



DOE Workshop on Community Modeling and Long-term Predictions of the Integrated Water Cycle

DOE Program Managers

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DOE's Perspectives and Interests

- Energy \leftrightarrow Water
- Research Needs \leftrightarrow User Needs
- Long-term integrated water cycle
 - Integrated = Atmospheric - Terrestrial – Human
 - Long-term = Climate time scales
- New Strategic Plan for CESD





Strategic Plan- Supporting Objectives

- “Develop, test, and analyze simulations of the integrated water cycle, including feedbacks and interactions among components and systems, the relative roles of global and local human and natural processes, and projections of shifts in means and extremes”
- “Advance understanding and process representation of the couplings involving energy, carbon, and water cycles, and improve dynamical representations of these cycles to better represent climate forcings at the interfaces of terrestrial, aquatic, and urban systems”
- “Develop improved high-resolution climate models and companion data sets that are capable of projecting, with increased level of skill and certainty, seasonal to decadal estimates of precipitation and water availability, wind speeds, cloud cover, and likelihood of extreme events such as droughts, floods, and storm surges, on scales relevant to DOE stakeholders”

Community Modeling ↔ Community Frameworks



Relevant DOE Capabilities

- Topic 1: Multi-scale behaviors of the water cycle
 - All CESD Programs
- Topic 2: Human-earth system interactions and impacts on the water cycle
 - Integrated Assessment Research (primarily)
- Topic 3: Challenges for land surface/hydrologic modeling
 - Terrestrial Ecosystem Science, Subsurface Research, Earth System Modeling, Regional and Global Climate Modeling
- Topic 4: Model testing, analysis, and evaluation and data needs
 - Earth System Modeling, Regional and Global Climate Modeling
- Topic 5: Prediction, analysis, and uncertainty quantification of water cycle mean and extremes
 - Earth System Modeling, Regional and Global Climate Modeling
- Topic 6: Use-inspired water cycle research to meet the most pressing energy and environmental challenges
 - DOE, EERE





Together



Challenges of the integrated Water Cycle have to be addressed through multi-Agency coordination and collaboration



Community modeling frameworks and tools can provide effective platforms for coordination and collaboration between relevant agencies, researchers and end users





Goals



- Identify use-inspired **scientific grand challenges** that will significantly advance the **predictions of the long-term integrated water cycle** using community models and frameworks for scientific understanding and decision support
- Reveal critical modeling and data needs
 - Focusing on development as well as evaluation and testing
- Elucidate collaborative opportunities amongst relevant institutions and agencies
 - Engage research community to improve synthesis and integration of water cycle research





Expected Deliverables

- Integrative Modeling Challenges that can robustly test models of the integrated water cycle across relevant spatial and temporal scales
 - Information to develop priorities for next generation models
 - CESM, next generation Community Land and Integrated Assessment Models
 - Highlight relevant synergistic work across agencies
- Workshop Report
- Workshop Summary
 - to a peer-reviewed journal





Thank you!

