

[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

convener: Toshiyuki Hibiya (Department of Earth and Planetary Science, Graduate School of Science, University of Tokyo), Louis St Laurent (Woods Hole Oceanographic Institution), Ren-Chieh Lien (None, 共同), Robin Ann Robertson (China-ASEAN College of Marine Science Xiamen University Malaysia)

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-P02]Spatial distribution of turbulent mixing in the central Pacific inferred from Argo float data

*Cheng Lingqiao¹ (1.Shanghai Ocean University)

Keywords: Turbulent mixing, Mean latitudinal variation, The fine-scale parameterization, Argo float data

A long-term mean turbulent mixing in the depth range of 200-1000 m produced by breaking of internal waves across the middle and low latitudes (40°S-40°N) of Pacific between 160°W and 140°W is examined by applying the fine-scale parameterization depending on strain variance to 8-year (2005-2012) Argo float data. The adequacy of Argo float data was validated by comparing the estimated turbulent dissipation rate (ϵ) with those from World Ocean Circulation Experiment (WOCE) data. It is found that although some underestimations may exist to estimate the exact intensity of turbulent mixing below 350 m, good correlations between ϵ_{argo} and ϵ_{WOCE} indicate the property of Argo data for investigation of spatial variation. Results show that elevated ϵ is obtained related to significant topographic regions, along the equator, and on the northern side of 20°N spanning to 24°N throughout the depth range. Two patterns of latitudinal variations of ϵ and the corresponding diffusivity (K_{ρ}) for different depth ranges are confirmed: One is for 200-450 m with significant larger ϵ and K_{ρ} , and the maximum values are obtained between 4°N-6°N, where eddy kinetic energy also reaches to its maximum; The other is for 350-1000 m with smaller ϵ and K_{ρ} , and the maximum values are obtained near the equator, between 18°S-12°S and 20°N-22°N. Most elevated turbulent dissipation in the depth range of 350-1000 m relates to rough bottom roughness (correlation coefficient=0.63), excluding the equatorial area. In the temporal mean field, energy flux from surface wind stress to inertial motions is found not significant to account for the relatively intensified turbulent mixing in the upper layer.