BER Response to the Report of the BERAC Committee of Visitors Review of the Climate and Environmental Sciences Division

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Program Point of Contact: Gary Geernaert, SC-33.1

Introduction

The Committee of Visitors (COV) reviewed the Climate and Environmental Sciences Division (CESD) in the Office of Biological and Environmental Research (BER) for the period October 1, 2015 through September 30, 2018 (Fiscal Years 2016, 2017, and 2018), including the processes used to create and manage the research portfolio. The name of the Division officially changed to the Earth and Environmental Systems Sciences Division (EESSD) on April 12, 2020, but will continue to be referred to as CESD in this report given that it was called CESD during the period of this COV review (2016-2018).

The COV presented findings and recommendations in a report presented to the Biological and Environmental Research Advisory Committee (BERAC) on October 24, 2019. The report was finalized and accepted by BERAC on April 17, 2020 during the Spring BERAC meeting. The report provided helpful recommendations and constructive comments for the management of programs in the Division that comprise a wide range of Laboratory Science Focus Areas, University Funding Opportunity Announcements, and User Facilities.

BER has compiled the following responses to specific COV recommendations and has organized them into three groups: Office Management, Program Management, and Science Programs. While some responses are specific to CESD, others apply more generally to business practices for all of BER and are addressed respectively in the response section.

Responses to Key Comments and Recommendations

COV Recommendation	Response
Office Management	
To strengthen management and operation of BER, it is recommended to hire several additional program managers and to support travel of program managers to fulfil their review functions at laboratories and universities.	BER has worked quickly to open and fill three program manager positions for its Earth and Environmental System Modeling, Atmospheric Systems Research, and Environmental System Sciences programs. There remains a need to increase the number of program managers with increasing budgets. BER is exploring additional support with IPAs, detailees, and AAAS fellows. BER received an increase to its travel budget in recent years, allowing for expanded engagement of program managers in workshops, conferences, laboratory site-visits, and on-site project reviews.
CESD is encouraged to maintain an active engagement and partnership with software developers in the Office of Science to improve the speed, organization, and efficacy of review and award management functions in PAMS.	BER will explore possibilities to improve the speed and organization of the PAMS interface.
Programmatic Management	
CESD is encouraged to strengthen investment in the university community with the goal of improving BER science outcomes.	CESD values the university contribution to the CESD science challenges and will continue to provide strategic opportunities through its FOAs to maintain and strengthen science outcomes. These opportunities are balanced against strong continuing support of unique facilities and capabilities at the DOE Labs needed as part of DOE's participation in the multi-agency USGCRP coordination effort.
The COV recommends BER maintain its commitment to excellence by engaging university partners in planning and synthesis workshops, and establishing more transparent mechanisms for universities to engage.	BER will continue its commitment to assuring active community engagement in the design and conduct of workshops and Town Hall events. CESD will continue to invest and place high value on university-based science. CESD encourages its SFAs to collaborate with the community, and we strongly encourage University grantees to link to SFAs where appropriate.

The COV recommends that CESD and BER develop the means to track funding trends for lab and university programs over the past 10 years, and for this information to be included in review materials for the next COV.	BER will hereinafter include these data in the information and briefing packages that are provided in advance to all future COVs.
The COV recommends that CESD (and BER) makes a formal commitment to inclusive excellence by creating a plan that articulates diversity goals, and that BER also collect long-term statistics on diversity to track changes over time.	BER makes a special effort to include diversity as a factor in the composition of all of its activities. We fully embrace the SC policy on diversity, i.e., "…SC's effective stewardship and promotion of diverse and inclusive workplaces that value and celebrate a diversity of people, ideas, cultures, and educational backgrounds is foundational to delivering on our mission." BER will support and implement the Office of Science protocol on this topic.
The COV recommends flexibility on the renewal process and timeline for successful SFAs.	BER is dedicated to ensure scientific rigor through the review process. BER will maintain flexibility in the SFA timeline as warranted, but will continue with the current SFA review timeline.
Science Programs	
The COV recommends that CESD develop a strategy for model integration across scales. This can mean different things within and across different programs. A key goal of this program should be to encourage new interdisciplinary modeling science that spans different existing program areas.	CESD has made tremendous progress in leading community efforts to integrate interdisciplinary models across scales. The NGEE projects and the new coastal efforts are particularly focused on this type of integration, and they have achieved success with a view towards improved predictability and with greater certainty. CESD will continue to broaden the strategy and encourage even greater interdisciplinarity.
The COV recommends reviewing programmatic means to align observational and modeling components of the scientific program and that any synergies are optimally benefiting broader scientific objectives.	CESD will continue to promote through FOAs, SFAs, the ARM facility, and large projects the programmatic linkages between theory, experiment, and modeling across scales under the MODEX (model-experiment) paradigm. The Cyberinfrastructure working group meetings will be tasked to explore processes to strengthen the linkages.

We recommend that CESD develop a plan to assess how different data archives, including ESSDIVE, the ARM archives, and others, may be integrated.	CESD is committed to the ARM strategy to host a data archive as part of the facility; ARM already shares its metadata with multiple national and international archives to increase data access by the broader community. CESD will explore mechanisms to make it easier for scientists to access and use datasets across ARM, ESS-DIVE, and ESGF, in order to maximize scientific productivity and impact.
The COV recommends CESD embark on developing a strategic plan for harmonizing its data collection, archiving, and data access/manipulation capabilities. An effective plan may include best practices guidelines, archiving procedures, standards for data longevity and access, and co-location of data and computational resources required to create a new environment for machine learning.	A community workshop will be organized to explore novel approaches to harmonizing data informatics (including machine learning) and management across its various programs.
The COV recommends a comprehensive review of CESD's computational needs across programs and development of a living plan for new computer investments. It is also recommended that CESD find ways to reduce wait times, increase accessibility, and streamline allocations of computational resources to funded projects.	CESD will continue to conduct annual assessments of computational needs across its science programs and facilities, and enhance computational resources through programmatic investments as the need arises. CESD coordinates its computational needs and investment strategies with ASCR, and will explore ways to reduce wait times at NERSC, OLCF, and ALCF. CESD will continue to invest mid-range computational resources to support individual programmatic needs and help alleviate resource limitations at ASCR user facilities.
The COV recommends that CESD explore a formal review process for evaluating the management of ARM facilities whose support is distributed across the national labs, including but not limited to ARM mobile facilities (AMFs).	The ARM facility undergoes a rigorous triennial review process, that includes performance management, value to science, and efficiencies gained by multi-lab engagement. CESD will consider ways to incorporate additional metrics to evaluate, e.g., lab performance and lab-unique leveraging opportunities in support of the ARM facility's vision and goals.
The COV recommends that ARM systematically track data set use and publication citation statistics.	The ARM facility systematically tracks many statistics related to data set use and publication citations and presents this information to reviewers during its Triennial Reviews. CESD will make more of these statistics available to future COVs.

The COV recommends an assessment of whether current process-level work is optimally aligned with the ARM program objective of improving earth system models, and to consider more explicit roles for earth system modelers within the current ASR working group structure.	The ARM facility has been highly successful in providing novel data sets to advance the atmospheric sciences as well as to enhance the predictability of the Earth system, e.g., with the ARM diagnostic package that is extensively used by climate modelers. ASR will continue to encourage modelers and experimentalists to work together in ASR working groups to advance modeling capabilities, in particular E3SM.
The COV encourages actions that will broaden the use and appeal of ASR and ARM to the research community, including broadening the ASR portfolio to not require use of ARM observations, and to support international activities that would elevate the use of ARM products.	DOE, as a mission agency, is recognized internationally for committing dedicated resources that focus on the most difficult challenge that currently limits confidence in Earth System Models (ESMs), i.e., the large uncertainties associated with cloud-aerosol-precipitation interactions and radiative transfer. BER will continue to aggressively address this atmospheric science challenge, i.e., by supporting ASR research that exploits measurements provided by the ARM facility and other BER programs that may be combined with atmospheric and other observations generated by other federal agencies (e.g., NASA, NOAA, and NSF). CESD will explore ways to increase exposure of the ARM Facility's capabilities and the value added from ASR supported science through, for example, more active engagement in a broader range of PI meetings, USGCRP agencies, and international scientific conferences.