

# The Energy Exascale Earth System Model (E3SM) All-hands Meeting Virtual, June 1, 3, 8, 9, 2021

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*Earth and Environmental Systems Sciences Division (EESSD)*

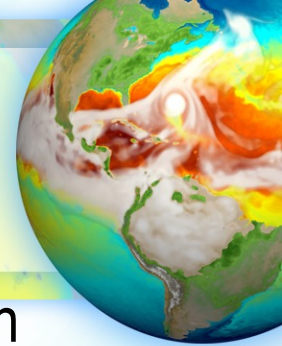


U.S. DEPARTMENT OF  
**ENERGY**

Office  
of Science

Office of Biological  
and Environmental Research

# The 2021 Spring All-Hands Meeting



**Goal:** updates from the E3SM Leadership Team on project vision and goals, current status, and future plans as researchers prepare for Phase 3 of the E3SM project.

## **Agenda:**

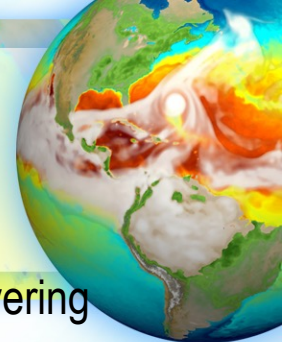
June 1, 8:00 am – 10:00 am, PDT

June 3, 8:00 am – 10:00 am, PDT

June 8, 8:00 am – 10:00 am, PDT

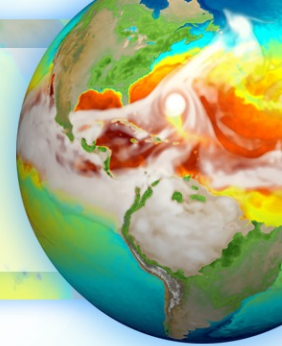
June 9, 8:00 am – 9:00 am, PDT

# Update since October 2020\*



- FY21 Budget: \$44M for ESMD
- [E3SM AGU Special Collection](#) Complete (50 papers by E3SM team and collaborators covering simulations and developments of v1 and some features for v2)
- BER Internal Review of E3SM, Nov 2020 (BER's 2<sup>nd</sup> responses in Apr 2021)
- [Participation of AGU](#) and AMS
- 18 [ESMD Research Highlights submitted](#) from Oct 2020-Apr 2021 on <https://climatemodeling.science.energy.gov/> site
- [ESMD-E3SM 2020 PI Meeting Report](#) Published
- [EESD AI4ESP White Papers](#) publicly Available: *The intent of AI4ESP is to **segue DOE's modeling and observing capabilities towards a hybrid system**, one that **combines physically-based models with machine learning in clever ways** to advance the predictability of the system and reduce uncertainties.- Gary Geernaert in American Resilience Conference, Apr14 2021*

# ESMD Supported Projects\*



Energy Exascale Earth System Model (**E3SM**), 61%

Central Driver

Enabling Aerosol-cloud interactions at Global convection-permitting scales (**EAGLES**)

v4

8 Scientific Discovery through Advanced Computing (**SciDAC**) Projects

BER/ASCR

13+ University Projects via FOA

Fresh knowledge

2 Early Career Awards

Creating a Sea-Level-Enabled E3SM, Simulating Estuarine Wetland Function

Early career talent

Others

Emissions Data for Earth System Models (CEDS), two Climate Process Team (CPT) projects

Interagency

Integrated Coastal Modeling (**ICoM**)

Interdisciplinary Research for Arctic Coastal Environments (**InterFACE**)

Coastal Observations, Mechanisms, and Predictions Across Systems and Scales (**COMPASS**)-GLM

BER Coastal  
Priorities:  
With other  
programs

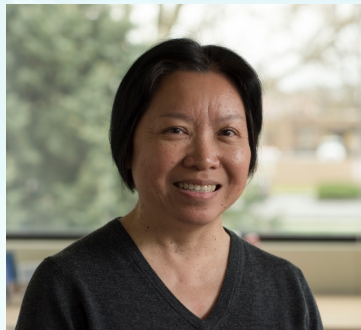
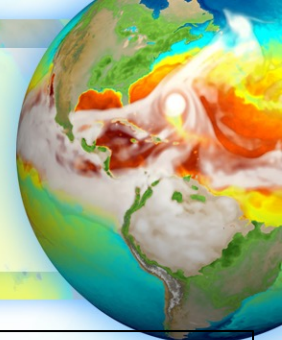
\* A full list of the ESMD supported projects can be found in the [ESMD-E3SM 2020 PI Meeting Report](#)

# Achievements and Recognition (*selected*)

- [The E3SMv1 standard resolution summary paper](#) is one of Journal of Advances in Modeling Earth Systems (JAMES)' **top cited papers** published between 2019 and 2020 (**141 citations by 05/31**). Congratulations to all 79 authors and contributors!
- The new atmosphere model being built by E3SM, i.e., the Simple Cloud-Resolving E3SM Atmosphere Model ([SCREAM](#)), **has demonstrated its early success** via its 3 km global simulation with improved representation of numerous fine-scale weather events; contributed to [DYMOND intercomparison project](#).
- E3SM participation of American Resilience Conference: how E3SM high resolution projection would provide actionable info to build resilience
- E3SM's new computer system, "Chrysalis," at ANL for v2 and v3 development. Throughput is currently as high as 40 SYPD (with 105 nodes) for Water Cycle simulations.

*More in [e3sm.org](http://e3sm.org) and [climatemodeling.science.energy.gov](http://climatemodeling.science.energy.gov) sites*

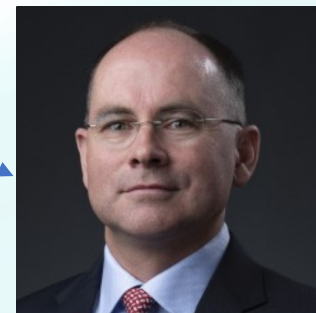
# Achievements and Recognition



- AGU Jacob Bjerknes Lecturer
- Featured by a DOE Office of Science Twitter post for Asian American and Native Hawaiian/Pacific Islander Heritage Month

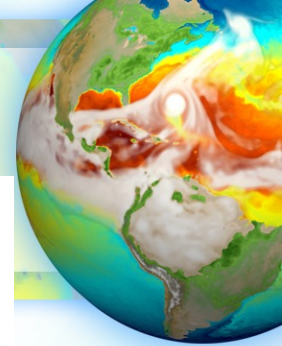
L. Ruby Leung @PNNL

- 2020 Editors' Citation for Excellence in Refereeing for the *Journal of Advances in Modeling Earth Systems (JAMES)*.

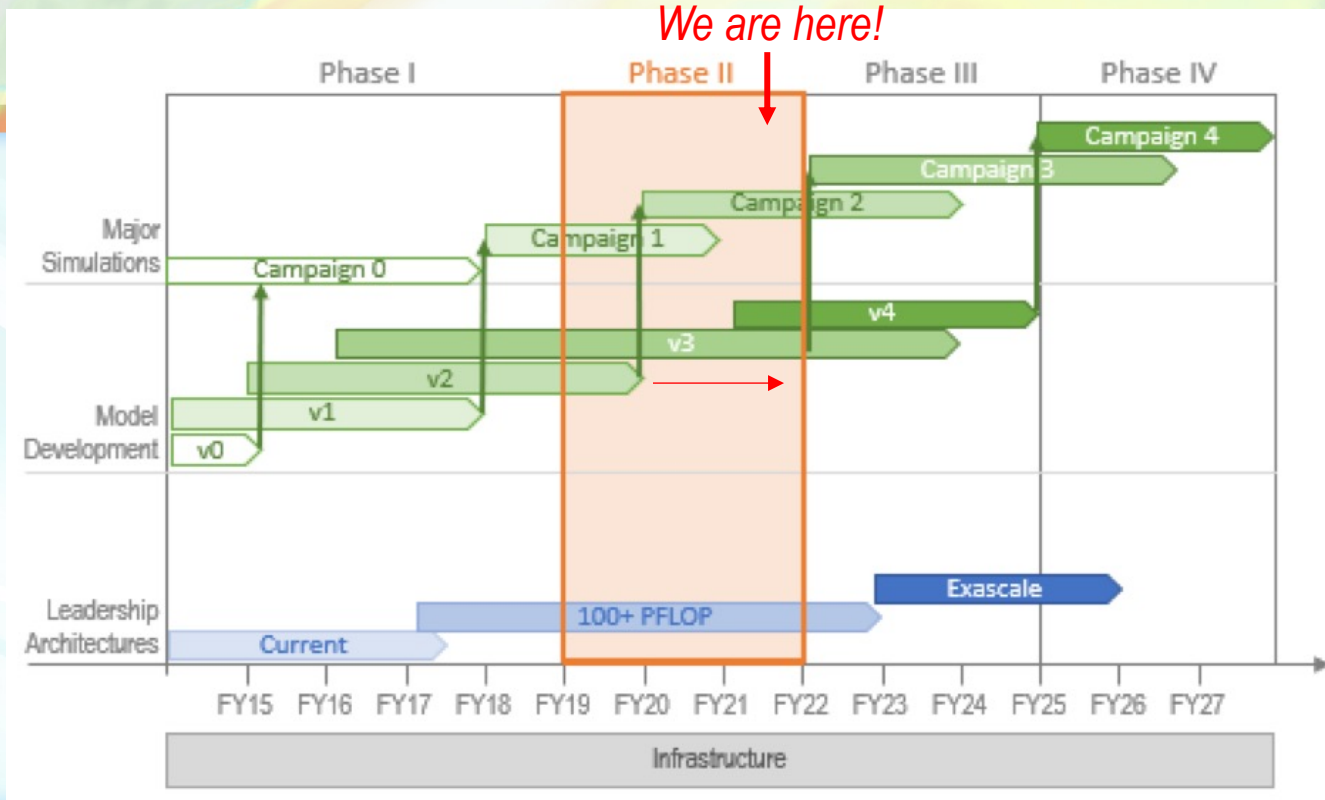


Andrew Roberts @LANL U.S. DEPARTMENT OF  
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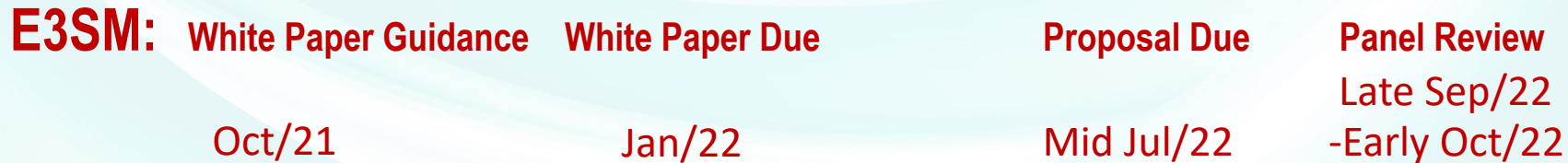
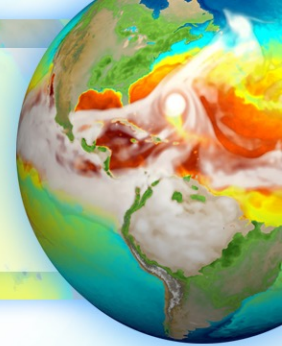
# E3SM Timeline: Transition from Phase 2 to 3



## E3SM Project Roadmap



# E3SM Timeline: Transition from Phase 2 to 3



Univ. FOA  
SciDAC  
EAGLES

Proposal due    Panel Review  
Late Fall/Early Spring    Spring/Early Summer



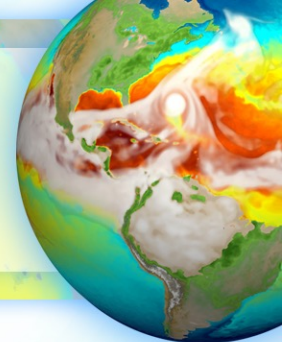
# Challenges and Opportunities

- Rigorous development cycle
- Code review process
- Increased interest in E3SM output
- The balance of project goals and support of users
- AI4ESP in E3SM
- Coordination with and leverage non-E3SM projects in DOE and broad ESM community

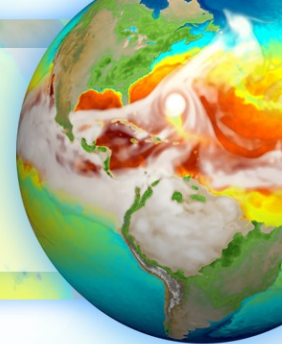
## *E3SM Longer term goal:*

*Assert and maintain an international scientific leadership position in the development of Earth system models that address the grand challenge of actionable predictions of Earth system variability and change, with an emphasis on the most critical scientific questions facing the nation and DOE*

# Resources and Communication



- ESMD-E3SM 2020 PI Meeting Report
- <https://e3sm.org/> (E3SM news, data, tools available, publication, publicity, openings);
- <https://climatemodeling.science.energy.gov/> (program info, research highlights, funding opportunities, meetings, news)
- Submit your Research Highlights
- Subscribe to E3SM Quarterly Newsletter: email to [listserv@lists.llnl.gov](mailto:listserv@lists.llnl.gov) with email body: 'subscribe E3SM-news'
- [E3SM-ALL@listserv.llnl.gov](mailto:E3SM-ALL@listserv.llnl.gov) list for ESMD science community



Thanks !!!