Geophysical Research Abstracts
Vol. 12, EGU2010-8696, 2010
EGU General Assembly 2010

The ENSO related Pacific equatorial currents variability in a global ocean circulation model forced by the ERA-40 data

HYOUN-WOO KANG and Ok Hee Seo

Korea Ocean Research and Development Institute, Climate Change and Coastal Disaster Research Department, Ansan, Republic Of Korea (hwkang@kordi.re.kr)

The relation between the El Nino Southern Oscillation (ENSO) and the Pacific equatorial current system is not fully understood yet because of its complexity and scarcity of observation. In this study, a global ocean circulation model based on HYCOM (HYbrid Coordinate Ocean Model) has been carried out to understand the ENSO related variability of the Pacific equatorial current system. The longitudinal grid spacing of the ocean model is 1.5 degree and the latitudinal grid spacing is 1 degree to the south of 65 N with finer resolution up to 1/3 degree near the equatorial region. North of 65 N has variable resolution finer than 0.5 degree using the arctic bipolar patch grid. The model has 30 vertical layers with maximum depth of 4500 m. The intrinsic energy loan sea ice module of HYCOM is also applied. The atmospheric forcing is adopted from the monthly surface heat and momentum fluxes of ECMWF 40 year Reanalysis (ERA-40) data. For the surface flux correction, the sea surface salinity has been relaxed to the climatological data with a time scale of 30 days and the long wave correction algorithm has been applied to the surface thermal radiation flux. Before applying the ERA-40 forcing, the model had been spun up for 50 years using the COADS climatological forcing from the initial state derived from the Levitus' climatology.
The standard deviation of sea surface temperature (SST) during the 1958 – 2001 is well simulated comparing with that of observational SST. ENSO is well reproduced in regard with the conventional Nino 3.4 index. The Equatorial Undercurrent (EUC) and those tropical surface currents such as North (South) Equatorial Current (NEC, SEC), and North (South) Equatorial Counter Current (NECC, SECC) in the Pacific Ocean show high variability related with ENSO. Climatologically averaged maximum (minimum) speed of the conventional EUC is about 0.9 m/s (0.6 m/s) around 140 W in May (February) while the undercurrent in the western Pacific show its maximum (minimum) speed in July (December) at deeper depth around 145 E. The decrease of EUC strength in the El Nino period is much greater than the increase of it in the La Nina period, though the Nino 3.4 SST anomaly shows comparable magnitude in both periods. The variability of SEC, NECC and SECC in connection with El Nino and La Nina phases as well as EUC variability are also discussed.