Our Recent Understanding About the Eddies in the South China Sea

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Abstract: Features of eddy kinetic energy (EKE) in the South China Sea (SCS) are discussed using geostrophic currents estimated from maps of sea level anomalies of the Topex/Poseidon altimetry data. A high EKE is identified in the southeast off Vietnam coast with the highest values about 1400cm2/sec2 in both summer and autumn. This high EKE is caused by the instability of the current axis moving forth and back the Vietnam coast in these seasons. There exists another high EKE region in winter time in the northeastern SCS, vicinity of the Luzon Strait. It is generated by the eddy activities initiated by the time-dependent Kuroshio intrusion over there and accumulates more than one third of the annual EKE amplitude. The transition of the upper circulations is evidenced quantitatively by the directions of the major axis of velocity variance ellipses and the most transiently adjusted circulations happen in the two aforementioned regions. This confirms that the monsoon-driven circulation adjustment favors the eddy activities in the SCS.

Development of the Vietnam coastal offshore jet is investigated by compared the in situ hydrographic and remote sensing data. The summer jet is always accompanied by a couple of eddies, warm one in the southern side and cold one in the northern side. The satellite tracked Argos buoy demonstrates an anticyclonic eddy off Vietnam coast in summer 2000, matching the observed pattern very well. The P-vector method was applied to retrieve the geostrophic currents with the multi-level structure. It was shown that this eddy has a significant vertical shear, i.e., a cyclonic feature below the 600m level.

ARGOS trajectories in the SCS also measure the surface eddies estimated from the altimeter. TOPEX/ Poseidon altimeter sea level anomalies from along-track data were interpolated by objective analysis to a 0.5-degree grid in the domain. Most variances of ARGOS trajectories of the eddies can be explained by the geostrophic component derived from the altimetry. The artificial trajectories were simulated with the combination of the geostrophic component derived from the altimetry and the Ekman drift calculated upon the ERS wind stresses. The simulated eddies resemble the real tracks of the beginning 30 to 50 days.

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