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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