

CCSI Earth System Modeling (ESM) Theme Discussion of Future CCSI

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ORNL Climate Change Science Institute (CCSI)

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ESM Scientific Goals

The Scientific Goals of the ESM Theme are to

1. improve understanding of the global Earth system,
2. quantify and reduce uncertainties in predictions of Earth system models, and
3. deliver actionable climate change knowledge.

These Goals will be accomplished by

1. developing and applying models and computational tools,
2. integrating models and observational data, and
3. providing usable model results with characterized uncertainties to the impacts community.

ESM Scientific Subgoals

- ▶ Improve predictions of climate change and variability by enhancing process representations in Earth system models and conducting model experiments to quantify land-atmosphere feedbacks and biogeochemical, cloud, aerosol, and radiation feedbacks with the climate system.
- ▶ Improve the computational efficiency and numerical accuracy of Earth system models by developing and applying computational performance tools and modern numerical algorithms and libraries to achieve unprecedented performance on Leadership-class computing resources.

ESM Scientific Subgoals (continued)

- ▶ Assess multi-model fidelity by confronting models with observational data, applying uncertainty quantification methods, and developing model evaluation tools.
- ▶ Deliver mission-relevant assessments of climate change and the influence of extreme events by analyzing multi-model projections at global, regional, and local scales over decades to centuries.

Questions for Other Themes

- ▶ Could the Data Theme collaborate with the ESM Theme to produce unique combinations of data sets and syntheses useful for model evaluation?
- ▶ Could the TESCC Theme benefit from closer collaboration with the ESM Theme on computational performance and numerical algorithms?
- ▶ Could the IAV Theme take advantage of high resolution simulations or envision new simulations that could be conducted in collaboration with the ESM Theme?
- ▶ Could CCSI Members identify possible funding opportunities to support new cross-Theme collaborations?

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