

Does global warming cause more extreme seasonal-to-interannual precipitation anomalies in southwestern North America?

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A popular idea surrounding the subject of climate change is that greenhouse warming will lead to 'more severe and frequent' droughts. IPCC multi-model ensemble means have already projected a shift to a drier climate beginning in the late 20th century to the early 21st century in southwestern North America (SWNA). The drying of SWNA is clear and robust in projections of changes in precipitation minus evaporation (P-E) anomalies averaged over time periods of more than a decade or so. This study finds that, while there is a shift to a drier mean climate, there are not more extreme seasonal-to-interannual (S/I) precipitation anomalies (including droughts) in the 21st Century relative to the 20th. Tropical Pacific sea surface temperature (SST) patterns drive much of S/I precipitation in SWNA. Correlation and regression analysis, on P-E and SST anomalies, confirms that this relationship is not amplified in the 21st Century. Correlation and regression analysis of geopotential height and SST anomalies show that the relationship strengthens, but is not reflected in the strength of zonal wind anomalies over the North Pacific Ocean. The mean winds above the North Pacific Ocean play an important role in the track of storms and hence the distribution of precipitation across western North America. The lack of a changed relationship between SST and zonal wind variability may explain the finding that precipitation variability and therefore extreme droughts do not increase.