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South Atlantic response to ENSO induced climate variability in an OGCM

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The response of the South Atlantic Ocean to ENSO is investigated by means of an ocean general circulation model (ORCA2) forced with NCEP reanalyses for the 1948-1999 period. Seasonal ENSO composites suggest that the ENSO-induced wind anomalies play a major role in driving upper ocean temperatures by altering the net surface heat fluxes, the meridional Ekman heat transport and Ekman pumping. Model diagnostics indicate that the Ekman heat transport changes are in better agreement with the upper ocean temperature anomalies during the first half of the ENSO event whereas, in the latter half, the surface heat flux anomalies agree better. In general, the atmospheric forcing tends to lead to a coherent ocean response with a time lag of about one season. Subsurface temperatures evolve more slowly in response to ENSO forcing than the upper ocean. They receive time filtered ENSO signals from mainly Ekman pumping (suction) and variations in thermocline depth that result in the poleward and equatorward margins of the subtropical gyre exhibiting temperature anomalies of the same sign but opposite to those in the central regions of the gyre.