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Characteristics of Mesoscale Eddies off Philippines and their effects on variations of the North Equatorial Current Bifurcation Latitude

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The statistic characters of mesoscale eddies near the region(10ºN-20ºN,122ºE-136ºE) of North Equatorial Current (NEC) Bifurcation Latitudes are studied based on the merged sea surface height anomaly (SSHA) data from 1993-2011. Totally 5568 eddies corresponding to 771 eddy tracks are identified using a slightly modified version of the 'winding-angle' method. The interannual variation of mesoscale eddies show a close relationship with Nino3.4 index. For anticyclonic eddy, the correlation coefficient is 0.32 when the eddy latitude lagged the nino3.4 index 1 month and the correlation coefficient is -0.43 when the eddy number lead the nino3.4 index 1 month. For cyclonic eddy, the correlation coefficient is -0.40 when the eddy latitude lagged the nino3.4 2 months and the correlation coefficient is 0.43 when the eddy number lagged the nino3.4 -1 month.

The seasonal variation show that the anticyclonic eddy number reaches its maximum with its latitude reaches northern most position in June and minimum eddy number with its latitude reaches southern most position in January; For cyclonic eddy, the eddy number reaches its maximum with its latitude reaches southern most position in December and minimum eddy number with its latitude reaches northern most position in August. There are very high correlation between non-ENSO eddy parameters and non-ENSO North Equatorial Current bifurcation latitude. The correlation coefficient between eddy number and NECBL is -0.42 for anticyclonic eddy (0.51 for cyclonic eddy), the coefficient between eddy latitude and NECBL is 0.22 for anticyclonic eddy (-0.60 for cyclonic eddy) at time lag of 0 month with confidence level exceeding 95%.

A case study was made for a cyclonic eddy during July to November 2004. The geostrophic velocity profile of this eddy suggest that the velocity of the outer edge can exceed 120cm/s, and its vertical extent can reach 2000m. Observations suggest that these eddies can significantly change the bifurcation location of NEC. Model experiments further suggest that cyclonic eddies can put the bifurcation latitude northward, while anticyclonic eddies can put it southward. The interannual and seasonal cycle of NECBL maybe contaminated by mesoscale eddies east of Philippine.