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Cooperative Institutes Hot Items

## **CICAR Study Shows Model Agreement on Future Droughts in North America**

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The findings of a new collaborative study between the Cooperative Institute for Climate Applications and Research (CICAR), the Geophysical Fluid Dynamics Laboratory (GFDL), and the Lamont-Doherty Earth Observatory (LDEO) show a broad consensus across climate models that southwestern North America will dry significantly due to anthropogenic influence in the 21st Century and that the transition to a more arid climate may already be underway. If these models are correct, the levels of aridity of recent multiyear droughts will, within the coming years to decades, become the new climatology of the American Southwest. The study's findings have significant implications for policies and decision making that protects the region from such extreme climate conditions. In contrast to historical droughts, future drying is not linked to any particular pattern of change in sea surface temperature but seems to be the result of an overall surface warming driven by rising greenhouse gases. Evidence for this is that subtropical drying occurs in atmosphere models alone when they are subjected to uniform increases in surface temperature. Greater details about the research appear in Science magazine (<http://www.sciencemag.org/cgi/content/abstract/1139601v2>).

Background: Projections of anthropogenic climate change conducted by 19 different climate modeling groups around the world, using different climate models, show widespread agreement that southwestern North America - and the subtropics in general - are heading toward a climate even more arid than now. The models show that human-induced aridification became marked early in the current century. In the Southwest, the levels of aridity seen in the 1950s multiyear drought, or the 1930s Dust Bowl, become the new climate regime by mid-century: a perpetual drought.

Significance: Drying of arid lands in the southwestern United States and northern Mexico will have important consequences for water resources, regional development and cross border relations and

migration. According to the models examined in this study, the drying should already be underway and, over the length of time it takes to plan significant changes in water resource engineering and allocation (years to a few decades), will become well established. The study also shows that other land regions to be hit hard by subtropical drying include southern Europe, North Africa and the Middle East as well as parts of South America. This research supports NOAA Mission Goal 2 – Understand Climate Variability and Change to Enhance Society's Ability to Plan and Respond.

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