



Will a warmer world mean a wetter or drier Australian monsoon?

Josephine Brown, Aurel Moise, Robert Colman, and Huqiang Zhang
Bureau of Meteorology, Melbourne, Australia (josephine.brown@bom.gov.au)

Multi-model mean projections of the Australian summer monsoon show little change in precipitation in a future warmer climate, even under the highest emission scenario. However there is large uncertainty in this projection, with models projections ranging from around a 40% increase to a 40% decrease in summer monsoon precipitation. To understand the source of this model uncertainty, we divide a set of 33 climate models from the Coupled Model Intercomparison Project Phase 5 (CMIP5) into groups based on their future precipitation projections (“DRY”, “MID” and “WET” terciles). The DRY model mean has enhanced sea surface temperature (SST) warming across the equatorial Pacific, with maximum increases in precipitation in the western equatorial Pacific. The DRY model mean also has a large cold bias in present day SSTs in this region. The WET model mean has the largest warming in the central and eastern equatorial Pacific, with precipitation increases over much of Australia. These results suggest lower confidence for projections of reduced monsoon precipitation due to the influence of model SST biases on the SST warming pattern and precipitation response. The precipitation changes for the DRY and WET models are also decomposed into dynamic and thermodynamic components. The component due to spatial shifts in the location of convergence and precipitation is responsible for most of the difference between DRY and WET models. As spatial shifts in precipitation are closely associated with patterns of SST change, reducing uncertainty in model SST warming patterns will be crucial to improved projections of Australian monsoon precipitation.