



The Earth System Grid: A global data access and analysis environment for climate research

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Now underway for six years, the Earth System Grid (ESG) provides almost 200 terabytes of climate model data for a worldwide research and impacts assessment community. ESG has emerged as a major resource for climate change research, delivering large multi-dimensional climate-model data to a variety of scientists and analysis projects conducting climate research. Research areas that have benefited from ESG capabilities include high-resolution modeling, grand challenge computations on leadership computing systems, regional climate modeling, coupled climate/carbon cycle modeling, land/biosphere modeling, atmospheric chemistry modeling, detection and attribution of climate change, and model intercomparison projects. Of particular note, ESG provided critical data resources for the recent Intergovernmental Panel on Climate Change (IPCC) 4th Assessment Report.

We have recently formed the Earth System Grid Center for Enabling Technologies (ESG-CET) and are in the process of designing and building a next-generation system that will deliver a global data and computational Grid in support of future research in this area. With a near-term emphasis on the next iteration of the IPCC process, ESG-CET must address the pressing requirements of realizing a broadly distributed data grid that is capable of supporting many petabytes of increasingly complex scientific data. In this presentation we will provide a brief survey of progress thus far, along with an overview of current development directions with an emphasis on some of the emerging challenges that span security, federation, petascale data volumes, and the application of semantic approaches.

ESG's primary sponsor is the U.S. Department of Energy's Scientific Discovery through Advanced Computing (SciDAC-2), with co-sponsorship from the U.S. National Science Foundation. It is a collaboration of seven organizations spanning three U.S. agencies, one university, and many other partners.