SESSION: (B3) S2D ensemble predictions and forecast information

(B3-03)

Multi-year ENSO prediction

Jing-Jia Luo, Hanh Nguyen, Harry Hendon, Oscar Alves, Guoqiang Liu, Nick Dunstone, Craig MacLachlan

Australian Bureau of Meteorology (1), UK Met Office (2)

El Niño and La Niña strongly affect the year-to-year variability of Australian climate, which exerts intense pressure on water resources and environmental management. Well-known examples include the severe floods in 2010-11 and 1998-2000 in association with multi-year persistent La Niña events, and strong drought in 2002 in association with El Niño. Growing evidence suggests that some ENSO events may be predictable at lead times beyond one to two years, which is longer than the forecasts currently issued by most operational forecast centres worldwide. However, it is still unclear how well ENSO can be predicted at multi-year timescales and what essential dynamics underpins such multi-year predictability. In collaboration with the UK Met Office, three sets of ensemble multi-year hindcasts were produced using the high-resolution ocean-atmosphere coupled model, ACCESS-S. The first set of experiments contain 30-member ensemble predictions of 16 target months starting 1 November for every year during the period 1980-2014. The second set of experiments consist of 10-member ensemble predictions of 66 target months starting 1 November every 2-3 years during the period 1960-2014. The third set of experiments involves using 23 ensembles of 36-month predictions to examine the multi-year predictability of the back-to-back La Niña during 1998-2001 and the 2002-03 central-Pacific El Niño event. Results suggest that, despite considerable model bias in simulating the annual mean states and seasonal cycle of the Indo-Pacific climate, ENSO over the past 35 years can be skilfully predicted out to 16 months ahead. Some ENSO events can be well predicted with a 3-year lead. In addition, the results also show good skill in predicting global warming related signals at multi-year timescales. Without any downscaling, the high-resolution model also displays encouraging skill in predicting local climatology and anomalies in Australia at seasonal to multi-year timescales.