Analyzing the Benefit of Track SLA Assimilation for Forecasting Surface Current in the South China Sea

Jiping Xie[1], Francois Counillon[2], Jiang Zhu[3], Laurent Bertino[2]

[1]*ICCES, Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing, China, 100029*

[2]*Mohn-Sverdrup Center，Nansen Environmental and Remote Sensing Center, Bergen, Norway*

[3]*LAPC, Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing, China, 100029*

Due to the significant influence of the Asian monsoon, the upper-layer circulation and associated mesoscale eddies in the South China Sea (SCS) is predominated with seasonal variability. Topography, Kuroshio intrusion through the Luzon Strait, coastline geometry and tides further enhance the complexity. In this study, we implement the Ensemble Optimal Interpolation (EnOI) method to assimilate the altimeter data into a nested model of HYCOM including tides, for improving the circulation and mesoscale eddies. In order to present the seasonal variation of the background error covariance that is essential for the Monsoon influenced SCS, the traditional static ensemble of EnOI is replaced by the seasonal static ensemble. Assimilating the along-track data rather than the interpolated SLA maps allows reducing the interpolation errors in data at the first place. Three-day averaged along-track data and model simulation are used to calculate the innovation vectors in order to remove the tidal signal from the model forecast. The spatial and time representative error of observations are estimated and taken into consideration in assimilation.

Results from two assimilation experiments with different localization scales (300 and 150 km) are compared with those of the control run spanning the period from January 1 1994 to December 31 1995. The root mean square (RMS) errors of the forecast SLA are remarkably reduced by assimilation. On average, the monthly RMS error can be reduced from about 9 cm to about 7 cm. The dipole structure related with the jet off the coast of Vietnam is clearly visible in July-August 1994, which is well consistent with other previous observations. In May 1995, several anticyclonic and cyclonic eddies appearing in the central SCS are consistence with the warm and cold gyres proposed by Chu et al. (1998) using an AXBT survey. The comparison of the currents and the observations by drifters further verifies that the currents have been improved in the northern SCS and off shore region east of Vietnam.