[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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Mon. May 21, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

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-P13]Diurnal forcing induces variations in seasonal temperature and its rectification mechanism in the e astern shelf seas of China

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Keywords:Diurnal wind forcing, Bottom cold water, Heat flux

This study investigates the seasonal variation in temperature induced by diurnal forcing in the eastern shelf seas of China (ESSC) using a high-resolution Regional Ocean Modeling System model forced by the National Center for Environmental Prediction and the National Center for Atmospheric Research re-analysis data for surface fluxes with both 6-h and daily frequencies, respectively. The comparison between two experiments revealed a ±0.4°C modification of the variation in seasonal temperature by diurnal forcing, which also increases the mixed-layer depth (MLD) in August by 26% and reduces the volume of the Yellow Sea Cold Water Mass (YSCWM) by 25%. Sensitivity experiments using different forcing variables indicated that diurnal wind can explain over 80% of the variability in seasonal temperature induced by diurnal forcing. Diurnal wind led to an increase in the net heat flux into the ocean by about 13 W/m2 in summer and a decrease by about 15 W/m2 in winter. Diurnal wind also generated an additional downward heat transport of 21 W/m2 over the ESSC that contributed to variability in the mean MLD and YSCWM in August. Experiments changing the temporal interval of wind forcing suggested that the increase in the forcing temporal interval gradually enhanced the reproduction of the variability in seasonal temperature generated by diurnal wind; a 6-h wind forcing can capture 70% of this type of variability given by 1-h wind forcing, while a 3-h or shorter wind forcing can capture 90%.