



Analysis of anthropogenic contributions to record high Australian summer rainfall (2010-2012) using CMIP5 simulations

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Changes in extreme climate events pose significant challenges for both human and natural systems. Some climate extremes are likely to become “more frequent, more widespread and/or more intense during the 21st century” (Intergovernmental Panel on Climate Change, 2007) due to anthropogenic climate change. Particularly in Australia, El Niño-Southern Oscillation (ENSO) has a relationship to the relative frequency of temperature and precipitation extremes. In this study, we investigate the record high two-summer rainfall observed in Australia (2010-2011 and 2011-2012). This record rainfall occurred in association with a two year extended La Niña event and resulted in severe and extensive flooding.

We examine simulated changes in seasonal-scale rainfall extremes in the Australian region in a suite of models participating in the Coupled Model Intercomparison Project Phase 5 (CMIP5). In particular, we utilise the novel CMIP5 detection and attribution historical experiments with various forcings (natural forcings only and greenhouse gas forcings only) to examine the impact of various anthropogenic forcings on seasonal-scale extreme rainfall across Australia. Using these standard detection and attribution experiments over the period of 1850 to 2005, we examine La Niña contributions to the 2-season record rainfall, as well as the longer-term climate change contribution to rainfall extremes. Was there an anthropogenic influence in the record high Australian summer rainfall over 2010 to 2012, and if so, how much influence?

Intergovernmental Panel on Climate Change (2007), Climate Change 2007: The Physical Science Basis, Contribution of Working Group I to the Fourth Assessment Report on the Intergovernmental Panel on Climate Change, edited by S. Solomon et al., 996 pp., Cambridge Univ. Press, Cambridge, U. K.