

### CCSI Leadership Team

James J. Hack, Director  
Benjamin L. Preston, Deputy Director  
Gary K. Jacobs, Ops & Bus. Dev. Manager

Leadership with 75 years of collective experience in climate change and its supporting sciences.

The Climate Change Science Institute (CCSI) is a inter-disciplinary, cross-directorate organizational body created in 2009 at the Oak Ridge National Laboratory to advance climate change science research along the lines of four primary themes:

- ◆ Earth System Modeling
- ◆ Data Integration, Dissemination, and Informatics
- ◆ Terrestrial Ecosystem and Carbon Cycle Science
- ◆ Impacts, Adaptation, and Vulnerability Science

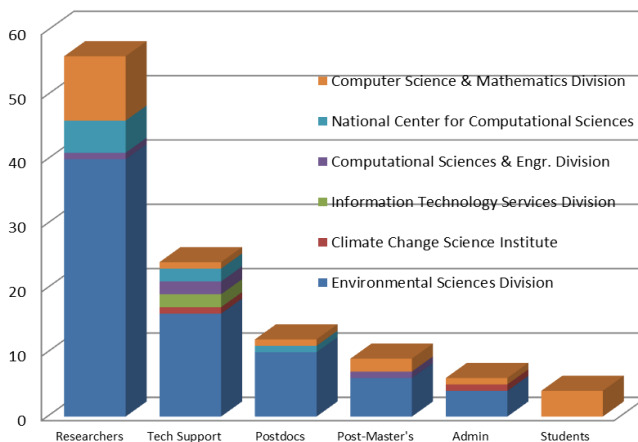
These themes enable ORNL leadership to identify where resources, proposal writing and other climate change research efforts should be directed to maintain focus and achieve a critical mass of effort.

### Staff Demographics

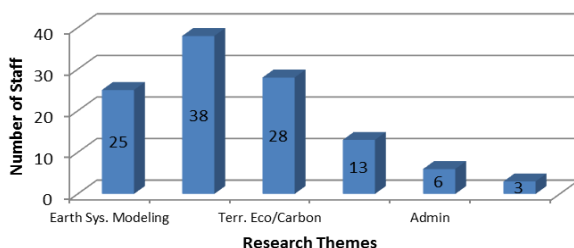
112 staff members of whom 91 reside in Building 2040

57 Researchers	12 Postdoctoral Research Associates
24 Technical Support	
6 Administrative Assistants	9 Post-Master's Research Associates
4 Students	

### CCSI Staff Distribution by Division

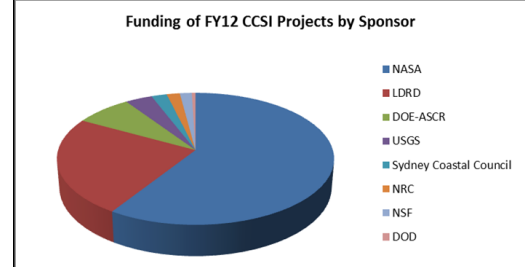
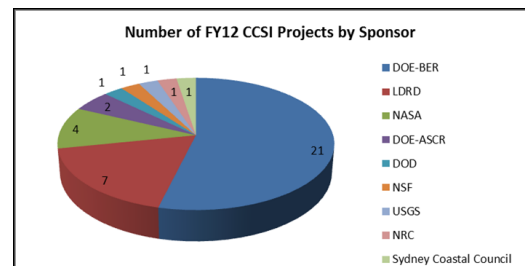


### Staff Distribution Among Research Themes



### FY12 Funding Demographics —\$42.4M

Seven of the 39 projects constitute ~71% of the FY11 funding.



### Sponsors

#### DOE National Laboratories

Argonne National Laboratory	Lawrence Berkeley National Laboratory	Pacific Northwest National Laboratory
Brookhaven National Laboratory	Lawrence Livermore National Laboratory	Sandia National Laboratories
Los Alamos National Laboratory		National Renewable Energy Laboratory

#### Universities

Boise State University	Texas A&M University	University of Prince Edward Island (Canada)
Duke University	UC-Berkeley	University of Puerto Rico
Florida State University	UC-Davis	University of Sydney (Australia)
Johns Hopkins University	UC-Irvine	University of Tennessee
Lund University (SWEDEN)	University of Alberta (Canada)	University of Utah
New York University	University of Illinois – Chicago	University of Victoria (Canada)
Massachusetts Institute of Technology	University of Michigan	University of the Sunshine Coast (Australia)
Purdue University	University of Oregon	
Rutgers University		

#### National Agencies

National Aeronautics and Space Administration	National Science Foundation	USDA Land Management and Water Conservation Research
National Center for Atmospheric Research	US Army Cold Regions Research and Engineering Lab	US Global Change Research Program
National Oceanic and Atmospheric Administration	US Department of Agriculture	US Geological Survey
	USDA Forest Service	

#### Other Partners

Barrow Arctic Science Consortium DuraSpace

## CCSI PROJECTS BY RESEARCH THEME

### EARTH SYSTEM MODELING

- ◆ Climate Science for a Sustainable Energy Future (CSSEF)
- ◆ Development of Frameworks for Robust Regional Climate Modeling
- ◆ Performance Engineering of the Community Climate System Model (PECCSM)
- ◆ Probabilistic Precipitation Modeling (Nuclear Regulatory Comm.)
- ◆ Scalable, Efficient, and Accurate Community Ice Sheet Model (SEACISM)
- ◆ Ultra High-Resolution Global Climate Simulation to Explore and Quantify Predictive Skill for Climate Means, Variability and Extremes
- ◆ Visual Data Exploration and Analysis of Ultra-Large Climate Data

### DATA INTEGRATION, DISSEMINATION, & INTEGRATION

- ◆ Atmospheric Radiation Measurement (ARM) Data Archive
- ◆ Carbon Dioxide Information Analysis Center (CDIAC)
- ◆ DataONE
- ◆ Distributed Active Archive Center (DAAC) for Biogeochemical Dynamics
- ◆ NASA—Data Management Support (LBA)
- ◆ NASA—Digital Object (ESDORA)
- ◆ NASA—MAST-DC
- ◆ US Geological Survey Metadata Clearinghouse
- ◆ Scaling the Earth System Grid to Petascale Data
- ◆ Ultra-Scale Visualization Climate Data Analysis Tools

### TERRESTRIAL ECOSYSTEM & CARBON CYCLE SCIENCE

- ◆ Free-Air CO<sub>2</sub> Enrichment (FACE) Experiment
- ◆ Improving the Representations of Human-Earth Interactions
- ◆ Investigation of the Magnitudes and Probabilities of Abrupt Climate Transitions (IMPACTS)
- ◆ Next-Generation Ecosystem Experiments—Arctic (NGEE)
- ◆ Quantification and Reduction of Critical Uncertainties Associated with Carbon Cycle-Climate System
- ◆ Terrestrial Ecosystem Science Focus Area

### IMPACTS, ADAPTATION, & VULNERABILITY SCIENCE

- ◆ Assistance with Incorporating Impacts into Integrated Assessment
- ◆ Integrated Science and Computing Support for National Climate Service
- ◆ Multi-Criteria Approaches to Adaptive Coastal Development
- ◆ Regional Integrated Assessment Model

### RECENT CCSI CONTRIBUTIONS TO CLIMATE CHANGE SCIENCE

- ◆ Manipulated grasslands and forests to see how precipitation, carbon dioxide and temperature changes affect the biosphere and highlighted the results in Scientific American to a worldwide audience.
- ◆ A multidisciplinary group of CCSI scientists conceived, simulated, constructed and tested a new experimental system for simulating future below-ground temperature increases in a temperate deciduous forest at ORNL.
- ◆ Observed a high degree of homeostasis while studying photosynthetic sensitivity to temperature and the potential for acclimation in relation to the climatic provenance, indicating that direct impacts of climatic warming on forest productivity, species survival, and range limits may be less than predicted by existing models.
- ◆ Directly contributed to the scalability and doubling of performance in the April 2010 release of CCSM.
- ◆ Analyses showed that aggressive adoption of advanced C sequestration technologies could greatly increase the potential cumulative increase in C by 2100.
- ◆ Proposed a framework for dealing with GHG Inventory uncertainties which should have a large impact on the functioning and effectiveness of the Kyoto Protocol and its successor.
- ◆ Successfully performed a coupled global high-resolution simulation that represented the interaction between tropical cyclones and the ocean surface.
- ◆ Improved geospatial resolution of cropland carbon fluxes in the US using inventory based carbon accounting.
- ◆ Observed that changes in plant dominance patterns and community evenness are an important part of community responses to climatic change, and generally, that such compositional shifts can alter ecosystem biomass production and nutrient inputs.
- ◆ SEACSIM developed a parallel version of the Glimmer-CISM ice sheet model that uses a scalable, accurate solver so that fine scale simulations can occur more efficiently and robustly.