Dynamical forecast of low-frequency variability of the Southern Annular Mode

E. Lim (1), H. Hendon (1), and H. Rashid (2)

(1) Centre for Australian Weather and Climate Research, Bureau of Meteorology, Melbourne, Australia (e.lim@bom.gov.au),
(2) Centre for Australian Weather and Climate Research, CSIRO Marine and Atmospheric Research, Aspendale, Australia
(harun.rashid@csiro.au)

In this study we investigate predictability and prediction skill of monthly to seasonal time scale Southern Annular Mode (SAM), using the Australian Bureau of Meteorology's coupled dynamical seasonal prediction system, POAMA.

SAM is the dominant mode of variability of the extratropical atmospheric circulation in the Southern Hemisphere throughout different time-scales, ranging from weeks to decades. The positive index of SAM is characterised by lower than average pressure over the high latitudes and higher than average pressure over the mid latitudes, and its variability explains $\sim$30% of the total variance of the circulation over the SH extratropics. SAM is driven by internal atmospheric dynamics as evidenced by its typical decorrelation time scale of $\sim$10 days. Nevertheless, in the current study we demonstrate that monthly to seasonal variability of SAM can be predicted with good skill (proportion correct > 60%, correlation > 0.4) at short lead times of 0-1 month by POAMA.

In order to understand the source of the prediction skill, we have conducted modelling experiments by altering atmosphere and ocean initial conditions in the forecast system and by forcing the atmospheric model with observed and forecast sea surface temperatures. The results suggest that the prediction skill of monthly-seasonal time-scale SAM stems from realistic atmosphere and ocean initial conditions and teleconnection between ENSO and SAM during austral late spring to summer.