



FY 2003 President's Request

Climate Change Research Initiative: Climate Modeling Center



Large-scale computer cluster used for climate modeling at NOAA's Geophysical Fluid Dynamics Laboratory

What is requested?

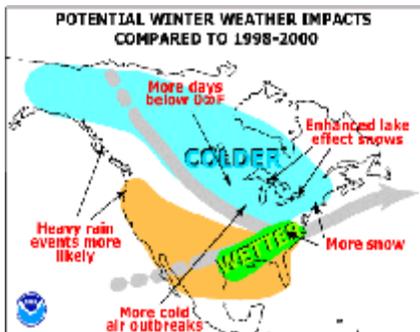
In his June 11, 2001, speech at the Rose Garden, President Bush announced the establishment of the U.S. Climate Change Research Initiative (CCRI) to study areas of scientific uncertainty and proposed a joint venture among the European Union, Japan and others to develop state-of-the-art climate modeling. As part of CCRI, NOAA requests an increase of \$5,000,000 and 2 FTE for the establishment of a Climate Modeling Center within the Geophysical Fluid Dynamics Laboratory to provide a suite of model products for decision support by policy makers.

Why do we need it?

Computer simulation is one of the most important components of a comprehensive climate research program. Because the Earth system cannot be isolated and studied in a physical laboratory, models are an essential tool for synthesizing observations and theory to investigate how the system works and how it is affected by human activities. The continued development and refinement of computational models that can simulate the past and future conditions of the Earth system is crucial for developing capabilities to provide more accurate projections of future change. Comprehensive climate models represent the major components of the climate system (atmosphere, oceans, land surface, cryosphere) and the transfer of water and energy among them. Current research targets model improvements by including biological and chemical processes that influence the atmospheric concentrations of carbon. The National Academy of Sciences recommended that the US capitalize on the strong climate modeling research enterprise by producing the routine and on-demand model products useful to policy and management decision makers. Such products will primarily will provide model output information on future climate and its impacts given an array of plausible scenarios.



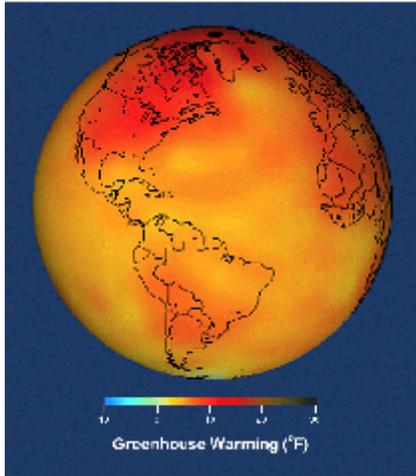
Will ice storms like those associated with the '97-98 El Niño event become more frequent?



Future climate models need to resolve regional impacts and extreme events.

What will we do?

NOAA will establish a Climate Modeling Center within the Geophysical Fluid Dynamics Laboratory (GFDL) at Princeton, New Jersey, which will focus on model product generation for assessment and policy applications as its principal activity. GFDL has played a central role in climate research. Much of the pioneering work in climate change, stratospheric modeling and seasonal forecasting was conducted by GFDL scientists. This core research capability will provide the foundation for the new center's product development and policy related research. The proposed center will utilize models to respond to specific questions asked by decision-makers and resource managers. For example, the center would be able to produce model outcomes and climate projections based on scenarios requested "on demand" for policy studies related to different energy strategy options. It would also be able to



Projected changes in surface air temperature in a 100-year simulation.

address other specific questions, such as the assessment of regional climate change impacts. NOAA will utilize the requested resources to establish the center's facilities and bring onboard personnel with main expertise in climate science and computer science. Some resources will be allocated towards advancing computer capabilities and assessing the long-term computing requirements for the center. GFDL will also work with other partners, such as the National Center for Atmospheric Research, to further develop venues for the transfer of improved modeling technology to routine model products.

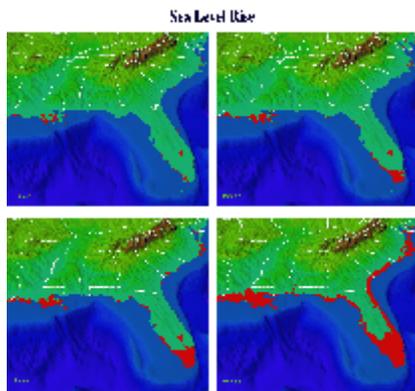
A visiting scientist and technology exchange program will be developed to promote cooperation in all aspects of climate modeling with the Community Climate System Model (CCSM) project. This cooperation will include model framework development, the adoption of standards, the joint evaluation of models and physical parameterization schemes.

Efforts will also focus on software engineering with the development of modeling frameworks to improve the compatibility and portability of model codes, thus ensuring that software and modeling advances can be more easily shared among centers and with the U.S. research community.

Additional research capabilities in modeling the carbon cycle, water resources, atmospheric chemistry, paleoclimate, oceans and climate, and integrated assessment modeling will be leveraged through collaborations with GFDL's existing partnerships with Princeton University and Columbia University's Lamont-Doherty Earth Observatory. Leveraging the Laboratory's resources will assure that the center's products were generated using the state-of-the-art climate models.

What are the benefits?

The Climate Modeling Center will provide timely and reliable knowledge and assessments of changes that might be expected in national and global climate resulting from natural climate variability and anthropogenic actions. By answering direct questions from decision-makers, it will capitalize of the US investments in basic research and provide the policy community with needed information quantifying the impacts of various scenarios and policy options. It will grow out of NOAA's charter to provide the U.S. with prediction products. It will utilize NOAA's delivery mechanisms for climate information that already have been established, e.g., the National Weather Service, the International Research Institute, and the Regional Integrated Science Assessments program. It will also build new links to the policy community and to the private sector involved in carbon mitigation strategies and long-range economic planning. The new center will be able to address a host of questions that are presently not part of GFDL's research activities by delivering model products and climate information in an operational format. Examples of such questions are the effects/impacts of targeted emissions reductions, and the effectiveness of proposed carbon sequestration strategies.



With more people moving to coastal regions, sea-level rise is becoming an important concern. (Figures show effects in red of sea-level rise of one, two, four, and eight meters, respectively.)



For more information:

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NOAA Budget

	FY2003 Change \$ millions
Climate Research	
Climate Observations and Services	
Climate Change Research Initiative	\$18