

Numerical simulation of meander, patch and lens structures of Changjiang Diluted Water in Yellow Sea.

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Abstract

The dynamic behavior of Changjiang Diluted Water was simulated numerically by using the ROMS 2.2 in the MPI mode on Onyx350 16-cpu machine. The 4x4 tiling parallel computing was a very powerful mode for computation, especially for reproduction of the behavior of low-saline water patch originated from Changjiang Diluted Water. The patch and sometimes so-called ‘lens’ of low-saline water body have been generally observed in the field survey in summer.

The goal of this study is to elucidate the generation, pathway and forms of the CDW dispersion in meander, patch and lens structures in summer 2003 as reported in many field observations. To simulate the fate of the CDW dispersion, the terrain-following ROMS model has been applied.

The scale of patches ranges from 50km to 150 km in horizon and 10m to 20m in vertical thickness. During summer of 2003, the life span has been estimated as approximately 20 days from generation of meandering to fading out from lens pattern. The moving speed of patch core has been estimated as approximately 40 cm/s along the major axis of meandering path with life span of 10 to 20 days dependent upon the local winds and tidal action.

Through the numerical drifter experiment and vorticity field, the local winds and tidal action are very important agency controlling the meander, patch and lens structures of the CDW low saline water body in summer.

Key Words: Yellow Sea, Changjiang River, ROMS model, Low-saline water, Meandering, lens and patch, Tidal stirring, Coastal fronts.