Climate Change Science Institute
AT OAK RIDGE NATIONAL LABORATORY

Predicting Ice Sheet and Climate Evolution at Extreme Scales (PISCEES)

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Project Duration: 2012 - 2017

Sponsor: PISCEES is jointly funded by the Office of Biological and Environmental Research and the Office of Advanced Scientific Computing Research of the DOE Office of Science.

Project Website: http://www.scidac.gov/PISCEES/
Additional Websites: http://climatemodeling.science.energy.gov/projects/predicting-ice-sheet-and-climate-evolution-extreme-scales-piscees ; http://www.scidac.gov/missionSD2.html

Project Description
Predicting Ice Sheet and Climate Evolution at Extreme Scales (PISCEES) is an Earth System Modeling project funded under the Scientific Discovery through Advanced Computing program at DOE. Melting of the Greenland and Antarctic ice sheets is accelerating and the resulting fresh water input into the oceans will be the dominant contribution to future sea level rise as the Earth's climate changes. The PISCEES project is developing better computer models of large ice sheets to improve future sea level rise projections. In particular, multi-scale formulations of ice sheet dynamics are being implemented to represent the wide range of spatial scales in a robust, accurate and scalable manner.

PISCEES has the following goals:

- To develop and apply robust, accurate, and scalable dynamical cores for ice sheet modeling on structured and unstructured meshes with adaptive refinements;
- To evaluate ice sheet models using new tools and data sets for verification and validation (V&V) and uncertainty quantification (UQ);
- To integrate these models and tools in the Community Ice Sheet Model and Community Earth System Model.

Using improved estimates of ice sheet initial conditions, decade-to-century-scale evolution of the Greenland and Antarctic ice sheets will be simulated, running the Community Ice Sheet Model in standalone mode and coupled to the Community Earth System Model. PISCEES aim to provide useful,

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credible predictions, including uncertainty ranges, of future ice-sheet mass loss and resulting changes in climate and sea level.

At ORNL, research is focused on Land Ice Verification and Validation - the development of new tools and techniques for validating ice sheet simulation results against observations and providing estimates of the uncertainty surrounding future projections.

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