

Response to the 2019 MGS and OS Committee of Visitors Report

INTRODUCTION

The Marine Geosciences and Oceans Sections of the Ocean Sciences (OCE) Division appreciates the 2019 Committee of Visitors (COV) for their time and effort to review the Fiscal Year 2014 to 2018 activities of the following programs in the Ocean Sciences portfolio: Biological Oceanography, Chemical Oceanography, Marine Geology and Geophysics, and Physical Oceanography.

We commend and thank the COV for the excellent guidance provided in the report resulting from the August 7-8, 2019 meeting and acknowledge the significant amount of work the committee undertook while evaluating the complex portfolio of programs. We greatly appreciate the very positive feedback the COV provided about the integrity of the merit review process and the management and note that only one question received a “data not available” and only one other question received a “no”.

The following are the MGS and OS responses to the recommendations and comments in the COV report.

RECOMMENDATIONS AND RESPONSES

<p>1. Are the review methods (for example, panel, ad hoc, site visits) appropriate?</p> <ul style="list-style-type: none">Recommendation I.1.1: Require at least four ad hoc reviews. <p>NSF sets policy (requirements) for the number of reviews across the entire NSF, not for individual programs or Divisions. Policy states that “programs are responsible for assuring that appropriate, qualified merit reviewers are selected and that an acceptable number of reviewers adequately address each of the merit review criteria” and that “all full proposals must be reviewed by three to eight reviewers”. This number includes panelists. Program Officers typically strive for well over the minimum for complex proposals, which generally also have larger budgets.</p> <p>By having at least three ad hocs and a panel summary, OCE typically has at least 4 reviews for every proposal that goes to panel and often more as noted above.</p> <p>Recommendation I.1.2: Provide more structure for the Panel Summary that prompts the panelists to a) comment on strengths or weaknesses in Intellectual Merit and Broader Impacts with respect to the five NSF evaluation criteria, and b) explain any diverging views between the panel and ad hoc reviews.</p> <p>We will continue to strengthen the panel’s explicit discussion of strengths and weaknesses for both review criteria. Divergent views between ad hoc reviews are covered in the Review Analysis, and Program Officer Comments, by Program Officers. When discussion of disparities between the ad hoc reviews and the panel are discussed in the panel, we agree it should be reflected in the panel</p>	<p>YES</p>
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summary. The Programs will work to ensure that panels discuss disparities in opinion, both among panel members and between the panel and ad hoc reviewers, and that divergence of opinion is recorded and justified in the panel summaries.

- **Recommendation I.1.3:** Panel summaries should always be approved by all involved panelists and the Program Officer.

The NSF panel system allows for several panel summary approval options, although this isn't one of them. It is standard practice in all OCE core science programs for all assigned panelists and the cognizant program director to review the summary before final approval. We will consider whether it would be appropriate to document this approval practice in panel context statements.

It is worth noting that "approval" by the Program Officer does not indicate agreement with the content or tenor of the panel summary, but rather that it is a faithful documentation of the panel discussion. Panel input is strictly advisory, as is all peer review, and the Program Officer considers the advice in the context of all merit review considerations.

- **Recommendation I.1.4:** Provide the next COV with data for panel diversity in expertise, geography, institution type, gender, race, ethnicity, age, and disability.

Agreed, although we are limited by NSF's reliance on self-reported demographic data. Despite encouragement by the programs to self-report, and assurances that data will only be used in aggregate, not all panelists are willing to share this information. While it may seem simple for OCE to maintain our own records, we will have to inquire with Policy and ODI about collection of information by Programs, including addressing any concerns about the appropriateness of reporting these data at a program level.

Recommendation I.1.5: Programs not currently using virtual or hybrid panels consider doing so.

This is already being done. NSF encourages all of its Programs to consider virtual and hybrid panels and provides infrastructure and best practices documents to support Program's decision making on this front.

- **Recommendation I.1.6:** Language should be included in the panel invitation to offer the virtual option without putting the onus on individual panelist to request it.

There are cases where a hybrid panel is not appropriate, but for those cases where it can be supported, Programs will consider making the option available to panelists.

- **Recommendation I.1.7:** Since MG&G appears to use more virtual panels, staff from other sections should sit in on an MG&G virtual panel to evaluate its potential use for their own programs.

If of interest, and the software and/or virtual panel room here at NSF allows, the M&G Program would welcome other OCE Program Officers to observe their virtual panels. In fact, several OCE Program Officers have already attended the virtual MG&G panels e.g., for the discussion of co-reviewed proposals.

<ul style="list-style-type: none"> • Recommendation I.1.8: There should be a clearer explanation to all PIs (generic?) as to how ad hoc evaluation ratings vs. panel rankings relate to the final program decision. <p>There is not a generic explanation of how ad hoc vs. panel ranking are used in making final program decisions, which is what makes NSF unique within the federal funding realm. The emphasis on ratings misses the point that the content of reviews and discussion inform the decision, as noted in the review analyses. The peer review process is neither mathematical nor generic, and the decision depends on more than peer review alone, such as portfolio balance. Program Officer comments are used to provide an explanation of the recommendation for each individual proposal.</p> <ul style="list-style-type: none"> • Recommendation I.1.9: Bio Oce requires that the lead panel member write a proposal review <i>prior</i> to viewing the ad hoc mail reviews. The COV thought this may be a good idea for other panels/programs to consider implementing. We note some programs felt that this was unnecessary. Please provide more justification to future COVs. <p>We will provide more explanation of and justifications for program differences to future COVs.</p>	
<p>2. Are both merit review criteria addressed?</p> <ul style="list-style-type: none"> • Recommendation I.2.1: Reviewers would benefit from a reminder that the five evaluation criteria also apply to Broader Impacts, not just Intellectual Merit. <p>Agreed. Every review request letter states “Five elements should be considered in the review for both criteria. In the context of these elements, reviewers should evaluate the strengths and weaknesses of the proposal with respect to each criterion.” Cross-Foundation efforts such as the OIA trainings and other videos also highlight this and programs recommend that panelists view the video. We will consider whether or not we can take an action that makes it more likely ad hoc reviewers take advantage of the available resources. If successful in a “pilot” mode, such a practice could potentially be implemented across NSF. In any case, we remain committed to providing the resources to panels during pre-panel briefings, etc.</p> <p>Recommendation I.2.2: COV was split on whether there would be value to requiring separate scores for Broader Impacts and Intellectual Merit. We recommend that Program consider implementing this practice.</p> <p>We will discuss this, and report outcomes in future responses. We do note that formal changes to NSF systems would need to be implemented agency-wide, although pilot experiments are possible in coordination with OIA.</p> <ul style="list-style-type: none"> • Recommendation I.2.3: The COV encourages continued vigilance by program officers during panel, reminding panels about what constitutes Broader Impacts and how best to assess them. <p>Agreed. We will continue to emphasize this in the future.</p>	<p>YES</p>

<ul style="list-style-type: none"> • Recommendation I.2.4: The Program Officer should be sure to note when proposals do not go to panel, and take care to provide the PI with adequate feedback in that event. <p>The period under review by this COV included a transition in how Programs identified and documented proposals that did not get discussed by a panel. It is the current practice of all programs to assign all proposals to the panel, and only remove them from the schedule if panelists deem that discussion by the panel would be unlikely to provide substantively different information to the PI(s) than ad hocs alone. In this case, no panel summary is generated, the context statement notes the conditions under which no panel summary is provided, and the decision to not discuss in the panel is documented in the Review Analysis.</p> <p>OCE acknowledges there were some concerns with the process in earlier years but believes these have been resolved. It is our understanding that the COV is also satisfied with the current practice, which we expect to continue.</p> <ul style="list-style-type: none"> • Recommendation I.2.5: The COV thought the assessment of Broader Impacts by the community would benefit from access to information gathered by NSF as part of annual and final project reports. Compilation of such data may inform NSF or programmatic internal strategic planning, and online access to such information might improve the overall quality of proposed Broader Impacts. <p>We thank the COV for suggesting an existing source of information that might inform NSF’s assessment of Broader Impacts impact. We will report back on what actions we have decided to pursue and will report on progress in a year. One important consideration, which has recently been highlighted by the National Science Board, is assessing how project-level broader impacts relate to organization-level broader impact goals. This is not something that would likely be reflected in annual or final reports.</p> <ul style="list-style-type: none"> • Recommendation I.2.6: Consider formal or external assessments of Broader Impacts. <p>We interpret this comment to mean Broader Impacts for all of OCE, or even all of NSF. This is an NSF-wide concern, and we will discuss with OIA any plans. If the COV is instead suggesting that individual projects/proposals have a plan in place to assess the Broader Impacts, we would like to highlight that the third element of both merit review criteria includes asking reviewers to assess the plan for carrying out activities (again for both Intellectual Merit and Broader Impacts)</p>	
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<p>3. Do the individual reviewers giving written reviews provide substantive comments to explain their assessment of the proposals?</p> <ul style="list-style-type: none"> • Recommendation I.3.1: Re-emphasize to reviewers the need to provide substantive comments on all proposals, particularly on E or P proposals. <p>We strongly agree that it is important that reviewers appreciate the importance of substantive comments on each and every proposal that they review. The Programs include detailed instructions and guidelines in invitations to review proposal but given the very high numbers of ad hoc review requests that go out, customized communication with each reviewer is not realistic. Program Officers could</p>	<p>YES</p>
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<p>emphasize the importance of reviews when doing outreach to the community. We will consider additional options and provide updates on any changes.</p> <ul style="list-style-type: none"> • Recommendation I.3.2: Consider supplying more specific criteria for each rating, which would help reviewers use the entire scale. <p>Some panels provide definitions for each rating (E to P), although these are not formalized or consistent across NSF and guidance is not provided to ad hoc reviewers. We will consider and report back.</p>	
<p>4. Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)?</p> <ul style="list-style-type: none"> • Recommendation I.4.1: The COV encourages Program Officers to consistently remind panelists of the required elements. <p>This is standard practice for all OCE programs and will be continued.</p> <p>Recommendation I.4.2: Panelists should be encouraged to provide detailed information of the rationale for the ranking in their summary.</p> <p>The panel summary reflects the panel discussion, which should include capturing the overall assessment of the proposal. The focus on ranking reflects an emphasis on the scores which are less important to the programs than the comments. We feel that the PIs should understand this as well and will endeavor to convey this more clearly through Program Officer Comments and through outreach to the community.</p> <ul style="list-style-type: none"> • Recommendation I.4.3: Program Officers must perform due diligence before approving panel summaries. <p>This is standard practice for all OCE programs and will be continued.</p>	YES
<p>5. Does the documentation in the jacket provide the rationale for the award/decline decision?</p>	YES
<p>6. Does the documentation to the PI provide the rationale for the award/decline decision?</p>	YES

<p>Recommendation I.6.1: The COV recommends that Program Officers continually strive to transmit to the community more transparency and openness so that PIs understand they can discuss final decisions with the Program Officer. This communication is particularly critical for investigators that are early career or from underrepresented groups.</p> <p>Agreed. It is common for Program Officers to encourage PIs to contact them to discuss reviews. OCE will provide updates if we adopt any new communication strategies. As mentioned later, we appreciate the COV’s direction towards early career investigators and minority serving institutions.</p>	
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<p>7. Additional comments on the quality and effectiveness of the program’s use of merit review process:</p> <p>Recommendation I.7.1: Although the COV recognizes that obtaining ad hoc reviews can be challenging, and adding another element to the process may reduce return rates, we encourage the consideration of implicit bias training for reviewers.</p> <p>Implicit bias training is covered in the Art and Science of Reviewing Proposals video, which some programs show to panelists and which can be linked to in review request letters. We will consider options and provide updates on any changes we make to increase the participation of ad hoc reviewers in available trainings.</p>	
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II. Questions concerning the selection of reviewers. Please answer the following questions about the selection of reviewers and provide comments or concerns in the space below the question.

SELECTION OF REVIEWERS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
<p>1. Did the program make use of reviewers having appropriate expertise and/or qualifications?</p> <ul style="list-style-type: none"> • Recommendation II.1.1: The program should track reviewer expertise and demographics and provide the next COV with those data. <p>Demographic data is self-reported, as discussed above. We will have further discussion about how to move forward on metrics for reviewer expertise.</p>	YES
<p>2. Did the program recognize and resolve conflicts of interest when appropriate?</p>	YES
<p>3. Additional comments on reviewer selection:</p> <p>a) International reviewers tend to have less familiarity with the NSF review process and their perceptions of proposal ranking may differ; further, it may be more difficult to identify conflicts of interest for international scientists. Thus Program Officers should ensure that ad hoc reviewers are not dominated by international reviewers, but have a balance of national vs. international experts.</p> <p>We agree there needs to be a balance and we will continue to strive to achieve this.</p> <p>b) Recognition: Obtaining robust ad hoc reviews for proposals is a centerpiece in the proposal evaluation process. The COV discussed whether there could be some formal recognition for especially effective reviewers. However, issues of confidentiality likely exclude this option.</p> <p>We appreciate the time it takes to provide robust reviews and will consider if there are any allowable avenues for recognition.</p>	

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.

a) We were not provided with data on the **total dollars allocated to each program, nor any justification thereof**. From the eJackets and conversations with program staff, it appears that allocation of funds across programs is based largely on historic allocations. There seemed to be less consideration of the number of proposals submitted (or size of program). We wondered how this situation may interact with any reduction in proposal pressure resulting from the elimination of target dates.

- **Recommendation III.1.1:** The COV recommends that this allocation be assessed using a broad range of metrics (e.g., submission rates, success rates, overall field-specific costs) in addition to traditional measures of outcomes, and that these considerations be made available to the next COV.

We appreciate that the COV provided multiple metrics in the recommendation as opposed to a single emphasis on number of proposals submitted. Funding allocation is a complex problem and decisions are made by Congress on how much money to give to NSF, by the NSF Director on how much money to give to each Directorate, by the Assistant Director on how much money to give to each Division, and by the Division Director as to how much money to give to each Program. We will report out in a year's time whether OCE has decided to pursue this further.

With respect to the impacts of the MG&G Program changing to no deadlines, we note that we are still in a period of adjustment and it would not be reasonable to make decision based on a transient situation. Furthermore, it has been demonstrated in many units across NSF that different program management practices can have major influence on proposal pressure, thus any comparison of programs with and without deadlines would have to take this into account.

b) Consideration of **no-deadline vs. traditional target** date is premature. With the "experiment" underway in MG&G, there is an opportunity to evaluate the costs and benefits of eliminating target dates, but we are too early in the process to do so.

- **Recommendation III.1.2:** The COV suggests that all programs continue to evaluate the quality of the submissions, feedback from the community, and real functional impacts of establishing a no-target date process with an eye to the future possibility of implementing no-target-dates across all four programs.

Agreed. We will report out on results in updates.

c) Strategic balancing within programs is a process that cannot be fully assessed by the COV due to lack of information about the goals for individual programs and lack of outcome data. At a general level, the COV members recognize the need for some amount of strategic planning within a program. Within OCE, the admitted bias is strongly toward maintaining as much of the resource as possible within the core merit review process. This is admirable.

- **Recommendation III.1.3:** There is a need for explicit monitoring of outcomes and expression of strategic planning.

As the COV is aware, this COV was the first time OCE undertook a self-study to assist in initial discussions about many things including strategic balancing. We expect to continue these discussions and will report out on our plan, and actions, in future responses.

d) Promotion of interdisciplinary and cross-cutting programs is handled in a number of ways, which strike us as too qualitative or informal. The self study identified opportunities that spanned one or more programs and/or divisions and were used to foster important cross-cutting work. It is also the case that individual programs review and fund interdisciplinary work, yet those projects are not tallied in a visible way. The COV perceived that interdisciplinary opportunities were relatively low compared to historical efforts, and thinks that members of the community may be reluctant to propose mid-scale interdisciplinary projects to core programs for fear of busting the budget.

- **Recommendation III.1.4:** We urge the program to develop new ways to encourage mid-scale interdisciplinary research (e.g., something smaller than initiatives such as Navigating the New Arctic, for example, but larger than typical 2-3 PI core projects).

NSF is thinking about mid-scale research via the Big Ideas in a different context. We appreciate the definition of a perceived gap in the current OCE portfolio by the COV and will report back on our further investigation and any future plans and actions. OCE thinks sharing information on award size might focus this discussion better.

- **Recommendation III.1.5:** The level of interdisciplinary work that is supported by the division would be better illustrated if coding (e.g., key words) and statistics of all projects were maintained and shared with the next COV.

The suggested use of coding (which already exists) or keywords (which would need to be implemented) will be considered.

e) Regardless of the timing and planning associated with the initiation of "top-down" efforts to enhance diversity, individual programs should attempt to maximize the success of those efforts. For example, the HBCU effort should include effective mentoring and the inclusion of an HBCU expert on the panel to afford the greatest likelihood of success.

- **Recommendation III.1.6:** The program should prioritize any institutional effort to enhance diversity because women and people of color continue to remain significantly underrepresented in the ocean sciences.

We agree and acknowledge that the lack of diversity is a persistent issue for OCE. We will report back on our plans to address this.

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

The COV recognizes that the Program responds to emerging opportunities via bottom-up proposals. The program's success in this area is evidenced by the fact that twice as many projects were characterized as "transformative," "high-risk," "innovative," or "novel" in panel summaries of awarded projects than declined projects.

Comments:

a) The COV notes that there is plenty of room for more pro-active approaches using other funding mechanisms. Specifically, we note that RAPID and EAGER awards apparently account for < 1% of funds, which appears quite low. At the foundation level, the levels of these awards are greater than those presently used at Ocean Sciences. Some Program Officers clearly prefer that emerging research and

education opportunities go through the normal channels of peer review, explaining why RAPID and EAGER awards are so low.

- **Recommendation III.2.1:** The COV recommends consideration of more strategic use of small grant opportunities to stimulate innovation.

We will discuss this and report on any actions taken. As recognized in the comments, it may be that different programs pursue different options rather than having a single OCE position.

- **Recommendation III.2.2:** Include statistics on EAGER/RAPID inquiries, submissions, and responses in the next Self Study to enable more effective evaluation for the demand for these programs.

We agree that this could be a useful statistic for the next COV to consider, though caution that because many EAGER and RAPID inquiries are informal and not pursued, it may be hard to draw conclusions from the numbers.

RCN's and Gordon Research Conferences are highly valued and may be underutilized by some programs.

- **Recommendation III.2.3:** We recommend that funding levels for RCNs and GRCs be reassessed and potentially increased to maximize community development.

We appreciate the COV's attention to community development. There is no set funding level for RCNs or GRCs; both are funded out of the core science programs and are considered on a case by case basis that varies year by year depending on the emergence of new areas and community interest. We also feel preserving the decisions on a Program by Program basis is important. We will report back if there are any changes in the level of investment by the programs.

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

Portfolio management is clearly done on a continuous and iterative basis, based partly on communication within and between programs. We were unclear of precise definitions of "appropriate" and "balance" in this context. We wondered if this question refers to research focus? PI age? Geography? All?

- **Recommendation III.3.1:** The COV recommends that the program, along with community input, come up with a clear definition of what a "balanced portfolio" means.

NSF does not define what a balanced portfolio means because it is a dynamic, responsive, and program specific concept. We will consider whether any actions are advisable and expect this is something that may attract the attention of the GEO Advisory Committee.

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

OCE responded thoughtfully to the previous COV's recommendations.

Comments:

- a) We found the OCE Self Study Report that was recommended by the previous COV to be extremely valuable.

- **Recommendation III.4.1:** We recommend that such a self study be undertaken each year prior to the COV visit.

We agree that the self-study was a useful exercise and product for this COV and will plan for a similar (perhaps improved) self-study for the next COV. We will consider which parts of the self-study might be useful to revisit on an annual basis.

- **Recommendation III.4.2:** We also suggest that a few categories of responses be enhanced, including: Award success rates by group, award topics, award outcomes.

We agree and will pay additional attention to these categories in future self-study reports.

- **Recommendation III.4.3:** Separate annual updates / responses to previous COV recommendations (and not a single summary) should be included with the report to show progress.

We agree.

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

<p style="text-align: center;">RESULTING PORTFOLIO OF AWARDS</p>	<p style="text-align: center;">APPROPRIATE, NOT APPROPRIATE, OR DATA NOT AVAILABLE</p>
<p>1. Does the program portfolio have an appropriate balance of awards across disciplines and sub-disciplines of the activity?</p> <ul style="list-style-type: none"> • Recommendation IV.1.1: The COV recommends that proposal submissions be tagged (as with AGU abstracts) using key words selected by the PIs. This input could be submitted on the cover page or in the Project Summary. <p style="color: red;">There are parts of the NSF that do this. We will discuss the pros and cons of adopting the practice in OCE.</p> <ul style="list-style-type: none"> • Recommendation IV.1.2: We encourage the use of existing tools in other NSF directorates (e.g., DEB), such as the use of key words; text mining, or PI-supplied) to help codify proposals, and keep sufficient metrics that can be used to describe portfolio as it stands, with the opportunity to set future goals. <p style="color: red;">See above.</p> <ul style="list-style-type: none"> • Recommendation IV.1.3: We recommend that there be a more quantitative metric for balance and that these be provided to the next COV. <p style="color: red;">As discussed above, balance is purposefully not defined, but we feel that the self-study process, perhaps enhanced as suggested here, could provide some of what the COV is recommending.</p>	<p>DATA NOT AVAILABLE</p>

<p>2. Are awards appropriate in size and duration for the scope of the projects?</p> <ul style="list-style-type: none"> • Recommendation IV.2.1: The COV would find it useful to know how per capita funding support to PIs has changed over time. This may be a useful computation to include in future self studies. <p>The Programs will discuss this, but suggest that award size with personnel numbers may provide more meaningful information.</p> <ul style="list-style-type: none"> • Recommendation IV.2.2: We encourage the creation of more opportunities for mid-size projects (see III.1.4) that have a bit more capacity for longer time periods and more personnel. <p>We have addressed this recommendation above (in the response to III.1.4). We also note that there is no cap on proposal or award size within the core science programs, so PIs can (and do) propose mid-scale projects to the core programs. Again, information about award size could inform future discussions on this topic.</p>	YES
<p>3. Does the program portfolio include awards for projects that are innovative or potentially transformative?</p>	YES
<p>4. Does the program portfolio include inter- and multi-disciplinary projects?</p> <ul style="list-style-type: none"> • Recommendation IV.4.1: The COV encourages the four programs to continue to strive to increase funding mid-size, multidisciplinary projects. Currently, large, multidisciplinary projects can compete for cross-cutting funds, but Program Officers expressed that these can tax the program. Some intra-OCE initiatives might help, where Program Officers commit some funds to integrated system science. <p>We will provide more information and examples of large and multi-disciplinary projects to future COVs.</p>	YES
<p>5. Does the program portfolio have an appropriate geographical distribution of Principal Investigators?</p> <ul style="list-style-type: none"> • Recommendation IV.5.1: We encourage the next self study to include and scale to community numbers if possible. <p>This is certainly a goal of the EPSCOR program that operates across NSF. We expect this task might be harder to do than it seems, but will certainly investigate if it is possible. The community is defined by the PIs, who are not evenly distributed geographically.</p>	YES
<p>6. Does the program portfolio have an appropriate balance of awards to different types of institutions?</p>	YES

<ul style="list-style-type: none"> • Recommendation IV.6.1: We recommend that staff from the EiB program participate in the panel review of these proposals. Importantly, including panel members from HBCUs is essential going forward. <p>We agree that there are success rate challenges for some types of institutions. We will work with other parts of the NSF to look at possible approaches and report back on any activities that are undertaken.</p>	
<p>7. Does the program portfolio have an appropriate balance of awards to new and early-career investigators?</p>	YES
<p>8. Does the program portfolio include projects that integrate research and education?</p>	YES
<p>9. Does the program portfolio have appropriate participation of underrepresented groups¹?</p> <ul style="list-style-type: none"> • Recommendation IV.9.1: We recommend continued and increased support by NSF for HBCUs, LSAMP and LSAMP Bridge-to-PhD programs, and graduate fellowships to support the development of a diverse ocean science research community. <p>See our proposed response to IV.6.1 above.</p> <ul style="list-style-type: none"> • Recommendation IV.9.2: To improve the submission rate of proposals from HBCU, the COV recommends that more HBCU scientists be invited to serve on OCE panels. That is how many of us learned about the process. <p>We agree that it is important to have underrepresented minorities participate in panels, and again acknowledge that this is a persistent challenge for OCE. While we do not yet have a solution, we are actively seeking ways of better engaging underrepresented groups in our review process (and in the field in general) and will report back on any progress we have made.</p>	NO
<p>10. Is the program relevant to national priorities, agency mission, relevant fields and other constituent needs? Include citations of relevant external reports.</p> <ul style="list-style-type: none"> • Recommendation IV.10.1: OCE should seriously consider whether future COVs could be provided with output metrics, such as publication and graduation rates per award, number of people supported per award, number of people impacted by broader impacts/outreach, and others. <p>We will investigate the potential for mining annual and final reports for these outcomes, and report back.</p>	YES

¹ NSF does not have the legal authority to require principal investigators or reviewers to provide demographic data. Since provision of such data is voluntary, the demographic data available are incomplete. This may make it difficult to answer this question for small programs. However, experience suggests that even with the limited data available, COVs are able to provide a meaningful response to this question for most programs.

<p>11. Additional comments on the quality of the projects or the balance of the portfolio:</p> <p>The COV notes that the programs are extremely faithful to the merit review process with little set aside to explicitly meet diversity goals (be they topical, geographical, HBCU-based, or demographical). For example, the combined use of funding for EAGER and RAPID projects across the division was less than 1% of the total expenditures during the review period. In other cases, such as encouraging HBCU submissions, the proposals were vectored into the standard panel review process and failed to produce a visible (to the COV) increase in the number of successful proposals in the targeted area.</p> <p>We again acknowledge that this is an area for improvement across OCE, GEO, and all of NSF. We appreciate the suggestions of the COV. We also believe the items summarized here have been captured by the COV in previous recommendations, to which OCE has provided a response.</p>	

OTHER TOPICS

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

- a) Based on the examination of ejackets, discussions with the Program Officers and data in the self study, the COV identified several disciplines/subdisciplines (e.g., coastal processes, deep biosphere, sediment transport, vents, interactions between math and physical oceanography) that fall in between core program areas. We encourage Program Officers to continue considering innovative ways to fund quality proposals in these areas.

We will continue to strengthen ties between programs to ensure that no proposal is left behind. The COV suggestion of using keywords could address OCE’s identification of such “gap” topics in proposal submission, and award success in a more structured way. As discussed above, we will explore the potential of keywords toward this end.

- b) The COV finds value in growing interdisciplinary research, and thus encourages Program Officers to consider means of fostering community-driven cross-cutting program efforts (see Recommendations IV.2.2 and IV.4.1 above).

The Programs agree that there is a lot of innovative and important work that bridges multiple programs, both within OCE and across divisions and directorates. We will continue to encourage PIs to come to us with their ideas of interdisciplinary projects and continue to work to identify funding partners across the foundation. We will also continue to encourage our PIs to take advantage of new cross-cutting programs that may be housed outside OCE (e.g., the Big Ideas)

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

The self study report included general information and background on the OCE program. The mission of the OCE program summarized in this section includes the statement "The Division works with the US ocean sciences research and academic community to direct funding to advance the frontiers of knowledge, develop the next generation of researchers, and enhance the public’s understanding of ocean science." The COV thinks these are worthwhile goals and objectives and our experience during

the COV process led us to believe the program is making significant progress in these areas. However, the general lack of outcome data makes it challenging to comprehensively and quantitatively evaluate the programs' performance. For example, in the area of educating the next generation of ocean researchers, the COV considered data on the number of graduate and undergraduate students funded as a measure of effectiveness. The data provided to COV indicates that the number of graduate and undergraduate students decreased from FY2010 to FY2018. It is unclear if this is a real trend because we did not have the data to evaluate it fully, but it generally agrees with the COV's members experience of decreasing number of students in many of our academic institutions. Additional data on this and other outcome-related topics would be informative to the program as well as ocean science community.

We appreciate the COV's comments in this area and the suggestions of useful metrics. OCE will consider what metrics to include in the Self-Study update, and also consider whether it might be possible to capture data on scientific workforce training that may not be directly supported by the grant.

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

- a) The tracking of keywords (as recommended above in Section IV.1.1) may need to be implemented on an agency-wide level if it is designed to occur within Fastlane (for example, if PIs need to select 5 index terms (similar to AGU index terms).

As mentioned above, we will work with other parts of NSF that already implement this to assess whether this could be beneficial for OCE.

- b) Encourage better use/performance of new and existing cross-cutting programs (especially across directorates). For example, we noted that need for more formal collaborations between mathematics and ocean sciences. Ensure support for management of the programs (financial and human resources).

Is the COV referring to PI response to cross-cutting programs, or to OCE participation in cross-cutting programs, or both? We will consider the specific recommendation of strengthening ties between mathematics and ocean sciences.

- c) Technology for virtual panel participation is greatly improved. We commend NSF for these advances. COV encourages increased use of this opportunity to diversify panel participation and reduce travel cost/impact.

We agree.

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

N/A

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

- a) There were no questions in the template about panel composition or process. The COV recognizes the vital importance of panels so this information is necessary for a full evaluation of the review process.
- **Recommendation:** Data on panel composition (expertise, demographics, institution type, geographic location, career stage, etc.) would be helpful for future COVs to assess fairness and efficiency, and the potential costs/benefits of virtual panel implementation.

See our answer to I.1.4 above.

b) A single login/password for the three websites we need to access and greater stability in the online collaborative writing platform (sharepoint) would facilitate the day-to-day functions.

We will pass along to OIA.

c) We note that the automated download of PDFs from the eJacket to our laptops is not very secure. It would be better to set the program to open the PDF but not download automatically.

We will pass along to OIA.

d) The self study was a substantial improvement and greatly assisted the COV in completing their review. We appreciated it very much. That being said, we have a few suggestions for improvement for the next self study for future COVs.

- **Include award success rates by group:** In a number of tables, simple computation of award success would be helpful for comparison among groups. (We note this was rapidly provided upon our request).
- **Include award topics:** More data on award topics (via the use of keywords) would help the COV evaluate the portfolio composition; and
- **Include award outcomes:** Data on broad outcomes (number of personnel funded, theses completed, papers published, etc.) of awards would be useful for assessing suitable allocation of funds. The COV notes that many of these data are required in the annual reporting activities, and compilation of such data would be informative.

We agree that the addition of a self-study to the COV process was a big step forward and thank the previous COV for suggesting it and thank the whole OCE team for making it happen, with a specific thank you to Gayle Pugh, Mary-Elena Carr, and Rasheda Spratley. We will carefully consider the thoughtful suggestions provided by the COV.