[EE] Evening Poster | A (Atmospheric and Hydrospheric Sciences) | A-OS Ocean Sciences & Ocean Environment

[A-OS11]What we have learned about ocean mixing in the last decade

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The study of ocean mixing processes has made great strides in development of observation technology over the last decade. This includes the improvement of micro-scale and multi-scale profilers, innovation of ocean gliders, as well as identifying internal waves and turbulence through echo sounding from an underway research vessel. These new technologies enable field observations of ocean mixing processes to extend much deeper and wider than ever before. The accumulated knowledge of the observed features has stimulated theoretical and modeling studies related to ocean mixing processes such as internal wave-wave interactions, internal wave interactions with background shear, and associated energy cascade down to dissipation scales as well as assessment and reformulation of existing turbulent mixing parameterizations to be incorporated into the global circulation and climate models.

This session encompasses a wide variety of coastal and open ocean mixing processes; from the surface through the interior to the near boundary benthic mixing, including the roles of mixing in the biological processes and productivity of the ocean. Through detailed discussions, we would like to confirm how far our understanding of the ocean mixing processes has advanced over the last decade, defining the new frontier of ocean mixing research to be tackled in the next decade.

[AOS11-P09]Observation of Internal Waves in Luzon Strait by the repeated XBT surveys

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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 dominancy 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.