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Biases and teleconnections in GC5 – insights for seasonal prediction and Australia

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Abstract:

The Bureau has been involved in the package testing and assessment process of the latest UK Met Office Global Coupled Model Version 5.0 (GC5) configuration. GC5 will underpin the Met Office's next seasonal prediction system, coupled NWP system and Earth System Model. It will also likely be the next version of the Bureau's seasonal prediction system. The GC5 configuration includes changes to almost all areas of model physics, including a new sea ice model and substantial updates to the atmospheric (UM) and ocean (NEMO) models. We have evaluated a 50-year GC5 coupled simulation, at N216 atmospheric resolution (~60km) and ORCA025 ocean resolution (~25km); and compared it to results from the previous coupled model (GC4). A major focus of our assessment is the mean state biases in the Indo-Pacific region, key climate drivers of Australian climate variability and teleconnections to Australian climate. Results associated with the representation of the El Niño Southern Oscillation (ENSO), the Indian Ocean Dipole (IOD), the Southern Annular Mode and the Madden Julian Oscillation will be presented. Notably, in comparison to its predecessor (GC4), GC5 shows significant improvements in the eastern Pacific mean state but a slight degradation in the Indian Ocean in terms of the mean state and variability. These and other results provide us with early insights of the potential performance of the next sub-seasonal/seasonal forecast system. Long-standing issues in the seasonal prediction system associated with the equatorial eastern Indian Ocean biases and an overactive ENSO/IOD will likely remain; however, improvements over the eastern equatorial Pacific in GC5 hold promise of improved prediction skill of ENSO and its teleconnections.