

A study on variability of baroclinic tides in Taiwan Strait

SUNG, Yu-Lin^{1*}, Ming-Huei Chang¹, Tswen-Yung Tang²

¹Department of Marine Environmental Informatics, National Taiwan Ocean University, ²Institute of Oceanography, National Taiwan University

The Taiwan Strait is a 180x400 km shelf channel located between Taiwan and China. Measurements from four bottom-mounted installations along the central part of the Taiwan Strait from August 29 to December 28, 1999 revealed that the internal tides could be intensified in the presence of horizontal fronts in the northern South Chinese Sea (SCS). The fronts were produced by either the typhoon-induced cold wake or oceanic mesoscale processes. In general, tidal motions are dominated by barotropic tides in Taiwan Strait. However, tidal currents in the Taiwan Strait can be dramatically changed after the fronts appear in the northern SCS. In the general phase, barotropic diurnal and semidiurnal tide magnitudes were ~ 0.15 m/s and 0.4 m/s, respectively, while the current magnitude of baroclinic diurnal and semidiurnal tide were ~ 0.1 m/s and 0.15 m/s, respectively. After the presence of fronts in northern SCS, the strong mode-1 semidiurnal baroclinic tides were intensified, with a maximum velocity of ~ 0.25 m/s. The magnitude and the depth-integrated kinetic energy of semidiurnal baroclinic tides after the time of the thermal fronts impact were, respectively, ~ 3 times and ~ 4 times of those in the general phase, while the diurnal baroclinic tides were not significantly affected. Subsequently, the strong mode-1 semidiurnal baroclinic tides weakened in the next 2-4 days. The variability of internal tide corresponding to the presence of fronts and the correlation between magnitude of fronts and internal tides were the most remarkable in the west of strait (Mainland China side), and eastward decrease.