

Why was the prediction of the 2012 positive Indian Ocean Dipole Mode difficult ?

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The seasonal prediction system based on the SINTEX-F ocean-atmosphere coupled model has so far demonstrated good performance of prediction on the Indian Ocean Dipole Mode (IOD). However, the system has failed to predict the 2012 positive IOD event 1-season ahead for the first time since it became operational. We have explored the reason, and found that the ocean subsurface temperature initialization in April was the key. The observation showed warmer-than-normal temperature below 50 m depth in the western equatorial Indian Ocean in April 2012. This sustained the warmer-than-normal sea surface temperature (SST) there in May. The active convection associated with this warm SST anomaly in the western pole favored a positive IOD condition, which evolved through ocean-atmosphere coupled feedback from June, to reach a mature state in August. The SST-nudging initialization, however, could not capture the unique subsurface precondition off East Africa and hence negatively influenced the 2012 IOD prediction.