

## Impact of ENSO on the South China Sea circulations analyzed with climatological and synoptic models

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Interannual variability of circulations in the South China Sea (SCS) and surrounding seas under influences of ENSO is investigated with comparative high-resolution downscaling models in synoptic and climatological modes. These two models are developed based on the Regional Oceanic Modeling System (ROMS) at a lateral resolution of 5 km, initialized and forced by the Hybrid Coordinate Ocean Model (HYCOM) global reanalysis product. The synoptic model is calculated for the four-year period from 2012 to 2015 including El Niño years with the HYCOM-ROMS system that properly accounts for wind stress and heat budget at surface, freshwater influences from the atmosphere and major rivers, and tidal variability as realistically as possible. In turn, the climatological model is embedded in the climatology of the parent HYCOM output and forced by the climatological atmospheric forcing with other conditions retained, which enables us to exclude the ENSO successfully. Through a comparative analysis on the differences between the two model results, we evaluate the impact of ENSO on the SCS circulations, the Kuroshio intrusion to the SCS through the Luzon Strait, and mass exchange between the SCS and the adjacent basins such as Sulu, Celebes, and Java Seas.

Keywords: South China Sea, ENSO, HYCOM-ROMS