Biological and Environmental Research Update

BER Advisory Committee (BERAC)
Fall Meeting
October 18, 2018

Sharlene Weatherwax
Associate Director
BER Staff Changes

Dan Drell
Program Manager
Joint Genome Institute
(Retired September 2018)

Jessica Moerman
AAAS Fellow – working with CESD
(Started September 2018)
Welcome!!!

Ashley Williamson
Program Manager
Atmospheric System Research
(Retired June 2018)

Sujata Emani
AAAS Fellow – working with BSSD
(Started September 2018)
Welcome!!!
BER Researchers Recognized

William D. Nordhaus
Sterling Professor of Economics
Yale University

2018 Nobel (Sveriges Riksbank) Prize in Economic Sciences
“for integrating climate change into long-run macroeconomic analysis”
Researchers Recognized (cont’d)

**Timothy Donohue**
Director, Great Lakes Bioenergy Research Center, University of Wisconsin-Madison
*American Society for Microbiology - Promega Biotechnology Research Award*

**Jizhong Zhou**
Professor, University of Oklahoma
*American Society for Microbiology - Award for Environmental Research*

**Steven J. Ghan**
Pacific Northwest National Laboratory
*Fellow of the American Geophysical Union*
BER Researchers Recognized (cont’d)

Inez Y. Fung
Professor, UC Berkeley
American Meteorological Society (AMS) - Carl-Gustaf Rossby Research Medal

Patrick Minnis
NASA Langley Research Center
AMS - Verner E. Suomi Technology Medal

Samson M. Hagos
Pacific Northwest National Laboratory
AMS - Clarence Leroy Meisinger Award (Early Career)

J. David Neelin
Professor, UC Los Angeles
AMS - Jule G. Charney Medal
Budget: Duration and Number of Continuing Resolutions

Source: Modified from GAO analysis of Congressional Research Service data. GAO-18-368T.

FY2019: No CR!
Funding Allotments throughout the Fiscal Year 2018

Percentage of total BER FY2018 Appropriation

- September 2018
- August
- July
- June
- May
- April
- March
- February
- January
- December
- November
- October
- September 2017
## The DOE/SC Budget Cycle

<table>
<thead>
<tr>
<th>Current Year (FY2019)</th>
<th>FY 2019</th>
<th></th>
<th>FY 2020</th>
<th></th>
<th>FY 2021</th>
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<tr>
<td><strong>March</strong></td>
<td><strong>June</strong></td>
<td><strong>September</strong></td>
<td><strong>March</strong></td>
<td><strong>June</strong></td>
<td><strong>September</strong></td>
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<tr>
<td><strong>Approved Funding Program Spending</strong></td>
<td><strong>Corporate Budget Prep</strong></td>
<td><strong>OMB Budget Prep/Defense</strong></td>
<td><strong>President's Request delivered to Congress</strong></td>
<td><strong>Congressional Appropriation</strong></td>
<td><strong>Continuing Resolution</strong></td>
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<td><strong>Approved Funding Program Spending</strong></td>
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<tr>
<td><strong>Current Year + 1 (FY2020)</strong></td>
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<tr>
<td><strong>Corporate Budget Prep</strong></td>
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<td><strong>Current Year + 2 (FY2021)</strong></td>
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<td><strong>Corporate Budget Prep</strong></td>
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### Office of Science

#### FY 2019 SC External Control Table

(B/A in thousands)

<table>
<thead>
<tr>
<th></th>
<th>FY 2017 Enacted</th>
<th>FY 2018 Enacted</th>
<th>President's Request</th>
<th>FY 2019 Enacted</th>
<th>FY 2019 Enacted Approp. vs President's Request</th>
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<tr>
<td>ASCR……………...</td>
<td>647,000</td>
<td>810,000</td>
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<td>BES……………...</td>
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<td>BER……………...</td>
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<td>673,000</td>
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<td>705,000</td>
<td>205,000</td>
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<td>FES……………...</td>
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<td>130,000</td>
<td>257,292</td>
<td>126,852</td>
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<td>103,000</td>
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<td>106,110</td>
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<td>PD……………...</td>
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<td>183,000</td>
<td>180,000</td>
<td>183,000</td>
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<td>SBIR/STTR (SC)……...</td>
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<td>......</td>
<td>......</td>
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<tr>
<td>Subtotal, Science…...</td>
<td>5,392,000</td>
<td>6,259,903</td>
<td>5,390,972</td>
<td>6,585,000</td>
<td>1,194,028</td>
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<td>SBIR/STTR (DOE)……...</td>
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<tr>
<td>Rescission of PY Bal &quot;a&quot;</td>
<td>-1,028</td>
<td>......</td>
<td>......</td>
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<tr>
<td><strong>Total, Science</strong>…...</td>
<td>5,390,972</td>
<td>6,259,903</td>
<td>5,390,972</td>
<td>6,585,000</td>
<td>1,194,028</td>
</tr>
</tbody>
</table>

## BER Budget FY2019

<table>
<thead>
<tr>
<th></th>
<th>FY2017 ($M) Enacted</th>
<th>FY 2018 ($M) Enacted</th>
<th>FY 2019 ($M) Appropriated</th>
</tr>
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<tbody>
<tr>
<td>Biological Systems Science</td>
<td>$306.7</td>
<td>$351.4</td>
<td>$367.8</td>
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<tr>
<td>Research</td>
<td>$227.2</td>
<td>$282.0</td>
<td>$297.8</td>
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<tr>
<td>Facilities</td>
<td>$79.5</td>
<td>$69.4</td>
<td>$70.0</td>
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<tr>
<td>Earth and Environmental Systems Sciences</td>
<td>$305.3</td>
<td>$321.6</td>
<td>$337.2</td>
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<tr>
<td>Research</td>
<td>$189.6</td>
<td>$206.6</td>
<td>$206.7</td>
</tr>
<tr>
<td>Facilities</td>
<td>$115.7</td>
<td>$115.0</td>
<td>$130.5</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$612.0</strong></td>
<td><strong>$673.0</strong></td>
<td><strong>$705.00</strong></td>
</tr>
</tbody>
</table>

FY2019 appropriation fully supports all three BER user facilities
FY19 Budget Directives for BER - Summary

- Prioritize the operation of BER user facilities. Specific funding levels provided for all 3 User Facilities and for replacement of the ARM aerial capability.

- Full funding of the Bioenergy Research Centers.

- Begin establishment of a national microbiome database.

- Continue to support model performance optimization of coupled systems for execution on high performance and exascale systems.

- Specific funding levels provided for multiple research activities in BSSD and CESD.
FY2020 Administration Research and Development Budget Priorities

R&D Priority Areas
1. Security of the American People
2. American Leadership in Artificial Intelligence, Quantum Information Sciences, and Strategic Computing
3. American Connectivity and Autonomy
4. American Manufacturing
5. American Space Exploration & Commercialization
6. American Energy Dominance
7. American Medical Innovation
8. American Agriculture

R&D Priority Practices
A. Educating and Training and Workforce for the 21\textsuperscript{st} Century Economy
B. Managing and Modernizing R&D Infrastructure
C. Maximizing Interagency Coordination and Cross-Disciplinary Collaboration
BER participates in Interagency R&D Policy Coordination

OSTP/National Science and Technology Council (NSTC)

Committee on Science  
*Co-chairs: NIH, NSF*  
- Food and Agriculture  
- Open Science*  
- Quantum Information Science  
- Physical Sciences*  
- Opioid FTAC  
- Biological Sciences  
- Aquaculture*

Committee on Technology  
*Co-chairs: DOE, NIST*  
- Advanced Manufacturing*  
- Material Genome Initiative  
- Future of Transportation  
- Nanotechnology* (NNI)  
- Machine Learning/AI  
- Biotechnology

Committee on Environment  
*Co-chairs: EPA, NOAA*  
- Polar Research*  
- Global Change* (USGCRP)  
- Water Availability & Quality  
- Earth Observations  
- Ocean Science*  
- Environmental Health

Committee on S&T Enterprise  
*Co-chairs: DOE, NIST, NSF*  
- Networking IT R&D* (NITRD)  
- Research Business Models*  
- International S&T Coordination*  
- Scientific Collections  
- R&D Infrastructure  
- Open Data  
- Lab 2 Market

Committee on Homeland and National Security  
*Co-chairs: DHS, DoD*  
- Bio Defense R&D  
- Space Weather/EMP  
- Critical Minerals  
- SCORE  
- Space-based threats  
- Rad/Nuclear Defense R&D  
- Disaster Infrastructure  
- Border Security  
- Autonomous Threats  
- Critical Infrastructure

Committee on STEM Education  
*Co-chairs: NASA, NSF*  
- FC-STEM*

*Congressionally Mandated
2018 BER Early Career Focus Areas

- **Systems-level design and engineering of microbial or plant systems for the production of biofuels and bioproducts**
  - Eukaryote or prokaryote photosynthetic or fermentative microbes that can synthesize biofuels and bioproducts
  - Oil- or lignocellulosic biomass-producing bioenergy crops that can be engineered for facilitated cell wall deconstruction and conversion into fuels and products

- **Atmospheric processes that impact the Earth’s energy budget**
  - aerosol formation, growth, or removal
  - secondary organic aerosol processes
  - aerosol-cloud interactions
  - boundary layer processes that impact cloud formation, microphysical properties, or lifetime
  - convective cloud processes
  - ice or mixed phase microphysical processes
  - radiative transfer processes
<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
<th>Topic Area</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>Daniel Amador-Noguez</td>
<td>Univ. of Wisconsin-Madison</td>
<td>Plant and Microbial Systems</td>
<td>Genome-scale in vivo determination of Gibbs free energies in metabolic networks</td>
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<tr>
<td>Nanette Boyle</td>
<td>Colorado School of Mines</td>
<td>Plant and Microbial Systems</td>
<td>Enabling predictive metabolic modeling of diurnal growth using a multi-scale multi-paradigm approach</td>
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<tr>
<td>Susannah Burrows</td>
<td>PNNL</td>
<td>Atmospheric Processes</td>
<td>Building a comprehensive understanding of ice nuclei sources from the ground up: Establishing the impact of sea spray and agricultural soils</td>
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<tr>
<td>Naruki Hiranuma</td>
<td>West Texas A&amp;M Univ.</td>
<td>Atmospheric Processes</td>
<td>Implications of aerosol physicochemical properties including ice nucleation at ARM mega sites for improved understanding of microphysical atmospheric cloud processes</td>
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<tr>
<td>Kolby Jardine</td>
<td>LBNL</td>
<td>Plant and Microbial Systems</td>
<td>O-acetylation and methylation engineering of plant cell walls for enhanced biofuel production</td>
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<tr>
<td>Kerri Pratt</td>
<td>Univ. of Michigan</td>
<td>Atmospheric Processes</td>
<td>Elucidating processes controlling arctic atmospheric aerosol sources, aging, and mixing states</td>
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<tr>
<td>ManishKumar Shrivastava</td>
<td>PNNL</td>
<td>Atmospheric Processes</td>
<td>Finding missing links associated with aerosol-cloud interactions: Aqueous and cloud-phase secondary organic aerosol formation</td>
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<tr>
<td>Philipp Zerbe</td>
<td>University of California, Davis</td>
<td>Plant and Microbial Systems</td>
<td>Improved biofuel production through discovery and engineering of terpene metabolism in switchgrass</td>
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<tr>
<td>Name</td>
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<td>Host Lab</td>
<td>Research Area</td>
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<tr>
<td>Charlotte Marie DeWald</td>
<td>University of California – San Diego</td>
<td>PNNL</td>
<td>Atmospheric System Research</td>
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<tr>
<td>Elizabeth Ann Holman</td>
<td>California Institute of Technology</td>
<td>LBNL</td>
<td>Imaging and measurement for biological systems</td>
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<tr>
<td>Emily Burt</td>
<td>University of Southern California</td>
<td>LBNL</td>
<td>Environmental Systems Science</td>
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<td>Glade Arthur Dlott</td>
<td>Stanford University</td>
<td>PNNL</td>
<td>Soil Microbiology</td>
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<td>Jessica Wedow</td>
<td>University of Illinois at Urbana-Champaign</td>
<td>PNNL</td>
<td>Plant Science for Sustainable Bioenergy</td>
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<td>Jordan F. Russell</td>
<td>University of Georgia</td>
<td>NREL</td>
<td>Computational Biology and Bioinformatics</td>
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<td>Morgan Elizabeth Barnes</td>
<td>University of California – Merced</td>
<td>PNNL</td>
<td>Environmental Systems Science</td>
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<tr>
<td>Teresa Eren Bilir</td>
<td>University of California – Berkeley</td>
<td>LBNL</td>
<td>Environmental Systems Science</td>
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The Office of Science Graduate Student Research (SCGSR) Program is managed by the Office of Workforce Development for Teachers and Scientists, and was developed to prepare graduate students for science, technology, engineering, or mathematics (STEM) careers important to the DOE Office of Science mission.

SCGSR Topics for Biological and Environmental Research (BER) in the second (current) solicitation of 2018 include:

(a) Computational Biology and Bioinformatics
(b) Novel in Situ Imaging and Measurement Technologies for Biological Systems Science
(c) Plant Science for Sustainable Bioenergy
(d) Soil Microbiology
(e) Environmental Systems Science
(f) Atmospheric System Research
(g) Earth System Modeling

Applications are due November 15, 2018
New BERAC Charge

Committee of Visitors (COV) to review BER processes for programmatic funding in the Climate and Environmental Sciences (CESD) Division
Thank you!