

Abstract

Characteristic features of hydrodynamic and sediment transport processes in the East China Sea, the Yellow Sea and the Bo Hai were studied under the condition of driving factors in 2007. The hydrodynamic characteristics were first investigated for tide, tidal current, mean flow, the Kuroshio and the temperature-salinity structure. Numerical results revealed that tide is dominated by the M_2 constituent, under which the largest tidal amplitude appears in the northwestern coast of the Korean Peninsula and around the Changjiang Estuary. Amphidromic points in the Yellow Sea and the Bo Hai were reproduced reasonably. Tidal current develops in the same basins where tidal range reaches the maximum. The annual mean surface flow field turned out to be mainly characterized by three current patterns: a clockwise circulation developing on the northwestern coastal banks, weak southward currents formed in the northern basin, and the opposite northward currents in the southern basin. The Kuroshio was reproduced fairly under the boundary condition of sea surface elevation using a geostrophic balance relation. The surface temperature in winter had a steep gradient along the longitudinal axis, whereas in summer it showed a relative low pattern in the western basin off Korea under the influence of the Yellow Sea Bottom Cold Water. It was also found that cold eddies exist northeast off Taiwan. The surface salinity presented a north-low and south-high pattern in accordance with the general feature of estuaries. Using the results of the hydrodynamic module, characteristics of water change and sediment transport were then investigated. For water exchange, temporal change in the residence rate of the initial seawater was calculated both for the whole area and for the area around Changjiang Estuary. As a result, the residence time was estimated at 13.7 years and 4.4 years, respectively. For sediment transport, the fate of Changjiang-derived sedimentary particles comprising three size classes – clay, fine silt, and silt and very fine sand – was investigated. The model result revealed that : clay particles are mainly transported northward from the Changjiang mouth and deposited on the northwestern banks; the majority of fine silt particles are transported into lower layers and deposited on the seafloor over a wide range extending far north, offshore and also south, especially on the flat basins; silt and very fine sand particles, on the contrary, are transported southeastward to form a deposition area from the Changjiang River to the southeast edge of the shelf, but the greater part are deposited inside the river mouth.