

Inversion of the ocean vertical diffusivity from steady-state tracer distributions by using an adjoint method

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The ocean vertical diffusivity is important for controlling the distribution of various ocean tracer including the temperature and salinity. Recent studies clarified that its spatial distribution is very inhomogeneous but the global coverage of its direct measurements from turbulent mixing observations are not enough and its quantification is still difficult. On the other hand, recent observational data about the ocean tracer including temperature and salinity are increasing significantly and dataset covering the global ocean is available. The inversion of ocean velocity distribution from ocean tracer has been reported in the previous studies (e.g. Wunsch, 1996). In the same way as this velocity inversion, some studies tried the inversion of the ocean vertical diffusivity (e.g. Ganachaud and Wunsch, 2000) but there are few studies which discuss its detail 3-dimensional distribution. In this presentation, I will report some attempts about the inversion of the ocean vertical diffusivity from the ocean tracer distribution; I focus on the temperature, salinity, and carbon isotope (C14) and discuss how their steady-state distribution is useful for obtaining the 3-dimensional distribution of the ocean vertical diffusivity.