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SST Variability over the Southern South China Sea: Local effects and Remote forcing

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The South China Sea (SCS) is one of the largest semi-enclosed marginal seas in the world ocean. The SCS is connected to the East China Sea through the Taiwan Strait to the northeast and the Pacific Ocean in the east through the Luzon Strait, laying between the Luzon and Taiwan Islands. To the south, SCS is connected to the Indonesian Sea (IS) through the Karimata and Gaspar Straits, and to the Indian Ocean though the Malacca Strait. The large-scale circulation and SST over the SCS is dominantly influenced by the seasonal reversal of the monsoon winds. Beyond the seasonal time scale, the circulation and temperature variability over the SCS demonstrate strong relationship with the El Niño/Southern Oscillation (ENSO) events in the Pacific Ocean. The present study addresses the inter-annual variability of Sea Surface Temperature (SST) over the southern South China Sea with special emphasis on the ENSO and Indian Ocean Dipole (IOD) events during the period 1993 to 2009. Due to its geographical location, the dynamics and thermodynamics of the southern SCS is largely influenced by the anomalous events occurring in the Pacific and Indian Oceans. A high resolution, three-dimensional sigma co-ordinate, regional ocean general circulation model (ROMS) configured for the South China Sea and Bay of Bengal region is used for the analysis. The model has been forced by 12-hourly varying surface wind, air temperature, relative humidity, surface downward solar and longwave radiation and precipitation fields obtained from the ERA-interim re-analysis data set as well as space- and time-dependent lateral fluxes of temperature, salinity, currents and sea level. Detailed analysis has been done to identify the roles of the surface heat fluxes, and the water mass advection from the Java Sea and northern South China Sea in driving the SST variability over the region. The surface heat flux data set (NOC v2.0) developed by the National Oceanography Centre, Southampton, is also used to elucidate the relative influence of local air-sea interaction processes on the SST variations. In particular, the study focuses on the upper ocean temperature variation that occurs during the peak phase of the ENSO/IOD events (i. e., in boreal fall and winter seasons).