



The Central Chile Mega Drought (2010-2018): Climate change or natural variability ?

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Central Chile, along the subtropical west coast of South America, has experienced an uninterrupted sequence of dry years) since 2010. The so called Mega Drought (MD) is the longest event on record with detrimental effects on water availability, vegetation and forest fires. Local records and reanalysis data reveal that the exceptional length of the MD results from the reiteration of a circulation dipole characterized by tropospheric-deep positive pressure anomalies over the southeast subtropical Pacific and negative pressure anomalies over the Amundsen-Bellinhausen Sea. Historically, ENSO is a major modulator of such dipole, but the ongoing dry period has mostly occurred under ENSO-neutral conditions. Climate model simulations forced with observed global SST and present-day radiative forcing replicate the south Pacific dipole and capture part of the rainfall anomalies during the MD. Further numerical experiments suggest that most of the ocean forcing emanates from the subtropical southwest Pacific, a region that has experienced a marked warming over the last decade. On the other hand, the positive trend of the Southern Annular Mode also contributes to strength of the south Pacific dipole, showing that anthropogenic forcing has also contributed to the maintenance of the central Chile MD. Given the concomitance of natural and anthropogenic forcing, we anticipate only a partial recovery of central Chile precipitation in the decades to come.