[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-P04]A global ocean state estimation using tidal mixing parameterizations

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Recent data synthesis experiments showed that adjusting mixing coefficients through data assimilation approach is a promising way to reduce a global misfit between a model simulation and ocean observations, and to improve an ocean state estimation. However, those experiments do not impose any constraints on mixing coefficients, although they are closely related to the energy budget. Aiming for a data synthesis experiment that is energetically consistent with the known constraint on the ocean energy budget, we are developing a new quasi-global four-dimensional variational dataassimilation system, based on our system for the Estimated STate of the global Ocean for Climate research (ESTOC). As the first step, we implemented two parameterizations for tidally induced vertical mixing into the base model of the system, and optimally estimated their parameters based on the Green’s function method. The simulation using the optimal parameters well reproduces temperature and salinity in the deep Pacific Ocean. Using this simulation as the first guess field, we are conducting a long-term data synthesis experiment. We will present also some preliminary results of the synthesis experiment.

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