Geophysical Research Abstracts
Vol. 12, EGU2010-778-1, 2010
EGU General Assembly 2010
© Author(s) 2009

Hydrodynamic and Thermohaline Seasonal Structures of Peninsular Malaysia's eastern continental shelf sea

Farshid Daryabor (1), Fredolin Tangang (2), and Liew Juneng (3)

(1) Center for tropical and climate change system- Faculty of Science and Technology- National university of Malaysia (UKM)- Bangi 43600- Selangor- Malaysia Email: fdaryabor@gmail.com, (2) Center for tropical and climate change system- Faculty of Science and Technology- National university of Malaysia (UKM)- Bangi 43600- Selangor- Malaysia, (3) Center for tropical and climate change system- Faculty of Science and Technology- National university of Malaysia (UKM)- Bangi 43600- Selangor- Malaysia

The seasonal ocean circulation and the seasonal thermal structure in Peninsular Malaysia's eastern continental shelf sea were studied numerically using the Regional Ocean Model System (ROMS) with 18-km horizontal resolution and 50 sigma levels conforming to a realistic bottom topography. A 10-year control run was performed using climatological monthly mean wind stresses, restoring-type surface salt, temp and heat, and observational oceanic inflow/outflow at the open boundaries. The seasonally averaged effects of isolated forcing terms are presented and analyzed from the following experiments: 1) heat fluxes effects removed and 2) wind effects removed. This procedure allowed analysis of the contribution of individual parameters to the general hydrology and specific features of the Peninsular Malaysia's eastern continental shelf sea: for example, coastal jets, mesoscale topographic gyres, and countercurrents. The results show that the ROMS model has the capability of simulating seasonal variations of the Peninsular Malaysia's eastern continental shelf sea circulation and thermohaline structure. The simulated Peninsular Malaysia's eastern continental shelf sea surface circulation is generally anticyclonic (cyclonic) during the summer (winter) monsoon period with a strong western boundary current, a mean maximum speed of 0.8 m s^{-1} (0.5 m s^{-1}), and extending to a depth of around 30 m (40 m). During summer, the western boundary current splits and partially leaves the coast; the bifurcation point is at 40°N in Jun and shifts north to 70°N in July. A mesoscale eddy on the Sunda shelf, the southwest of Natuna Island at (2.50°N, 1060°E) and extending to two mesoscale eddy at (20°N, 1070°E) and (2.50°N, 1090°E) also on the Gulf of Thailand (7.50°N, 1040°E), was also simulated. These eddies are cyclonic (anticyclonic) with maximum swirl velocity of 0.3 m s^{-1} at the peak of the summer (winter) monsoon. The simulated thermohaline structure for summer and winter are nearly horizontal from east to west except at the coastal regions. Coastal upwelling and downwelling are also simulated: localized lifting (descending) of the isotherms and isohalines during summer (winter) at the west boundary. The simulation is reasonable when compared to the observations. Sensitivity experiments were designed to investigate the driving mechanisms. The Wind is shown to be important to the transport of baroclinic eddy features, but otherwise insignificant. In general, seasonal circulation patterns and upwelling phenomena are determined and forced by the wind, while the heat fluxes plays a secondary role in determining the magnitude of the circulation velocities.