

Observation of Internal Waves in Luzon Strait by the repeated XBT surveys

*Akie Sakai¹, Tomoharu Senju², Eisuke Tsutsumi², Takeshi Matsuno², Guo Xinyu³, Ichiro Yasuda⁴

1. Department of Earth System Science and Technology, Interdisciplinary Graduate School of Engineering Sciences, Kyushu University, 2. Research Institute for Applied Mechanics, Kyushu University, 3. Center for Marine Environmental Studies, Ehime University, 4. Atmosphere and Ocean Research Institute, The University of Tokyo

Luzon strait is known to create large amplitude internal waves. Many observations have been made in the strait (ex, Rainville et al. 2013), but few studies measured both temporal and spatial variations simultaneously. To reveal the generation and propagation processes of internal waves in the strait, we carried out repeated observations around a ridge in Luzon Strait with XBT, shipboard and moored ADCPs by R/V Hakuho-Maru in November 2017.

Since Luzon strait has two meridional ridges, we set an observation line along 21° N from 121° 30' E to 122° 10' E. Along the observation line, we casted XBT or XCTD at every 2.5 min in longitude, except for the interval from 121° 50' E to 122° 00' E, near the ridge, where every 1 min casts were made. Horizontal velocities down to about 500 m were measured with the shipboard ADCP set at the sampling interval and bin size of 8 s and 5 m, respectively. The series of observations were repeated 5 times during the period of November 22-27, and totally 6 cross sections were given. In addition to the repeat observations, we moored an ADCP at 20° 59.892' N 121° 45.136' E, west of the ridge, during the period of November 22-28, at the sampling intervals and bin size of 1 min and 8 m, respectively.

We here report only the results of the temperature observations. The thermocline represented by the 23 °C isotherm was temporary undulated in the upstream and downstream regions of the ridge. The comparison with flows from the mooring ADCP observation indicates a dominance of the diurnal tide in this region. When the tidal current was weak, there were prominently tilted isotherms around the ridge. In some sections, wavy structures of isotherms, which have wavelength of about 10 km and high vertical mode, were recognized near the ridge. We observed temperature overturns (>0.05 °C) in the upstream region in the ridge in a section during strong eastward tidal current, which suggests generation of strong turbulent mixing.

Keywords: Luzon Strait, internal wave