possible. Finding a way through this maze and shortening timelines for replacement vessel definition and design/build would be a worthy topic for a dedicated workshop tasked with this endeavor. Effort to ensure that the Academic Research Fleet size genuinely reflects realistic needs for supporting future levels of seagoing research demand and utilization is needed. The forthcoming NAS Decadal Survey should provide useful input in this determination as well as for the likely SMRs of future ship builds.

III. Submersible Support (SS)

Summary:

The Submersible Support Program supports the National Deep Submergence Facility (NDSF), hosted at WHOI. This is a federally funded center that operates, maintains, and coordinates the use of three deep ocean vehicles: Human Occupied Vehicle (HOV) *Alvin*, Remotely Operated Vehicle (ROV) *Jason/Medea*, and Autonomous Underwater Vehicle (AUV) *Sentry*.

NDSF is funded primarily via the NSF IPS Submersible Support Program's multi (5) year cooperative agreement. The proposals under this agreement set day rates and plans for inclusion of other agency use of the NDSF assets. The Navy (ONR) and NOAA (OER) have supported NDSF in the past through an MOU and proportional contributions to overhauls. This mechanism changed prior to this review period to a day rate model. Oversight of/guidance to NDSF is provided by NSF Program Director involvement, reviews, informal annual cooperative agreement reviews by NSF, ONR, and OER Program Directors, WHOI post-cruise Vehicle Debriefs, and advisory activities of the UNOLS DEep Submergence Science Committee (DESSC).

Since the 2011 COV, the *Alvin* rebuild has been completed, the *Alvin* and *Jason* day rates have been separated, and the NDSF has been asked to establish a Major Overhaul Stabilization Account (MOSA) for *Alvin* for inclusion in the FY15 cooperative agreement. Demand for *Jason* has been consistently high, with operations tempo at approximately 170 days at sea per year. *Sentry* demand has increased (193 days in 2014) with increased platform and sensor capability, and proactive scheduling on the part of NDSF. *Alvin* science operations began in the Gulf of Mexico this spring and will continue throughout FY14. Budget variances are not excessive and are sufficiently explained.

Personnel costs for NDSF have increased, both because of general rising personnel costs, and the additional technical work on *Sentry*. Even with this increase in operations tempo, day rates have remained relatively stable. Since the operations tempo is near its maximum, adjusting to a level or reduced funding level in the future will result in science being 'left on the pier.'

SS1 Finding: Proposals and annual reports provide sufficient information about funding plans and past activities. The cooperative agreement mechanism provides flexibility for schedule changes and reporting rules for accountability. Active Program Director involvement is nevertheless key, and is evident in the attention to detail of both the reports and correspondence in the jacket.

SS1 Recommendation: The Program should continue to use cooperative agreements and play an active role in monitoring expenses and use.

SS2 Finding: NDSF staff are only partially supported by the SS Program; staff are expected to complete their remaining salaries with other WHOI and soft money activities. This model provides a flexible resource for providing efficient support for the three NDSF vehicles. The equivalent total of ~ 25 FTEs directly supports all 3 vehicles through the Program. This is reasonable given deployment requirements, but the model has not been specifically examined for efficiency.

SS2 Recommendation: The SS Program should conduct an operational assessment of personnel efficiencies.

SS3 Finding: The reviewers of the NDSF 2010 proposal were all scientists with ocean facility use experience, but none with operational oversight experience. This resulted in two reviews with no recommendations, and two reviews with recommendations regarding metrics, but no further operational or budgetary specifics.

SS3 Recommendation: The SS Program should expand the diversity of expertise of NDSF proposal reviewers to include university and industry marine submersible operators.

SS4 Finding: Resolution of Recommendation 10 (accountability measures) of the 2011 COV addressed the recommendation at an operational level, but not necessarily from a management point of view. The recommendation, ..." build(ing) accountability measures into the NDSF funding process on value delivered; better define(ing) NDSF goals and the feedback used to define and refine these; and assess(ing) responsiveness to community needs and requirements" was resolved by implementing the use of a Post Cruise Assessment Form System (PCAR) report for NDSF vehicles. Use of a PCAR, with the existing Vehicle Debrief practice, serves to fully address NDSF responsiveness to operational level community needs, but does not assess the broader community deep submergence science demand, NDSF strategic goals, or NDSF accountability measures that may be communicated to management and funding entities.

SS4 Recommendation: The SS Program should examine the need for metrics from a managerial and programmatic standpoint; engage appropriate level expertise to define simple metrics and goals that can be used to communicate the value of NDSF activities to funding agents (see next).

SS5 Finding: Deep Submergence Science projects are funded across a number of NSF directives (Geo, Bio, etc.). Their value can be shown relative to projects within their discipline, but the value of the science conducted by NDSF vehicles is not easily assessed or demonstrated. The last comprehensive workshop on deep submergence science was held in 1999 (DESCEND).

SS5 Recommendation: The COV suggest that a community workshop be supported that focuses specifically on deep submergence science in order to discuss current and future needs.

SS6 Finding: The document: "Clarifications on National Science Foundation Division of Ocean Sciences (OCE) Facilities Costs and Coordination, May 2012" does not clearly address use of non-NDSF submersible facilities. The document references the RVSS, within which there is reference to the "UNOLS Safety Standards for Human Occupied Vehicles." However, conditions under which non-NDSF submersible vehicles may be used are not described. Given the increasing use of a variety of submersible assets, more specific guidance would be prudent.

SS6 Recommendation: Add specific guidance with respect to the use of non-NDSF submersibles, ROVs and (large) AUVs to the NSF directive(s).

SS7 Finding: The use of gliders and small AUVs has matured to a point where development of a center of excellence/pool should be considered. Because these tools are not deep water vehicles or shipboard-installed equipment, they appear to 'fall between the cracks' within the IPS organization and should be specifically addressed in the future.

SS7 Recommendation: The SS Program should coordinate with Oceanographic Instrumentation to proactively investigate feasibility of a pool for gliders and/or small AUVs.

IV. Oceanographic Technical Services (OTS)

Summary:

The Oceanographic Technical Services Program funds shore-based and sea-going technical support for the academic research fleet. In 2012, the OTS panel evaluated and funded 22 proposals to support these activities and other initiatives. Overall, the program is to be commended for ensuring basic and specialized oceanographic cruises were supported and exploring new areas that benefit the scientific community. Several initiatives were funded that make more effective use of data collected by the academic research fleet. Good decisions were made to increase the connectivity of ships at sea; the archiving of underway data and international coordination and standardization of data; the establishment of a Multibeam Advisory Committee; the initiation of a technician pool; and promotion of technician training, education and the MATE program. It is evident the OTS program is carefully reviewing budgets and is proactive in negotiating reasonable day rates and specialized equipment support.

The program used a combination of reviewers and panel members to undertake reviews of proposals. Panel summaries were generally very good in highlighting positive and negative aspects of each proposal. For the more complicated proposals from large, multi-vessel operator institutions the panel did an exceptional job in summarizing the consensus opinions. The documentation provided a complete picture of the rationale used in the decision-making process. The Program Director is to be commended on the extensive review analysis presented, which included a candid assessment of each

proposal, historical perspective and a comprehensive discussion of the negotiated day rate. It is evident that a significant amount of effort was put into the writing of each review analysis.

OTS1 Finding: While the 2012 OTS Review Panel was diverse, it was noted that only representatives from large and multi-ship institutions were used.

OTS1 Recommendation: The OTS Program should strive to have balanced review panels consisting of individuals from single ship and multi-ship operator institutions, and individuals representing a variety of research vessel classes.

OTS2 Finding: Since 2011 the OTS budget has remained essentially flat at approximately $13M per year. Increased personnel costs are straining this budget. It was noted that since 2010 OTS has supported 80 marine technicians, but that overall only 30-35% of technician time is spent at sea. This major under utilization of the technician groups needs to be addressed. Rising personnel costs in the face of static budget levels makes the OTS budget unsustainable and is a major concern of the COV.

OTS2 Recommendation: While shore-side maintenance and pre-cruise planning are important duties of marine technician groups, better balance needs to be attained between shore and seagoing activities. The Program Director, in part using the annual reviews, should monitor the budgetary seagoing technician expenditures relative to shore support. Initial investments in establishing a technician pool is viewed as a move in the right direction and the program is encouraged to move forward with their plans to develop a pool of technicians that will support the academic fleet. The OTS Program should also consider moving from five-year awards to cooperative agreements like the SO Program in order to achieve greater flexibility in funding marine technician groups. Efficiencies and savings from economies of scale should continue to be explored.

OTS3 Finding: A need for increased bandwidth for Internet communications and telepresence from sea has been identified. Costs in this area have increased dramatically and are borne by the program. In response, an initiative to place Fleet Broadband on vessels, in addition to HiSeas Net, was funded. Extensive investments in infrastructure and the purchase of additional bandwidth have been made. The Program is planning to move the day rate for these services out of the OTS budget and into the Ship Operations budget.

OTS3 Recommendation: Internet communications are an essential service provided on research vessels, allowing for the efficient trouble-shooting of problems, communications with shore support personnel and for morale. The OTS Program is currently undertaking a study of how bandwidth is being used. Plans by the OTS Program to shift the costs of this service to the SO Program budget are appropriate. The OTS Program should use the findings of the bandwidth study to establish a base line capability, above which, individual users pay for the costs.

OTS4 Finding: Several new initiatives were funded during the 2012 proposal review, including the establishment of a Multibeam Advisory Committee and a supplement to the Rolling Deck to Repository (R2R) to coordinate its standards and approaches with international partners, working towards interoperability that will benefit the global end-user community.

OTS4 Recommendation: Approximately $50M has been invested in Multibeam systems across the academic fleet. The establishment of an advisory committee to optimize the collection of Multibeam beam data, operations and quality is considered a good investment of funds and should be continued. Similarly, expansion of the R2R Program to work with international collaborators is also a move in a positive direction and is encouraged to maximize access to the data being collected.

OTS5 Finding: Funds have been used to enhance the training and education of marine technicians through their participation in national (i.e., RVTEC) and international (i.e., INMARTECH) meetings. In addition, a UNOLS technician training cruise was held. The program funded two interns in the MATE program, with one individual subsequently becoming a marine technician in the academic research fleet.

OTS5 Recommendation: Investments in education and training are critical to maintain a pool of qualified marine technicians that can operate, maintain and trouble-shoot increasingly complex instrumentation and equipment. This is viewed by the COV as a very good use of funds and the program is encouraged to promote these activities and identify future opportunities in these areas.

V. Shipboard Scientific Support Equipment (SSSE)

The SSSE Program provides support for the safety and enhanced scientific capabilities and productivity of seagoing research programs that use major facilities, primarily the Academic Fleet. Research vessel operators submit proposals to NSF for new permanent or portable equipment for oceanographic research vessel; for the overhaul of equipment funded under this program including such items as science handling systems (winches, frames, cranes, etc.), a range of navigation and communication equipment, and safety and regulatory-related items. This program also provides support for the UNOLS equipment pools (wires, vans and winches).

For decades NSF has held review panels to review, approve or disapprove SSSE proposals. Experts like principal investigators, marine/ship operators, and technicians provide rigorous and thorough reviews of the proposals submitted. In general the COV agree that the SSSE program is being properly managed and provides for an effective program for funding of equipment. The UNOLS marine operations managers and the NSF Program Directors are very familiar with the needs of the fleet and properly fund the requests to maximize use of the asset.

After review of the SSSE proposals submitted from 2011 to 2013, the COV agrees with the present process of operators submitting SSSE proposals to NSF for panel review. The COV does have some concern with the quality of the panel's review. Furthermore, a review of the SSSE proposals shows poorly written proposals were approved because of need, not because of merit. The COV believes operators know this and don't expend the necessary effort because they know their critical piece of equipment will get funded for repair or replacement. The COV believes that poorly written proposals should be declined for funding even though the funds for the project might be available. Even though the equipment is critical to the operations of the vessel, proper justification should be completed and submitted so NSF can justify its decision to fund one SSSE over another.

SSSE1 Finding: The SSSE program budget has swung significantly from a low in 2008 of $2.33M to a high of $5.62 in 2011 and retreating back to $3.70M in 2013 (with the exception of 2009 at over $13M due to ARRA funds). This six year trend does not appear to be a major issue now; however fluctuations like this could be very problematic in the future.

SSSE1 Recommendation: A more stable budget will enable better large scale planning for out years and more evenly paced revitalization of SSSE Program needs.

SSSE2 Findings: The SSSE Program has identified opportunities for cost-saving measures such as equipment pools and shared-used equipment (and instrumentation). The shared assets have improved the efficiency of maintenance and use of these assets.

SSSE2 Recommendation: The SSSE Program should continue to promote utilization of shared used equipment (and instrumentation) pools.

SSSE3 Finding: Progress has been made in improving utilization of the NSF Ship Inspection program to assist in evaluating a ship's operational status and, in consultation with ship operators, to plan for future capital expenditures. However, critical deficiencies found in the inspection report need a vehicle to be addressed quickly. Most of the time, a research vessel can absorb the costs to correct the deficiency; and do so promptly. At times, it is not possible for the vessel to correct the critical deficiency due to its high cost of repair or replacement.

SSSE3 Recommendation: The COV proposes NSF institute a "Special SSSE" proposal that could be submitted anytime to NSF to fund and correct noted critical deficiencies from the NSF Ship Inspection Program. A dollar amount of this "Special SSSE" proposal could be established (i.e., deficiency must cost over $10K).

SSSE4 Finding: Web-based inventories, available to the community, of the UNOLS pooled equipment and shared-use instruments are now in use. These online inventories allow for more efficient scheduling of the assets and increase their availability to scientific users. The COV believes that this "pooled information" of instruments and

equipment fleet wide is vital and should be expanded to include the institution's equipment as well.

SSSE4 Recommendation: The SSSE Program should continue use of these inventories, with incremental increases in funding in order to obtain a more encompassing pool.

SSSE5 Finding: The SSSE Program has employed cost-saving measures such as group purchases to maximize use of the limited NSF funds.

SSSE5 Recommendation: The SSSE Program should continue to solicit and incorporate reviewer, panel, operator and technician recommendations for funding group purchases. The group purchase of equipment benefit the academic fleet; and is of particular benefit to single ship operator institutions that do not have the "buying power" of a large fleet.

SSSE 6 Finding: The SSSE Program must maintain its flexibility in funding equipment to meet today's and tomorrow's cruise requirements. The ability to deal with unanticipated losses, urgent safety/operational issues, and environmental disasters are the keystone to the program's flexibility.

SSSE6 Recommendation: The COV recommends a percentage of total SSSE budget (suggest 10%) be held for unanticipated equipment issues. If these funds are not expended after ~ 80% of the year has transpired, for example, then the Program Director may award these funds to meritorious proposal(s) that did not receive funding during the normal panel review process.

VI. Oceanographic Instrumentation (OI)

Summary:

The Oceanographic Instrumentation (OI) Program provides support to enhance the scientific capabilities and productivity of seagoing research projects. The OI program receives roughly a dozen proposals per year from the institutions with platforms from the academic fleet, and over the past three years has managed to partially fund nearly all of the proposals. This is achieved by separating the proposals, which typically contain requests for multiple instruments or instrument parts, into the individual subcomponents and independently reviewing each hardware request within the proposal. Using reviewer guidance, the program then funds the highest priority items overall and suggests other opportunities for the operators to obtain other requested equipment. Recent examples of such solutions include cross-decking equipment from retiring Academic Fleet vessels, referring the proposers to other federal agency partners for acquisition, encouraging the pooling of instrumentation (new or existing) between academic institutions, and pursuing internal EPSCoR funding at NSF to co-fund proposals submitted to the OI program.

All proposals submitted over the past three years have gone through a thorough panel review. For efficiency, the same review panel is often used for OI and SSSE proposals. As stated earlier, there were discrepancies in the depth of panel reviews. That having been said, panels contained significant depth and breadth of experience and provided suggestions to the OI Program in identifying other equipment sources should funds not be available for new acquisitions.

The OI Program is currently managed under the same budget and by the same Program Director as OTS. In the future, the SSSE Program will soon be added into this management structure. With the exception of the ARRA stimulus year in 2009, the realized budget of the OI Program has been on a steady decline since 2005. In 2012 and 2013, funding for the OI Program has dipped below $500k, with an average award of just $43k with a total OI Program funding of $435k in 2013. This leads to questions about whether it is a useful exercise to have the institutions prepare and submit a dozen proposals a year, to be reviewed and discussed in person over one day by a review panel.

OI1 Finding: Funds for the OI Program are diminishing, and has fallen below critical mass. It is no longer recognized as a viable means of instrument acquisition and refresh for the Academic Fleet. The co-management of equipment funds (OI and SSSE) along with the OTS Program enables and encourages the use of these monies for more emergent needs. While this solves immediate funding issues, it is unsustainable in the long run as human capital costs associated with OTS Program continue to grow.

OI1 Recommendation: The COV suggests that grouping the OI and SSSE Programs together makes programmatic sense, as it would allow the institutions that operate the vessels in the Academic Fleet to assess the overall capabilities of their platforms and make a more holistic request to IPS for both scientific instrumentation as well as support equipment in a single proposal submission.

OI2 Finding: Many times, the OI Program has been able to defer instrumentation requests because the necessary capability exists at other institutions. It would be useful to both the operating institutions as well as individual scientists if an accurate database of existing oceanographic instrumentation across the Academic Fleet were available, with both scientific capabilities and dates of acquisition for the available equipment.

OI2 Recommendation: The OI Program should encourage the use of the OI database for management decisions, which would also help to enable the use of instrument pools in the future, should that be determined to be a useful construct for reducing costs.

OI3 Finding: The prioritization of OTS Program needs over instrumentation funding is defendable in the short term, but may lead to long-term consequences. As it is, the OI Program is largely reactionary, funding the proposed equipment that is of most immediate need due to instrument failures and replacement of components that are past their useful scientific lifetime. While this approach is currently keeping the existing

capabilities mostly intact, the OI Program should proactively consider what instrumentation the community will need in the future, and whether the planned acquisition opportunities are adequate to address these needs. The post-cruise assessments represent important feedback regarding the state of the existing instrumentation and equipment and should be better utilized, but additional guidance would be useful.

O2 Recommendation: IPS should engage the community in a discussion of future instrumentation needs, and use the results of the discussion and the database of existing instrumentation to create a vision that includes a notional schedule for future instrumentation acquisition for the academic fleet.

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

The table below should be completed by program staff.

Date of COV: June 24 -26, 2014
Program/Cluster/Section: Integrative Programs Section, Oceanographic Centers and Facilities
Division: Ocean Sciences
Directorate: Geosciences
Number of actions reviewed: 111 **Awards: 106** **Declinations: 5** **Other: 0**
Total number of actions within Program/Cluster/Division during period under review: 111 **Awards: 106** **Declinations: 5** **Other: 0**
Manner in which reviewed actions were selected: **All actions for FY2011 through FY2013 were reviewed. Two additional actions were added for activities that began prior to FY2011, but were active in the review period: 1036843 the award for the National Deep Submergence Facility (NDSF); and, 0921084 the award for the University National Oceanographic Laboratory System (UNOLS).**

COV Membership

	Name	Affiliation
COV Chair or Co-Chairs:	**Claudia Benitez-Nelson**	**University of South Carolina**
COV Members:	**Richard Behn** **Mary-Lynn Dickson** **Scott Harper** **Karen Kohanowich** **Daniel Schwartz**	**University of Miami** **Dalhousie University** **Office of Naval Research** **National Oceanic and Atmospheric Admin.** **Daniel S. Schwartz and Assoc.**

INTEGRITY AND EFFICIENCY OF THE PROGRAM'S PROCESSES AND MANAGEMENT

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

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

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCESS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
1. Are the review methods (for example, panel, ad hoc, site visits) appropriate? Comments: The Program used a combination of reviewers and panel members to undertake reviews of proposals submitted to the program. It is noted that the number of external reviews varied widely per proposal with additional reviews provided by members of the panel. Given the relatively small pool of potential reviewers and panelists available to the Program, it is unrealistic to expect a minimum of three external reviews for each proposal as is the model used in the OCE science programs. The Program used an appropriate method to review the proposals. **Data Source: EIS/Type of Review Module**	YES
2. Are both merit review criteria addressed a) In individual reviews? b) In panel summaries? c) In Program Director review analyses?	 YES YES YES

Comments: The two criteria, Intellectual Merit and Broader Impacts, are not easy to address in these types of proposals. Adoption of more appropriate criteria should be considered to make reviews more effective. In addition to Intellectual Merit and Broader Impact statements, the Programs should also evaluate proposals based on more realistic criteria such as: “The likely success of proposed activities to provide effective support for scientific research using institutional facilities and personnel.” “The costs related to the support activities in terms of day rate and specialized service costs.” "Technical merit" **Data Source: Jackets**	
3. Do the individual reviewers giving written reviews provide substantive comments to explain their assessment of the proposals? Comments: Reviews were hit or miss depending on the individual providing the review. Some reviews were not substantive, not showing how the proposal could be funded, while other reviews were detailed, insightful and extremely helpful in evaluating the scope of the work and proposed budget. (this is a common theme across the Geoscience Directorate exacerbated by the small size of this particular community) **Data Source: Jackets**	YES AND NO
4. Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)? Comments: The panel summaries were generally good in highlighting positive and negative aspects of each proposal, but the quality varied significantly. The Program should consider establishing a standardized, formal format for panel summaries. **Data Source: Jackets**	YES AND NO

5. Does the documentation in the jacket provide the rationale for the award/decline decision? [Note: Documentation in the jacket usually includes a context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), Program Director review analysis, and staff diary notes.] Comments: The jackets contained a context statement, individual reviews, panel summary, Program Director review analysis, and staff diary notes. Rationale for award decisions was provided in these documents. The Program Directors are to be commended on the extensive review analysis they presented, which included a candid assessment of each proposal, historical perspective, difficulties experienced in previously in providing support, as well as a comprehensive discussion of the jacket's subject. A significant amount of effort was put into the writing of each review analysis by the Program Directors. **Data Source: Jackets**	YES
6. Does the documentation to the PI provide the rationale for the award/decline decision? [Note: Documentation to PI usually includes context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), and, if not otherwise provided in the panel summary, an explanation from the Program Director (written in the PO Comments field or emailed with a copy in the jacket, or telephoned with a diary note in the jacket) of the basis for a declination.] Comments: The documentation provided to the PI was sufficient for the decisions that were made. Better justifications for awards that were declined could help the PI improve their future submissions. **Data Source: Jackets**	YES AND NO
7. Additional comments on the quality and effectiveness of the program's use of merit review process: Overall, the Program Directors did a good job at identifying appropriate reviewers and panel members to evaluate proposals. There were instances where panel composition was not ideal. Panel membership should be balanced according to the proposals being reviewed.	

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

SELECTION OF REVIEWERS	**YES , NO, DATA NOT AVAILABLE, or NOT APPLICABLE**
1. Did the program make use of reviewers having appropriate expertise and/or qualifications? Comments: For the most part, reviewers had appropriate expertise and qualifications for reviewing the proposal. However, there were several instances when this was not the case. For example in the OTS Program, reviewers and panel members possessed extensive expertise in managing and providing marine technical support to the scientific community. They included a marine technician, technical operations managers, a ship manager at another federal agency and a scientist. It is noted that panel members were mainly drawn from institutions operating global class ships; representatives from single ship institutions operating coastal, regional or intermediate class ships were not included in this panel. Broader representation from the entire academic fleet should be considered for future panels. **Data Source: Jackets**	YES AND NO
2. Did the program recognize and resolve conflicts of interest when appropriate? Comments: In only one instance was a COI found. During a panel, members left the room during discussions in which they had a conflict of interest. However, it is noted that a proposal reviewer with a conflict of interest with a PI provided a written review that was used in the evaluation of the proposal. The reviewer provided a balanced assessment of the proposal and a bias was not evident, but given the clear instructions about what constitutes a conflict of interest, this should not occur again. **Data Source: Jackets**	YES

Additional comments on reviewer selection: None	

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

MANAGEMENT OF THE PROGRAM UNDER REVIEW
1. Management of the program. Comments: *Please see 2014 COV Narrative*
2. Responsiveness of the program to emerging research and education opportunities. Comments: *Please see 2014 COV Narrative*
3. Program planning and prioritization process (internal and external) that guided the development of the portfolio. Comments: *Please see 2014 COV Narrative*
4. Responsiveness of program to previous COV comments and recommendations. Comments: *Please see 2014 COV Narrative*

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

Programs should provide materials to the COV regarding portfolio goals and can insert specific targeted questions about their portfolios. *(Some dimensions of portfolio balance to consider include: balance across disciplines and sub-disciplines, award size and duration, awards to new investigators, geographical distribution of awards, awards to different types of institutions, innovative/potentially transformative projects, projects with elements of risk, inter- and multi-disciplinary projects, projects that integrate research and education, participation of groups that are under-represented in science and engineering, and projects that are relevant to agency mission or national priorities).*

Please see 2014 COV Narrative

OTHER TOPICS

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

Please see 2014 COV Narrative

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.

Please see 2014 COV Narrative

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

Please see 2014 COV Narrative

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

Please see 2014 COV Narrative

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

Please see 2014 COV Narrative

SIGNATURE BLOCK:

July 8, 2014

_____

For the Integrative Programs Section
Dr. Claudia Benitez-Nelson, COV Chair