

>> SYNTHESIZE MOUNTAINS OF KNOWLEDGE <<

Submitted Abstract

ID IMC22-FSAbstr- 913

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Country	United States of America
Region	North America
Title	Assessing The Impacts Of Climate Change On Sierra Nevada Snow Hydrology And California'S Agricultural Systems.
Keywords	Climate Change, Impacts, Agriculture, Low-To-No Snow Future, California, Sierra Nevada
Type	List Of Focus Session
Focus Session ID	28

Abstract

Mountain regions are important assets as the world's water towers in the Earth system. In the western United States, where nearly 75% of freshwater originates as snow in the Sierra Nevada, Rocky, and Cascade mountain ranges, over 90% of snow monitoring sites show declines in snowpack and earlier melting times. This is projected to continue and possibly accelerate into the mid-to-end of the 21st century. California is the largest agricultural producer in the United States and the country's largest agricultural exporter. However, California's snow-dependent basins are actively threatened by anthropogenic climate change, which will reduce freshwater availability from snow in the Sierra Nevada and in turn could significantly affect crop yields. Although previous studies have assessed the impacts of droughts and changes in precipitation on agriculture, few have focused specifically on quantifying the projected impacts of declining snowmelt on crop production. We are developing a framework combining the Energy Exascale Earth System Model (E3SM), satellite observations, and a crop water model to determine the direct dependence of agricultural production in California's Central Valley on snowmelt from the Sierra Nevada mountains and assess the future vulnerability of the water-food nexus under climate change.