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Advancing Climate Change and Impacts Science Through Climate Informatics

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CLIMATE INFORMATICS: The application of information science to capture scientific knowledge in the context of integrated climate and environment research (climateinformatics.ornl.gov).

Climate Informatics Challenges (General)

1. Integrate multidisciplinary research, management, and societal communities
2. Provide management and decision support

Specifically

1. Present information for a variety of user communities;
2. Integrate model and observational data across different spatial and temporal scales;
3. Link climate models with other models such as hydrologic models;
4. Model diagnostics and uncertainty quantifications

Climate Informatics Challenges (Technical)

1. Climate model data (generated from long-term simulation on coarse grid cell scale) mismatches with observational data (satellite, in situ, aviation, and infrastructure observations, etc.)
2. Data volume and conversion standards become immediate challenges for integrated climate impact analysis
3. Scenario-based high level, extensible model-model integration frameworks are missing.
4. Standardized modules for model-data comparison and other types of diagnostics need improvements
5. Regional (including watershed) data federation workflows require further enhancements

Use Cases

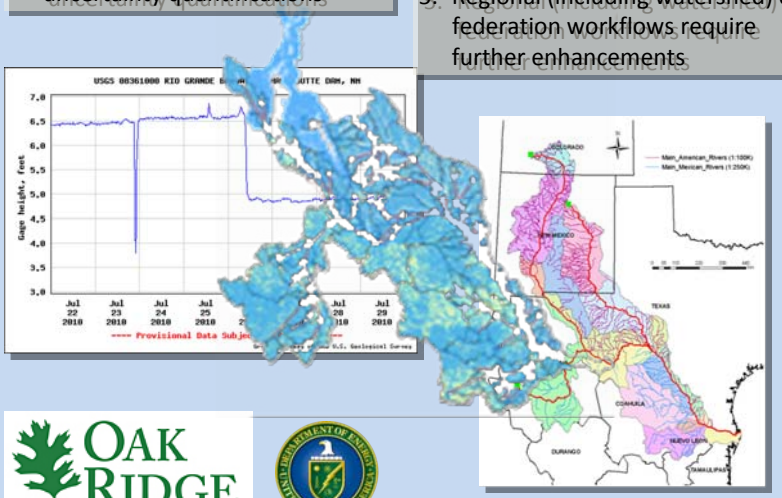
1. Evaluation/test of CCSM4 biases in hydrology (precipitation, soil water, runoff, river discharge) over the Rio Grande Basin. User: climate modeler
2. Investigation of projected changes in hydrology of Rio Grande Basin using the VIC (Variable Infiltration Capacity Macroscale) Hydrologic Model. User: watershed hydrologist/modeler
3. Impact of climate change on agricultural productivity of the Rio Grande Basin. User: climate impact scientist, agricultural economist.
4. Renegotiation of the 1944 "Treaty for the Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande". User: A US State Department analyst or their counterpart in Mexico.

Our Functionality Requirements

1. End user engaged GUI design and scenario-based, automatic information presentations
2. Knowledge discovery over large-scale distributed datasets
3. Unified APIs to utilize core information analysis and data processing functionality on open infrastructure
4. Information workflow abstraction

Next Steps

1. Community User Interface Design
2. Architecture design
3. Workflow implementation
4. User applications based on default climate analysis toolkits, such as CDAT



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