Brief Overview of Earth System Model Development

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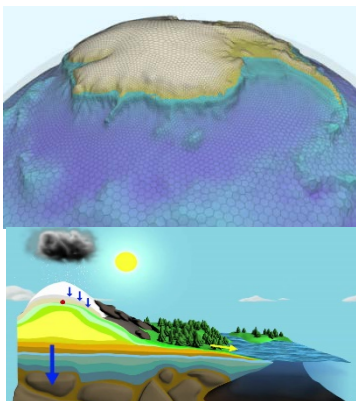
Earth System Model Development (ESMD)

Vision: *Develop Earth system models, i.e, Energy Exascale Earth System Model (E3SM) and its subcomponents, to address the grand challenge of actionable predictions of the changing Earth system, emphasizing on the most critical scientific questions facing the nation and DOE*
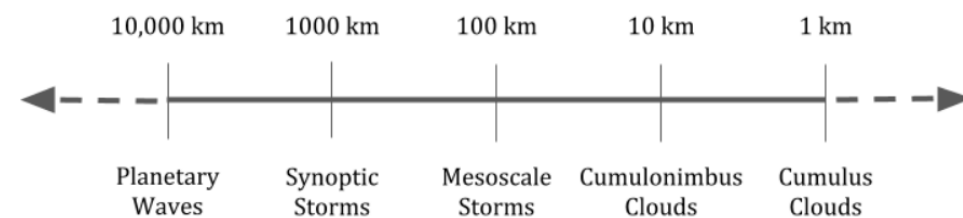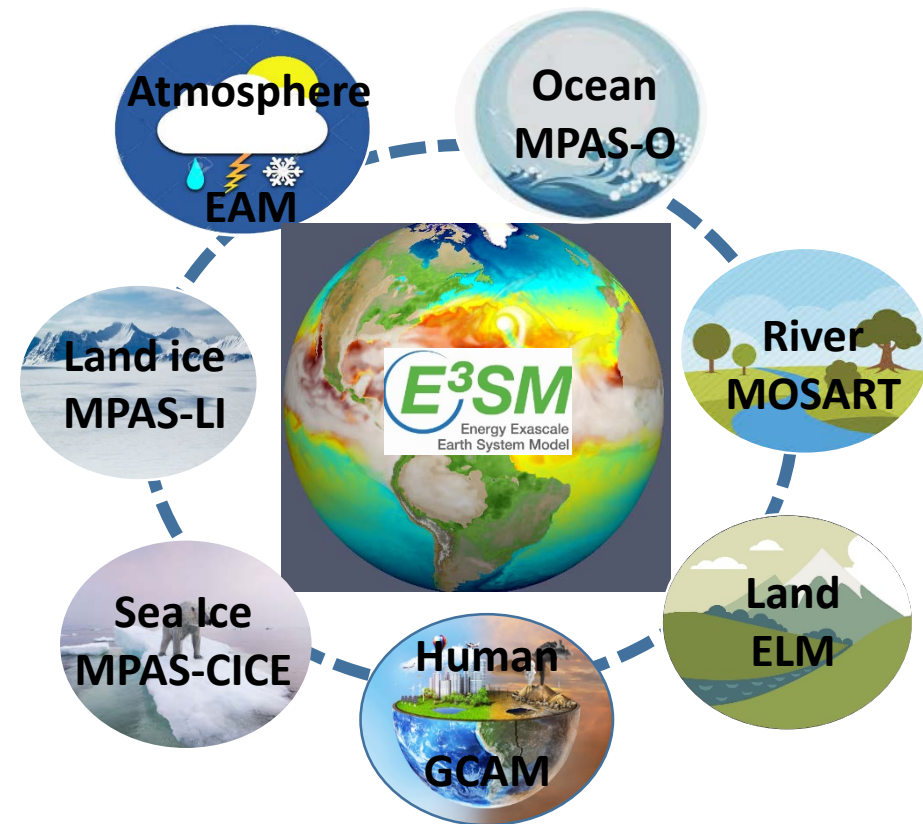
Goals:

- ✓ Improved predictability of the Earth system
- ✓ Simulations, predictions, and projections to support DOE's energy mission
- ✓ Prepare for and overcome the disruptive transition to next era of computing

Strategies:

- ➢ High-resolution frontier
- ➢ Earth system across scales
- ➢ Science driver for model development
- ➢ Innovative computational methods
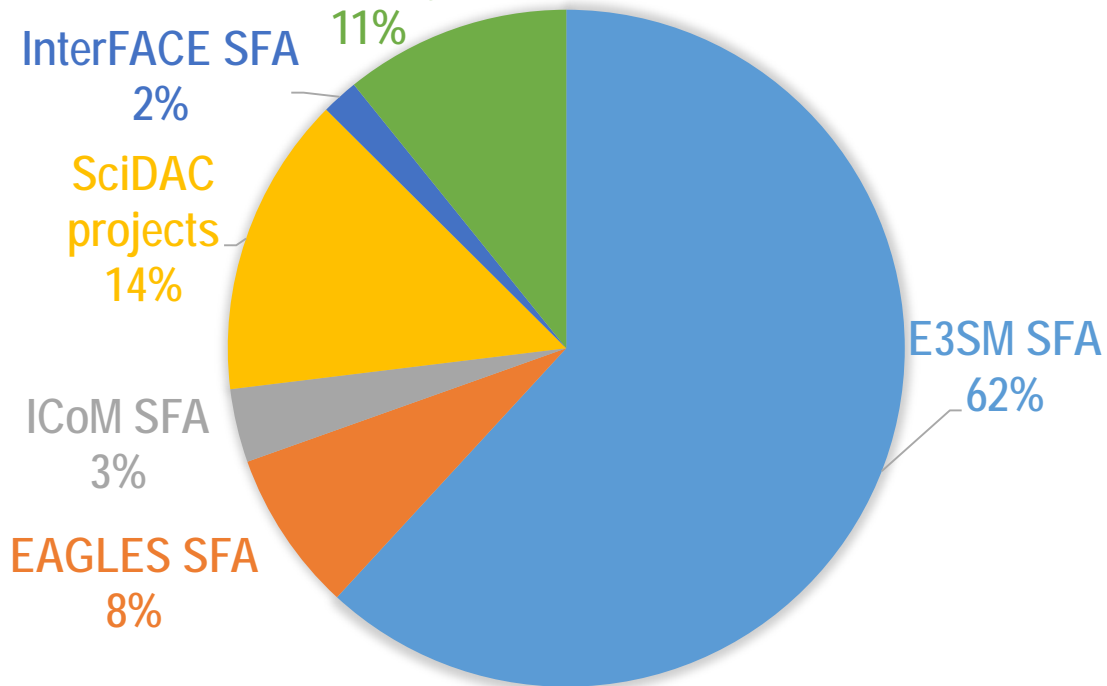
Integrated Earth System Model Across Scales

10,000 km	1000 km	100 km	10 km	1 km
Planetary Waves	Synoptic Storms	Mesoscale Storms	Cumulonimbus Clouds	Cumulus Clouds

ESMD Portfolio

ESMD FY20 Budget: ~44 M

*FY20 University Awards 11%

InterFACE SFA 2%

SciDAC projects 14%

ICoM SFA 3%

EAGLES SFA 8%

E3SM SFA 62%

* the budget from 8 other active university awards is not included

ESMD supported Projects:

➢ **E3SM SFA is the central driver** of the E3SM development; *Lead: **Dave Bader** (present next)*, 8 DOE labs and multiple universities

➢ Advancement from other projects (e.g., **EAGLES**, **InterFACE, ICoM SFAs, SciDAC, University awards)** are integrated into, support and accelerate E3SM development in various ways on different time frames

Welcome to attend ESMD/E3SM PI meeting, Oct 26-29, 2020!

Registration is still open: https://www.orau.gov/esmd-e3sm; Draft agenda is available
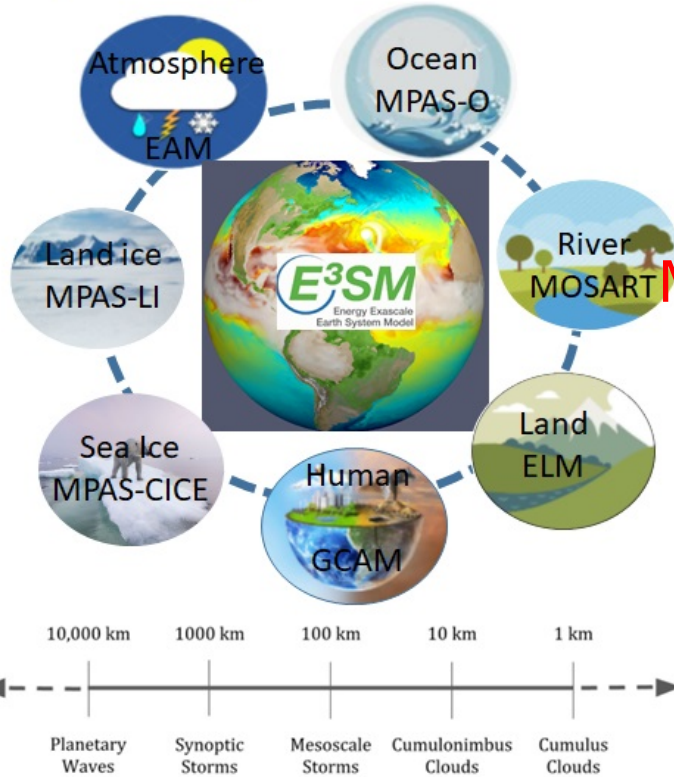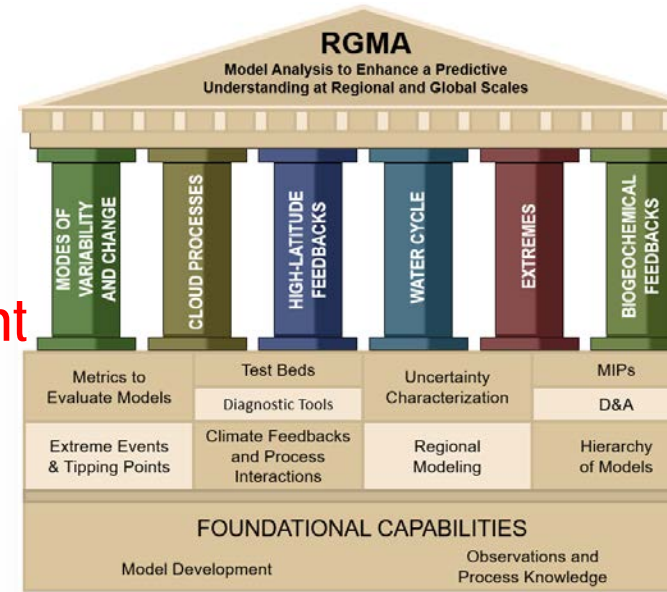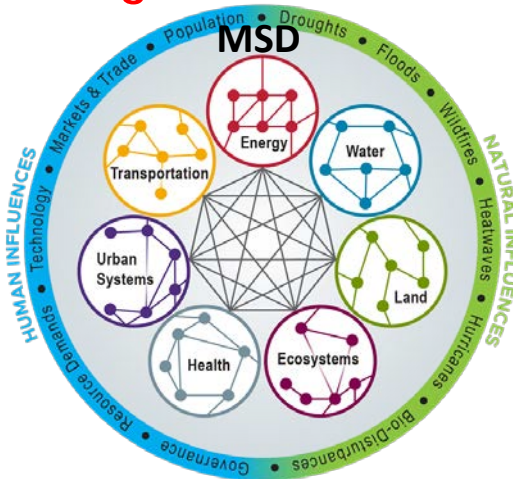
ESMD & RGMA Linkages

ESMD
Integrated Earth System Model Across Scales

Simulations for RGMA to enhance understanding

New RGMA knowledge to benefit E3SM development

MSD

Ongoing discussion for better coordination ....

EESM Goal: To develop and demonstrate advanced modeling and simulation capabilities, in order to enhance the predictability of the Earth system over multiple temporal and spatial scales.