



Measuring tidal and residual currents and volume transport through a wide strait by use of the coastal acoustic tomography system

Xiao-Hua Zhu, Ze-Nan Zhu, Yun-Long Ma, Xiaopeng Fan, and Yu Long

Second Institute of Oceanography, State Oceanic Administration, State Key Laboratory of Satellite Ocean Environment Dynamics, Hangzhou, China (xhzhu@sio.org.cn, 86-571-88839374)

Quantifying the tidal current and volume transport through the Qiongzhou Strait (QS) is vital to understanding circulation in the northern South China Sea. To measure the tidal current in the strait, a 15-day coastal acoustic tomography (CAT) experiment with four acoustic stations was carried out in March, 2013. The horizontal distributions of the tidal currents were calculated by an inverse analysis using the CAT data. Diurnal tidal current constituents are dominant: the ratio of the amplitudes of O1, K1, M2, S2 and MSF is 1.00:0.60:0.47:0.21:0.11. The residual currents are westward in the northern QS and turn southward in the southern part of the strait. The velocities of residual current are larger in the northern area than in the southern area, with a maximum westward velocity of -12.4 cm/s, appearing at the northern part of the QS. Volume transport estimated using the CAT data, varies between -0.710 and 0.859 Sv, with a westward residual current transport of 0.044 Sv. Dynamic analyses indicate that tidal rectification and sea level difference between two entrances of the QS are important in maintaining the residual current through the strait. This is the first estimation from synchronous measurements on major tidal current constituents, residual current and volume transport in this strait.