



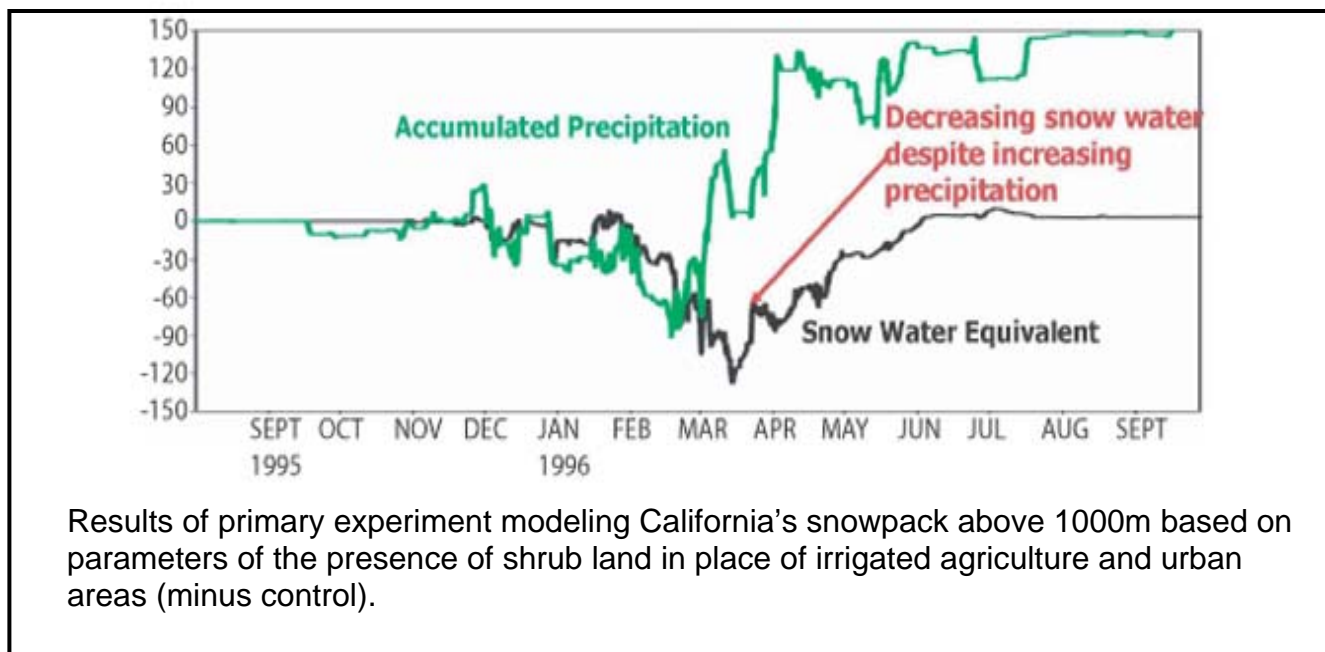
# California-2100: Assessing California's Future Water Resources

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As a preliminary step in providing high resolution estimates of California's water budget out to the year 2100 (Cal21), several different climate change scenarios were analyzed based on results obtained with the widely used regional model MM5. The results of the primary experiment, in which all present day irrigated and urban areas are replaced by scrub land, indicate that the surface temperatures in the Central Valley would be lower while those of the higher elevation foothills would be higher. As a result, a smaller fraction of incoming precipitation would be stored as snow above the 1000 m elevation level than is currently stored.

This study initiated a long-term modeling project, California-2100 (Cal21), which is aimed at making and evaluating high resolution estimates of climate change over California out to the year 2100. The initial WRC component of this project has been focused on evaluating how well regional climate

models reproduce the variations of important components of the water budget for California, and on estimating the effects of increased irrigation in California over the past century on regional climate, especially snow accumulation.



The utilized regional model is the widely used MM5 running at 30km grid spacing and having 45 levels. The outer boundaries, which are placed in the central Pacific Ocean and the Midwestern United States, are from the ERA-40 reanalysis. Currently, we have made seven runs for the period 1 August, 1995- 30

September, 1996. The outputs are stored in netcdf format for easy storage and comparisons. Initial statistical comparisons of the output of these model runs have been made with the NCEP North American Regional Reanalysis (NNRR) and other observations for the California region. Six present-day

MM5 runs with slightly different parameterizations of rainfall and the planetary boundary layer have been run. In general, these runs simulate well the observed patterns of variation of precipitation and surface temperature. However, the simulated surface temperatures are approximately two degrees Centigrade colder than the NNRR nearly everywhere.

Then, in the primary experiment, all of the present day irrigated and urban areas are replaced by scrub land. Our preliminary results indicate that the climate of an un-irrigated California would have lower Central Valley and higher foothill temperatures (see Figure above). Associated with the greater high altitude temperatures is a smaller fraction of precipitation remaining as snow.

### **Professional Presentations**

B. C. Weare, Global Climate Change in the Past Century: Focus on California Climate Change: Challenges and Solutions for California Agricultural Landscapes, UC Davis, May 12, 2005.

B. C. Weare, Modeling Climate Change in California: Land Surface Changes Laboratory for Dynamic Meteorology Seminar, University of Paris, VI, July 5, 2005.

### **Collaborative Efforts**

California Energy Commission collaborations: Modeling groups from UCSD (Dan Cayan, PI), UCSC(Lisa Sloan, PI), and UCB (Norm Miller, PI)

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