

Predictability of the subtropical dipole modes in a coupled ocean-atmosphere model

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Predictability of the subtropical dipole modes is assessed using the SINTEX-F coupled model. Despite the known difficulty in predicting subtropical climate due to large internal variability of the atmosphere and weak ocean-atmosphere coupling, it is shown for the first time that the coupled model can successfully predict the South Atlantic Subtropical Dipole (SASD) 1 season ahead, and the prediction skill is better than the persistence in all the 1-12 month lead hindcast experiments. There is a prediction barrier in austral winter due to the seasonal phase locking of the SASD to austral summer. The prediction skill is lower for the Indian Ocean Subtropical Dipole (IOSD) than for the SASD, and only slightly better than the persistence till 6-month lead because of the low predictability of the sea surface temperature anomaly in its southwestern pole. However, for some strong IOSD events in the last three decades, the model can predict them 1 season ahead.

The co-occurrence of the negative SASD and IOSD in 1997/98 austral summer can be predicted from July 1st of 1997. This is because the negative sea level pressure anomalies over the South Atlantic and the southern Indian Ocean in September-October (November-December) that trigger the occurrence of the negative SASD and IOSD are related to the well predicted tropical Indian Ocean Dipole (El Niño/Southern Oscillation).