National Research Council Review of the *Strategic Plan* for the Climate Change Science Program

Chapter 10 – Modeling Strategy

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US Climate Change Science Program
www.climatescience.gov

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Overarching Question:

How can we most effectively **accelerate the development, testing, and application of** the best possible scientifically-based **climate and climate impact models to serve scientific research and decision support needs**?

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Goal 1: Improve the scientific basis of climate and climate impact models.

- Objective 1.1: Accelerate research on ***climate forcing, responses, and feedbacks*** aimed at improving methods for quantifying and reducing uncertainties in the current generation of prediction and projection models.
- Objective 1.2: Develop the next generation of global climate models through the addition of ***more complete representations of coupled interactive atmospheric chemistry, terrestrial and marine ecosystems, biogeochemical cycling, and middle atmospheric processes***.
- Objective 1.3: Foster model analysis and testing through ***model diagnostics and intercomparison activities, including comparison with observations***.
- Objective 1.4: Improve short-term climate predictions through ***model initialization with enhanced observational data.***
- Objective 1.5: Provide comprehensive ***observationally-based model-assimilated climate data sets*** for climate process research and testing of climate model simulations and retrospective projections.
- Objective 1.6: Accelerate the development of scientifically-based predictive models to provide ***regional and fine-scale climate and climate impacts information*** relevant for scientific research and decision support applications.

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Goal 2: Provide the infrastructure and capacity necessary to support scientifically rigorous and responsive U.S. climate modeling activity

- Objective 2.1: Provide the ***computing, data storage and retrieval, and software engineering resources*** required to support a world-class U.S. climate modeling activity.
- Objective 2.2: Establish ***graduate, post-doctoral, and visiting scientist programs*** to cross-train new environmental scientists for multidisciplinary climate and climate impacts modeling research and applications.

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Goal 3: Coordinate and accelerate climate modeling activities and provide relevant decision support information on a timely basis

- Objective 3.1: Provide ***routine***, on-demand state-of-the-science ***model-based global projections of future climate.***
- Objective 3.2: Develop mechanisms for effective ***collaborations and knowledge transfer***.
- Objective 3.3: Provide for ***interagency coordination*** of CCSP modeling activities to improve implementation and external advisory processes to evaluate performance.

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Challenges

- Making connections between applied climate modeling results and consumers of climate change information
- NCAR (CCSM) and GFDL roles and management
- Testing against the climate record
- Computational resources
- Four-year deadline

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