THE CALIFORNIA WATER RESOURCES RESEARCH AND APPLICATIONS CENTER

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RESEARCH OBJECTIVES

The California Water Resources Research and Applications Center is designed around a set of integrated activities that focus on issues related to California water resources. Its primary objectives are to advance understanding of California climate and hydrologic variability and change. Core projects include building research partnerships that focus on analysis of (and educational outreach related to) hydroclimate impact on natural systems, society, and infrastructure. The following highlights our approach and results.

APPROACH

The California Water Resources Research and Applications Center uses dynamic and statistical downscaling schemes within our Regional Climate System Model framework. We produce hydroclimate simulations at short-term, seasonal, and long-term time scales for weather and river-flow forecasts, climate change analyses, uncertainty estimates, landslide modeling, water-quality monitoring and forecasting; and climate-change assessments of water resources, agriculture, rural economy, and hazards (see Figure 1).

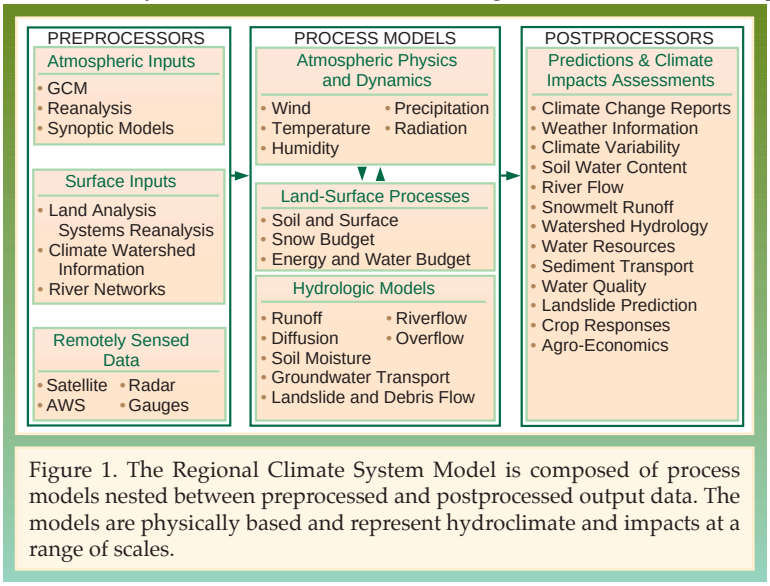

Figure 1. The Regional Climate System Model is composed of process models nested between preprocessed and postprocessed output data. The models are physically based and represent hydroclimate and impacts at a range of scales.

Our applications projects include:

- Runoff contaminant monitoring and real-time management in the San Joaquin Basin with the U.S. Bureau of Reclamation
- Contaminant identification and monitoring from Sierra Foothills mine sites with the University of California Space Sciences Laboratory
- Development of a dynamic sediment-transport and landslide-hazards prediction system with the University of California Earth and Planetary Science Department
- Snow cover area and water equivalent maps for California with University of Arizona
- Geostatistical uncertainty analysis of precipitation and streamflow simulations
- Contributions to impact-assessment reports

ACCOMPLISHMENTS

Our center became a member of the Earth Science Information Partnership, providing value-added climate, weather, streamflow and impact information to the broad user community and the 2000 U.S. National Assessment and the Intergovernmental Panel on climate change reports. We have completed a series of seasonal and multiyear regional climate and streamflow simulations, developed a new statistical downscaling technique for estimating the limits of uncertainty (Kyriakidis et al., 2001), and have used our results as input to the above applications. Recent analysis of 2040 to 2049 projected climate and streamflow analysis has been submitted (Kim et al., 2001, Miller et al., 2001) and received national media coverage.

SIGNIFICANCE OF FINDINGS

The climate change and streamflow analyses indicate that the likelihood of extreme weather events will increase and that nighttime temperature will increase at a faster rate than daytime temperature. The simulated shift in stream peakflow implies an increase in winter and spring high flow (flooding) and a decrease in summer and fall streamflow. We received new support from the California Energy Commission, CALFED, and DOE based on our accomplishments. The California Water Resources Research and Applications Center has become a voice in California climate change assessments, increasing the awareness of potential water resource problems in California and the United States.

RELATED PUBLICATIONS

Kyriakidis, P.C., N.L. Miller, and J. Kim, Uncertainty propagation of regional climate model precipitation forecasts to hydrologic impact assessment, J. Hydrometeorology 2, 140–160, Berkeley Lab Report LBNL-45852, 2001.

Miller, N.L., W.J. Gutowski, J. Kim, and E. Strem, Assessing California streamflow for present day and 2040 to 2049 scenarios, J. Hydrometeorology (submitted), Berkeley Lab Report LBNL-47987, 2001.

ACKNOWLEDGMENTS

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