

## **Local and remote effects of California's Central Valley summer irrigation on climate from GCM analyses**

Min-Hui Lo<sup>†</sup>; James Famiglietti

<sup>†</sup> UC Center for Hydrologic Modeling (UCCHM), USA

Leading author: [mlo@uci.edu](mailto:mlo@uci.edu)

Agricultural irrigation in the Central Valley of California has always depended on surface water reservoirs and groundwater pumping. The anthropogenic redistribution of water modifies the land hydrological cycle significantly, especially by increasing evapotranspiration. In this study we establish the importance of California's Central Valley irrigation in local and regional climate, including its role in land surface-atmosphere interactions. Irrigation processes modify the surface radiation budget, which generally increases the latent heat and decreases the sensible heat release, resulting in a decrease of land surface temperature. Atmospheric water vapor increases due to enhanced evapotranspiration; however, during the summer, the Central Valley is the descending branch of the large-scale circulation that inhibits the occurrence of convection. While Central Valley irrigation has negligible effects on local precipitation, precipitation in the region downwind of California, i.e. the Colorado River basin, has increased, forming a regional, anthropogenic recycling loop of the water cycle via natural and managed surface water flows back into the southwest and California. On the other hand, the Colorado River accounts for 25 % of southern California's water supply. Consequently, this study has important implications for the importance of human-driven impacts on the hydrological cycle and local and regional climate, and for water resources management in California.