

Role of sea-ice initialization in climate predictability over the Weddell Sea

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Potential impact of sea-ice initialization on the interannual climate predictability over the Weddell Sea is investigated using a coupled general circulation model. Climate variability in the Weddell Sea is generally believed to have association with remote forcing such as El Niño-Southern Oscillation and the Southern Annual Mode. However, sea-ice variability in the Weddell Sea has been recently suggested to play additional roles in modulating local atmospheric variability through changes in surface air temperature and near-surface baroclinicity. When both the model's sea-surface temperature (SST) and sea-ice concentration (SIC) are initialized with observations using nudging schemes, reforecast experiments from September 1st show improvements in predicting the observed SIC anomalies in the Weddell Sea up to four months ahead, compared to the other experiments with only SST initialization. During austral spring (Oct-Dec) of lower-than-normal sea-ice years in the Weddell Sea, reforecast experiments with the SST and SIC initializations reasonably predict high surface air temperature anomalies in the Weddell Sea and high sea-level pressure anomalies over the Atlantic sector of the Southern Ocean. These results suggest that accurate initialization of sea-ice conditions during austral winter is necessary for skillful prediction of climate variability over the Weddell Sea during austral spring.

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