

**CORE QUESTIONS and REPORT TEMPLATE**  
**for**  
**FY 2019 NSF COMMITTEE OF VISITOR (COV) REVIEWS**

**Guidance to NSF Staff:** This document includes the FY 2019 set of Core Questions and the COV Report Template for use by NSF staff when preparing and conducting COVs during FY 2019. Specific guidance for NSF staff describing the COV review process is described in the “COV Reviews” section of NSF’s Administrative Policies and Procedures which can be obtained at <https://inside.nsf.gov/tools/toolsdocuments/Inside%20NSF%20Documents/COV%20Policy%20and%20Procedures%20070915.pdf><sup>1</sup>.

NSF relies on the judgment of external experts to maintain high standards of program management, to provide advice for continuous improvement of NSF performance, and to ensure openness to the research and education community served by the Foundation. COV reviews provide NSF with external expert judgments in two areas: (1) assessments of the quality and integrity of program operations; and (2) program-level technical and managerial matters pertaining to proposal decisions.

The program(s) under review may include several sub-activities as well as NSF-wide activities. The directorate or division may instruct the COV to provide answers addressing a cluster or group of programs – a portfolio of activities integrated as a whole – or to provide answers specific to the sub-activities of the program, with the latter requiring more time but providing more detailed information.

The Division or Directorate may add questions relevant to the activities under review. Copies of the report template and the charge to the COV should be provided to OIA prior to forwarding to the COV. In order to provide COV members adequate time to read and consider the COV materials, including proposal jackets, COV members should be given access to the materials in the eJacket COV module approximately four weeks before the scheduled face-to-face meeting of the COV members. Before providing access to jackets, the Conflict of Interest and Confidentiality briefing for COV members should be conducted by webinar, during which, NSF staff should also summarize the scope of the program(s) under review and answer COV questions about the template.

Suggested sources of information for COVs to consider are provided for each item. As indicated, a resource for NSF staff preparing data for COVs is the Enterprise Information System (EIS) –Web COV module, which can be accessed by NSF staff only at <http://budg-eis-01/eisportal/default.aspx>. In addition, NSF staff preparing for the COV should consider other sources of information, as appropriate for the programs under review.

For programs using section IV (addressing portfolio balance), the program should provide the COV with a statement of the program’s portfolio goals and ask specific questions about the program under review. Some suggestions regarding portfolio dimensions are given on the template. These suggestions will not be appropriate for all programs.

**Guidance to the COV:** The COV report should provide a balanced assessment of NSF’s performance in the integrity and efficiency of the **processes** related to proposal review. Discussions leading to answers of the Core Questions will require study of confidential material such as declined proposals and reviewer comments. **COV reports should not contain confidential material or specific information about declined proposals.** The reports generated by COVs are made available to the public.

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

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<sup>1</sup> This document has three parts: (1) Policy, (2) Procedures, and (3) Roles & Responsibilities.

**FY 2019 REPORT TEMPLATE FOR  
NSF COMMITTEES OF VISITORS (COVs)**

The table below should be completed by program staff.

<b>Date of COV: August 7-8, 2019</b>
<b>Program/Cluster/Section: Biological Oceanography, Chemical Oceanography, Marine Geology and Geosciences, and Physical Oceanography</b>
<b>Division: Division of Ocean Sciences</b>
<b>Directorate: Directorate for Geosciences</b>
<b>Number of actions reviewed: 346</b> <b>Awards: 138</b> <b>Declinations: 205</b> <b>Other: 3 Return without review</b>
<b>Total number of actions within Program/Cluster/Division during period under review:</b> <b>Awards: 1281</b> <b>Declinations: 3315</b> <b>Other: 12 Return without review</b>
<b>Manner in which reviewed actions were selected:</b>  <p>The complete list of actions from which the samples were taken was obtained from the NSF Enterprise Data Warehouse (EDW), the official storehouse of NSF proposal information. Using the EDW, all of the programs actions (awards, declines, and others; Table 6) with a DD Concur date during the COV evaluation period of review were identified, resulting in a list of 5001 actions. The following actions were removed from the full list: IPA/Rotator grants, supplements, forward fund actions, current IPA projects (b/c data not available), OCE Postdoc fellowships and RIG program (reviewed by Ocean Education), and old return without review (RWR) actions, resulting in the final total of 4608.</p> <p>Each of the remaining 4608 actions represents a proposal. To create the COV sample set (Table 6), the proposals were grouped by project (so that collaborative projects could only be added to the sample set once). Each project was assigned a randomly generated value in Excel, then the list of actions was sorted, and the first 50 projects were selected for each program. Upon inspection of the 50 projects, we modified the selection continuing down the random list to make sure that the list for each program included a RAPID and EAGER project as well as four projects that were declined even though they were highly ranked by the ad hoc reviewers and four projects that were awarded even though they were not highly ranked by ad hoc reviewers. In addition to randomly selected projects, the programs had the opportunity to select up to five additional projects to ensure their portfolio represented breadth of projects supported by the programs, including special programs and interdisciplinary projects. Chemical Oceanography selected two additional projects, Physical Oceanography and Marine Geology and Geophysics selected five additional projects.</p> <p>Additional data on each action managed by the programs was gathered from the EDW. The data were consolidated into the "OCE Authoritative Reference Dataset" and used for subsequent analyses included in this report. A copy of the data set is included in the COV document module.</p>

### COV Membership

Available	First Name	Last Name	Institution/Organization
<b>COV Chair</b>	Miguel	Goñi	Oregon State University
<b>COV Members:</b>	Roger	Buck	Lamont-Doherty Earth Observatory
	Ellen	Druffel	University of California, Irvine
	Keith	Julien	University of Colorado, Boulder
	Emily	Klein	Duke University
	Jeff	Paduan	Naval Postgraduate School
	Tammi	Richardson	University of South Carolina
	Steve	Riser	GEO Advisory Committee Representative, University of Washington
	Su	Sponaugle	Oregon State University
	Patricia	Yager	University of Georgia

## MERIT REVIEW CRITERIA

An understanding of NSF's merit review criteria is important in order to answer some of the questions on the template. Reproduced below is the information provided to proposers in the Grant Proposal Guide about the merit review criteria and the principles associated with them. Also included is a description of some examples of broader impacts, provided by the National Science Board

### 1. Merit Review Principles

These principles are to be given due diligence by PIs and organizations when preparing proposals and managing projects, by reviewers when reading and evaluating proposals, and by NSF program staff when determining whether or not to recommend proposals for funding and while overseeing awards. Given that NSF is the primary federal agency charged with nurturing and supporting excellence in basic research and education, the following three principles apply:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.
- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals. These broader impacts may be accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified.
- Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects. If the size of the activity is limited, evaluation of that activity in isolation is not likely to be meaningful. Thus, assessing the effectiveness of these activities may best be done at a higher, more aggregated, level than the individual project.

With respect to the third principle, even if assessment of Broader Impacts outcomes for particular projects is done at an aggregated level, PIs are expected to be accountable for carrying out the activities described in the funded project. Thus, individual projects should include clearly stated goals, specific descriptions of the activities that the PI intends to do, and a plan in place to document the outputs of those activities. These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

### 2. Merit Review Criteria

All NSF proposals are evaluated through use of two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. Both criteria are to be given full consideration during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. ([PAPPG Chapter II.C.2.d.\(i\)](#) contains additional information for use by proposers in development of the Project Description section of the proposal.) Reviewers are strongly encouraged to review the criteria, including [PAPPG Chapter II.C.2.d.\(i\)](#), prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

- a) **Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge; and
- b) **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to:
  - a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
  - b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

### **3. Examples of Broader Impacts**

The National Science Board described some examples of broader impacts of research, beyond the intrinsic importance of advancing knowledge.<sup>2</sup> “These outcomes include (but are not limited to) increased participation of women, persons with disabilities, and underrepresented minorities in science, technology, engineering, and mathematics (STEM); improved STEM education at all levels; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a globally competitive STEM workforce; increased partnerships between academia, industry, and others; increased national security; increased economic competitiveness of the United States; and enhanced infrastructure for research and education. These examples of societally relevant outcomes should not be considered either comprehensive or prescriptive. Investigators may include appropriate outcomes not covered by these examples.”

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<sup>2</sup> [NSB-MR-11-22](#)

**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, returns without review, and withdrawals) that were *completed within the past four 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
<p><b>1. Are the review methods (for example, panel, ad hoc, site visits) appropriate?</b></p> <p>Overall, the review methods are appropriate and they work well. The COV commends the diligence and dedication of all OCE personnel involved in the proposal review process.</p> <p>With respect to specific aspects of the proposal review process, the COV was particularly impressed with the quality of the Program Officer summaries (Review Analysis), in their attention to detail, and their thoughtful synthesis and digestion of the ad hoc reviews, panel summaries, and relevant programmatic factors.</p> <p><b>Comments:</b></p> <p>While the COV found that the proposal review procedures in general work quite well, we identified the following areas for improvement, attention, or consideration:</p> <p><b>a) Ad hoc reviews:</b> While the ad hoc reviews were typically thoughtful, and addressed both intellectual merit and broader impacts, the number of ad hoc reviews returned for each proposal varied widely, both within and across programs (sometimes with the minimum of three reviews including a review by a panel member). We believe that a minimum of three is insufficient, particularly if the three differ in their ratings. We wonder whether there are any data on return rate (e.g., by program or sub-discipline) that can be used to inform the number of requests made, and thus achieve more than the minimum of three ad hoc reviews.</p> <ul style="list-style-type: none"> <li>• <b>Recommendation I.1.1:</b> Require at least four ad hoc reviews.</li> </ul> <p><b>b) Panel summaries:</b> The panel summaries varied significantly in quality and usefulness. Most consist of detailed, thoughtful syntheses of the panel discussion and digestion of the ad hoc reviews. But among proposals that went to panel during the review period, a number of panel summaries were terse, relied on recaps of ad hoc reviews, or provided weak feedback to the</p>	<p>YES</p>

PI. Recent panel summaries appeared to be improved, but because panels continue to work under significant time constraints, we would like to emphasize to POs the importance of meaningful panel summaries for all proposals taken to panel.

- **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.

We understand the concern expressed by some NSF staff that providing too much structure runs a certain risk (panel summaries that "just check the boxes"). We therefore suggest initially trying this as a pilot project by providing panels with one or two good Panel Summary examples.

- c) **The Panel Summary approval process** seemed uneven across the programs. Sometimes all involved panelists sign off (which we think best substantiates the panel input); at other times, the panel summary is signed by one panelist or sometimes just the Program Officer.

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

- d) **Panel diversity:** The COV did not have access to data on panel composition (beyond individual panelist information in the e-jackets), so evaluation of the panel diversity was not possible. We know that the programs strive for diversity in panel composition, and we encourage continued and enhanced efforts to ensure that panels reflect diversity in geography, institution type, gender, race, ethnicity, age, and disability, in addition to expertise. We also note the possibility that greater use of virtual (teleconference) panels (see below) may foster greater panel diversity.

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

- e) **Virtual or hybrid (teleconference) panels:** The panel recognizes the great benefits to both panel members and OCE staff of interacting in person. Nevertheless, there are also potential benefits in the use of virtual panels, beyond the obvious concern for the carbon footprint of travel. The COV also thinks that there may be a substantial number of potential panel members who decline invitations to participate in person because of family obligations, teaching schedules, disability issues, or time associated with travel.

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

<p>f) <b>No deadlines.</b> The COV was quite intrigued with the MG&amp;G "experiment" of no proposal deadlines (target dates), and strongly encourages other OCE programs to take note. We are pleased to hear that the MG&amp;G program is collecting data to track impact, and encourage continued evaluation to validate the apparent benefits. This no-deadline approach may be particularly useful for Bio Oce, with its high proposal burden.</p> <p>g) <b>Additional recommendations:</b></p> <ul style="list-style-type: none"> <li>• <b>Recommendation I.1.8:</b> 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.</li> <li>• <b>Recommendation I.1.9:</b> 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.</li> </ul> <p><b>Data Source: Jackets and discussions with POs</b></p>	
<p><b>2. Are both merit review criteria addressed?</b></p> <p>The COV feels that both Intellectual Merit and Broader Impacts criteria were generally consistently addressed by all participants. However, there was inconsistency in how Broader Impacts criteria were evaluated and weighed.</p> <p>a) <b>Individual reviews</b> were generally thorough in addressing Intellectual Merit, but showed variation in evaluating Broader Impacts (with some reviews providing only cursory comments or basis for evaluation).</p> <p>Despite repeated education, the community apparently still does not understand what Broader Impacts encompass. While the situation is challenging, the Program must keep pressing on the issue, particularly in terms of broadening the definition beyond K–12 outreach.</p> <ul style="list-style-type: none"> <li>• <b>Recommendation I.2.1:</b> Reviewers would benefit from a reminder that the five evaluation criteria also apply to Broader Impacts, not just Intellectual Merit.</li> <li>• <b>Recommendation I.2.2:</b> 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.</li> </ul> <p>b) <b>Panel summaries</b> addressed both Intellectual Merit and Broader Impacts, but varied in thoroughness and detail. We note that the quality of the panel summaries improved over the time period considered by the COV.</p> <ul style="list-style-type: none"> <li>• <b>Recommendation I.2.3:</b> The COV encourages continued vigilance by program officers during panel, reminding panels about what constitutes Broader Impacts and how best to assess them.</li> </ul> <p>c) <b>In Program Officer review analyses?</b> COV found that merit criteria were well explained in review analyses. Explanations and clarifications of Panel Summaries in terms of merit criteria were often provided.</p>	<p>YES</p>



<ul style="list-style-type: none"> <li>• <b>Recommendation I.2.4:</b> 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.</li> </ul> <p>d) <b>Additional Comments:</b> COV wonders about the overall ways that NSF assesses the success of Broader Impacts. We are encouraged that a discussion of Broader Impacts is now required in proposal sections describing Results from Prior Support, but we wonder if standard peer-review of these activities is adequate, especially given the confusion about what exactly they are.</p> <ul style="list-style-type: none"> <li>• <b>Recommendation I.2.5:</b> 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.</li> <li>• <b>Recommendation I.2.6:</b> Consider formal or external assessments of Broader Impacts.</li> </ul> <p><b>Data Source: Jackets</b></p>	
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<p><b>3. Do the individual reviewers giving written reviews provide substantive comments to explain their assessment of the proposals?</b></p> <p>Most reviewers provided substantive comments on Intellectual Merit of each proposal; the quality of comments on Broader Impacts were more variable as noted above.</p> <p><b>Comments:</b></p> <p>a) <b>Mismatch</b> between reviewer comments and reviewer score sometimes occurs.</p> <ul style="list-style-type: none"> <li>• <b>Recommendation I.3.1:</b> Re-emphasize to reviewers the need to provide substantive comments on all proposals, particularly on E or P proposals.</li> </ul> <p>b) <b>"Score inflation"</b> appears to be an issue because most scores were compressed at the top end of the scale, reviewers being reluctant to use the "Poor" category. This reality may be unavoidable.</p> <ul style="list-style-type: none"> <li>• <b>Recommendation I.3.2:</b> Consider supplying more specific criteria for each rating, which would help reviewers use the entire scale.</li> </ul> <p>c) <b>Reading beyond the score:</b> The COV recognizes and appreciates that both the panel review process and the iterations within each Program work deliberately and diligently to interpret the comments and to not rely on scores as the sole determinative factor.</p> <p><b>Data Source: Jackets and OCE Self study</b></p>	<p>YES</p>
<p><b>4. Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)?</b></p> <p>Panel summaries were generally useful and appropriate in this regard.</p> <p><b>Comments:</b></p>	<p>YES</p>

<p>a) <b>When there was no panel discussion:</b> The COV recognizes that while the handling of proposals that were not discussed by the panel has remained essentially the same, the manner in which it is communicated has evolved and improved over the review period. Boilerplate text was eliminated in favor of no text in those cases that did not receive panel review, removing previous ambiguities. In those cases, context and feedback were provided by the Program Officer.</p> <p>b) <b>There was some unevenness</b> in panel summaries. (See also Recommendation 1.2 above.)</p> <ul style="list-style-type: none"> <li>• <b>Recommendation I.4.1:</b> The COV encourages Program Officers to consistently remind panelists of the required elements.</li> <li>• <b>Recommendation I.4.2:</b> Panelists should be encouraged to provide detailed information of the rationale for the ranking in their summary.</li> <li>• <b>Recommendation I.4.3:</b> Program Officers must perform due diligence before approving panel summaries.</li> </ul> <p><b>Data Source: Jackets and discussions with Program Officers.</b></p>	
<p><b>5. Does the documentation in the jacket provide the rationale for the award/decline decision?</b></p> <p><i>[Note: Documentation in the jacket usually includes a context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), program officer review analysis, and staff diary notes.]</i></p> <p>COV was impressed with the thorough documentation of the review process. We found all the jackets complete, and decisions well justified. COV members were also impressed with the extensive deliberations and consensus building that takes place among the Program Officers within each of the programs after the panel reviews.</p> <p><b>Comments:</b></p> <p>a) COV found the internal documentation to be adequate, but there were challenges with how to explain those decisions to PIs (see Section 6 below).</p> <p><b>Data Source: Jackets</b></p>	YES
<p><b>6. Does the documentation to the PI provide the rationale for the award/decline decision?</b></p> <p><i>[Note: Documentation to PI usually includes context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), and, if not otherwise provided in the panel summary, an explanation from the program officer (written in the PO Comments field or emailed with a copy in the jacket, or telephoned with a diary note in the jacket) of the basis for a declination.]</i></p> <p>In general, the documentation forwarded to the PI included explicit explanations for the rationale of the decision. We found the Program Officer comments (in Review Analysis) to be especially helpful in instances where perhaps Panel Summaries were not as informative as they could have been or where the proposal was rejected without panel review. The COV was impressed by the care that all Program Officers took to provide as much information as possible to the PI.</p>	YES

**Comments:**

- a) Many in the community are likely unaware of the critical nature of what constitutes a third leg of the review process following the ad hoc and panel reviews. Good communication between Program Officers and the PIs is key, thus:
- **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.

**Data Source: Jackets**

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

- a) **Hybrid/Virtual panel benefits.** The COV members discussed the positives and challenges of virtual panels with NSF staff during our visit. We feel that virtual panels afford the opportunity to increase panel diversity in terms of geography (west coast, Alaska, and Hawaii vs. east coast), career stage (junior PIs with families), other factors (physical disability), while minimizing the carbon footprint. We note that video conferencing infrastructure has greatly improved and allows a much more desirable outcome and experience.

Program Officers gave numerous reasons for not favoring virtual panels: panels need to be of sufficient size to ensure breadth of opinions; on-site panels harbor greater interaction and agility. They also noted logistic and management issues that questioned cost savings. Also noted was that virtual panels may be appropriate when reviewing a smaller number of proposals (<15). Virtual panels were said to:

- Work best with a short panel with small number of proposals
- Work least well with a large panel, and a large number of proposals

- b) **No impact of no-deadlines on co-reviews.** COV members noted that MG&G moved recently to no deadline proposal submission, whereas Bio Oce, Chem Oce and Phys Oce remain using the Feb and Aug deadlines. The COV had questions regarding the logistics of handling joint co-reviews of deadline vs. no deadline panels. NSF Program Officers' responses indicated this was not a serious problem, indicating they use the same model of co-review with other programs within the foundation where panels are not at the same time. MG&G's different annual schedule is handled, at least in part, by that program aligning one of its panels with a larger in-person group panel.

- c) **Reviewer biases.** The COV wondered about the extent to which panelists are trained/reminded about inherent biases and other types of biases. Program Officers from several disciplines noted that all panelists are reminded of this at the start of the panels. However, it appears that no training is encouraged/provided for ad hoc reviewers.

- **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.	
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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><b>1. Did the program make use of reviewers having appropriate expertise and/or qualifications?</b></p> <p>From the information supplied, the COV believes that reviewer selection was effective and appropriate. We also observed careful planning and coordination of reviewer selection among Program Officers in each program. Based on our field-specific knowledge, as well as the content of the reviews, ad hoc reviewers appear to be experts.</p> <p><b>Comments:</b></p> <p>a) During conversations, Program Officers indicated that they use many of the reviewer suggestions provided by PIs, although all are scrutinized for potential conflicts of interest. Program Officers also generally accommodated any "Do Not Use" lists supplied by the PI, but they pay attention to the specific circumstances of those suggested. A strong rationale is required for a potential reviewer to be eliminated. All programs find the list of suggested reviewers supplied by the PI to be helpful and strongly encouraged.</p> <p>b) The COV was unable to locate single copy information about PI-chosen reviewer selection and/or exclusion in the e-jackets.</p> <p>c) The COV was not provided data about the expertise or demographics of the reviewers (or panel members). This is something worth tracking for future COVs.</p> <ul style="list-style-type: none"> <li>• <b>Recommendation II.1.1:</b> The program should track reviewer expertise and demographics and provide the next COV with those data.</li> </ul> <p><b>Data Source: Jackets</b></p>	YES
<p><b>2. Did the program recognize and resolve conflicts of interest when appropriate?</b></p> <p>The COV found the identification and resolution of conflicts of interest in OCE a rigorous and transparent process.</p> <p><b>Comments:</b></p> <p>a) In the unusual case where a COI with a panelist was discovered late in the panel process, the conflict was handled conservatively and thoroughly. In one example case this involved eliminating several ad hoc reviews, a panelist review, and all discussion that occurred at the panel. Additional reviews were solicited and a final decision rendered without panel input.</p> <p>b) The COV noted the recent improvement in COI data collection from PIs and hopes that it will ease the burden of keeping track of COIs for Program Officers.</p>	YES

<b>Data Source: Jackets and conversations with Program staff</b>	
<p><b>3. Additional comments on reviewer selection:</b></p> <p><b>a) International reviewers</b> 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><b>b) Recognition:</b> 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>	

**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.**

The COV recognizes that management of the program is complex and nuanced. Many of the OCE staff have long institutional histories and their dedication and professionalism provides much needed continuity. This is balanced well with rotators who bring community knowledge and immediacy to the program. The COV considered the balance of permanent and rotating staff and heard that most programs are satisfied with the current composition.

It was clear from our conversations, that the Program views itself as a bottom-up driven program, funding the top proposals that fare best under peer review. From our view of the jackets, the COV agrees that this was the case. At the same time, however, there is an element of “portfolio balance” within the management process that remains mysterious to many in the ocean science community (see Section 3 below).

Our conversations with OCE management indicated an awareness of the need to continually improve communications between NSF OCE and the Ocean Sciences community—this would enhance the opportunities and engagement of community members and improve science outcomes.

**Comments:**

The COV identified the following issues that made it difficult for us to comment on this question:

- 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.
- 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.
- 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.
- 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).
  - **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.
- 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.

## 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.
  - **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.
- b) 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.



### **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.

### **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.
  - **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.
  - **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.

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

<p style="text-align: center;"><b>RESULTING PORTFOLIO OF AWARDS</b></p>	<p style="text-align: center;"><b>APPROPRIATE, NOT APPROPRIATE, OR DATA NOT AVAILABLE</b></p>
<p><b>1. Does the program portfolio have an appropriate balance of awards across disciplines and sub-disciplines of the activity?</b></p> <p>As described in Section III.1 and III.3, we were unclear of the programmatic definitions of "appropriate" and "balance" in this context.</p> <p><b>Comments:</b></p> <p>a) The COV appreciated the effort by the programs to search for "frequently used terms" from the submitted proposals, but found this did not especially help the COV evaluate the balance of awards. It was difficult to obtain a complete sense of the funded projects at a given time, or know the meaning of a "balanced portfolio". It would be helpful if we could evaluate this in a more quantitative fashion.</p> <ul style="list-style-type: none"> <li>• <b>Recommendation IV.1.1:</b> 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.</li> <li>• <b>Recommendation IV.1.2:</b> 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.</li> <li>• <b>Recommendation IV.1.3:</b> We recommend that there be a more quantitative metric for balance and that these be provided to the next COV.</li> </ul> <p>These recommendations may require modification to proposal handling software, but the COV felt that investment in such change would assist programs with internal communication regarding the portfolio, as well as with program communication with external parties, including the COV. The COV recognizes that there is much uncertainty as to what constitutes an "appropriately balanced portfolio." Implementation of key words, etc., would help Program Officers define, track, share, and discuss within the program and with the broader scientific community how they view their particular "balance."</p> <p><b>Data Source: EIS/Committee of Visitors Module.</b> (We did not have this data set.)</p>	<p>DATA NOT AVAILABLE</p>

<p><b>2. Are awards appropriate in size and duration for the scope of the projects?</b></p> <p>The self study reported that awards had an average of 36 months in duration and that the majority of awards were funded at the level that was requested by the PI.</p> <p>The COV thought that the awards we reviewed were appropriately sized.</p> <p><b>Comments:</b></p> <p>a) The COV was impressed that only a small fraction of funded proposal budgets were reduced from original requests. We have the sense that funding proposals at their requested level has improved from previous years and commend the Program Officers if this is true. We also recognize, however, that funds requested are generally greatly minimized by PIs to avoid 'sticker shock' during peer-review. Requests for three year projects are likely made for the same reason.</p> <p>b) Since OCE supports many soft-money researchers, we think that the peer-review community takes their status or institution into account when assessing a proposal's budget. But we also know that researchers spread themselves very thin. This constraint on requested budgets may impact the quality of science outcomes. The high proportion of soft money researchers is likely a big distinction between OCE and other NSF directorates, and one that should be continuously assessed by the program.</p> <ul style="list-style-type: none"> <li>• <b>Recommendation IV.2.1:</b> 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.</li> <li>• <b>Recommendation IV.2.2:</b> 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.</li> </ul> <p><b>Data Source: EIS/Committee of Visitors Module. From the Report View drop-down, select Average Award Size and Duration. (We did not have this data set.)</b></p>	<p>YES</p>
<p><b>3. Does the program portfolio include awards for projects that are innovative or potentially transformative?</b></p> <p>It is clear that the program portfolios include awards for projects that are potentially transformative or innovative (see Section III.2). Overall, we think the peer-review process works well to fund innovative research.</p> <p><b>Comments:</b></p> <p>a) According to the self study, a significantly higher percentage of funded proposals than declined proposals were described as transformative in panel summaries.</p> <p>[Note: We assume that the counting of the word "transformative," or other words like this in reviews, occurred without the word "not" in front of it.]</p> <p><b>Data Source: Self Study</b></p>	<p>YES</p>

<p><b>4. Does the program portfolio include inter- and multi-disciplinary projects?</b></p> <p>Each program portfolio includes inter- and multi-disciplinary projects.</p> <p><b>Comments:</b></p> <p>a) It appears that the number and coverage of interdisciplinary projects are somewhat patchy and there may be several areas that are not exploited as much as they could be (e.g., Tables 23 &amp; 24 of self study).</p> <ul style="list-style-type: none"> <li>• <b>Recommendation IV.4.1:</b> 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.</li> </ul> <p><b>Data Source: Self Study</b></p>	<p>YES</p>
<p><b>5. Does the program portfolio have an appropriate geographical distribution of Principal Investigators?</b></p> <p>The maps provided in the Self Study indicate that the geographic scope of funded proposals largely follows the pattern of submitted proposals.</p> <p><b>Comments:</b></p> <p>a) We note that there was no scaling of these distributions to the number of programs or marine researchers in each region.</p> <ul style="list-style-type: none"> <li>• <b>Recommendation IV.5.1:</b> We encourage the next self study to include and scale to community numbers if possible.</li> </ul> <p>b) COV recognizes that the EPSCOR program encourages proposals from underrepresented regions. We were curious whether there were any other metrics of the program's success.</p> <p><b>Data Source: Self Study</b></p>	<p>YES</p>
<p><b>6. Does the program portfolio have an appropriate balance of awards to different types of institutions?</b></p> <p>Overall, the programs have similar award rates for proposals submitted from different types of academic institutions and non-academic institutions.</p> <p><b>Comments:</b></p> <p>a) The COV felt that the program to support HBCU researchers (EiB) appeared largely unsuccessful, although only one of these proposals appeared in the e-jackets we had access to, and the expressed efforts of the program involved seemed exemplary. The way the program was structured, with the PI from the HBCU needing to partner with R1 universities, is not necessarily wise.</p> <ul style="list-style-type: none"> <li>• <b>Recommendation IV.6.1:</b> 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.</li> </ul>	<p>YES</p>

<p><b>Data Source: Jackets and Self Study</b></p>	
<p><b>7. Does the program portfolio have an appropriate balance of awards to new and early-career investigators?</b></p> <p><i>[NOTE: A new investigator is an individual who has not served as the PI or Co-PI on any award from NSF (with the exception of doctoral dissertation awards, graduate or post-doctoral fellowships, research planning grants, or conferences, symposia and workshop grants.) An early-career investigator is defined as someone within seven years of receiving his or her last degree at the time of the award.]</i></p> <p>The self study showed that beginning and early career investigators were funded at a reasonable rate. Comparing beginning investigator success to average success is useful and reasonable. We would expect beginning investigators to not be as successful as more experienced investigators.</p> <p><b>Comments:</b></p> <p>a) The COV emphasizes that the NSF funded programs such as ECO-DAS, PODS, and DISCO provide excellent experiences for new investigators, and is highly valued by the community at large.</p> <p><b>Data Source: Jackets and Self Study</b></p>	<p>YES</p>
<p><b>8. Does the program portfolio include projects that integrate research and education?</b></p> <p>Salary requests in proposals demonstrate that substantial educational efforts are being supported. The COV requested and received information on the numbers of students (graduate and undergraduate) supported by OCE grants. The information clearly shows the large impact in terms of hundreds of students (both graduate and undergraduate) supported by OCE. The information provided shows an increase in the percentage of female and minority students supported in FY2018 vs FY2010.</p> <p>Comments:</p> <p>a) The COV notes that there is still work to be done to increase support for underrepresented groups (see below).</p> <p><b>Data Source: Jackets and NSF-provided table</b></p>	<p>YES</p>

<p><b>9. Does the program portfolio have appropriate participation of underrepresented groups<sup>3</sup>?</b></p> <p>Underrepresentation of females and people of color is recognized as a continuing problem in the field as a whole and not just within OCE. Nevertheless, NSF OCE has an opportunity to use funds strategically to help improve diversity of the Ocean Science research community.</p> <p><b>Comments:</b></p> <p>a) There is some bias training provided for panel members via video. It would be ideal if this could be extended to reviewers (see Section I.7c above).</p> <p>b) The COV supports the training and growth of the community of underrepresented groups through programs such as REUs, MPOWiR, GRFs, and support for students at Gordon Research Seminars and SACNAS meetings.</p> <ul style="list-style-type: none"> <li>• <b>Recommendation IV.9.1:</b> 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.</li> </ul> <p>c) The COV views the failure rate of proposals from HBCUs as concerning, and suggests that the process may need to be modified.</p> <ul style="list-style-type: none"> <li>• <b>Recommendation IV.9.2:</b> 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.</li> </ul> <p><b>Data Source: Jackets and Self Study</b></p>	<p>NO</p>
<p><b>10. Is the program relevant to national priorities, agency mission, relevant fields and other constituent needs? Include citations of relevant external reports.</b></p> <p>Overall, COV considers Ocean Science research to be a high national priority, and one that provides information that can enhance significantly the security and wellbeing of US citizens.</p> <p>In general, however, the bottom up, community-driven, proposal process for core OCE programs will not necessarily produce projects across the range of relevant national priorities or agency mission. Still, reviewing the proposals provided to the COV, it appears that a number of awards are relevant to the priority science questions identified in the Sea Change 2015-2025 Decadal Survey of Ocean Science. We note, for example, that the balance between core science programs and infrastructure has met the recommendation of the Sea Change document.</p> <p>To the extent that coverage is desirable or expected, the programs will need to use explicit initiatives to meet those goals.</p>	<p>YES</p>

<sup>3</sup> 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><b>Comments:</b></p> <p>a) The COV is limited to commenting on the various program procedures for creating their portfolios (e.g., fairness, geographic distributions, etc.). From our review of the eJackets, it is not possible for us to comment on program impacts, nor the relevance of external reports.</p> <ul style="list-style-type: none"> <li>• <b>Recommendation IV.10.1:</b> 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.</li> </ul> <p><b>Data Source: Self Study</b></p>	
<p><b>11. Additional comments on the quality of the projects or the balance of the portfolio:</b></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>	

**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.
- 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).

**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.

**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).
- 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).
- 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.

**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.
- 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.
- 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.
- 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.

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