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Competitive influences on droughts: present and future

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A “super El Niño” with above-normal precipitation over California is providing some drought relief in the region. We argue that ENSO may not always be a source of relief in the future in regions where the mean change in terrestrial aridity/moistening in response to greenhouse warming becomes larger than the expected range of current variability. We use a suite of state-of-the-art climate model simulations to identify the regions where a projected change in aridity exists, and consider whether this change is large enough to overwhelm the effect of local drying/moistening associated with ENSO variability.

By the end of the 21st century, warming is expected virtually everywhere, independent of the phase of ENSO. In contrast, expectations regarding the net anomalies in regional precipitation are less evident, because changes in the mean state and variability are governed by a number of different, spatially-complex mechanisms. Here, we provide a comprehensive assessment of the relative contributions to future drought from changes in moisture supply and demand. We also investigate the competing effects of mean changes and ENSO variability in terms of ameliorating or exacerbating drought.

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