

Turbulent Mixing in the Oceans and the Atmosphere

*Lakshmi Kantha¹, Andreas Schneider², Haruka Nakano³, Franz-Josef Luebken², Jiroy Yoshida³, Michael Gerding²

1.Aerospace Engineering Sciences, University of Colorado, Boulder, Colorado, USA, 2.Leibniz Institute of Atmospheric Physics, Kuehlungsborn, Germany, 3.Tokyo University of Marine Science and Technology, Tokyo, Japan

In the global ocean, measurements of the dissipation rate of turbulence kinetic energy are now quite routine. The same cannot be said about the atmosphere. Such measurements have been difficult to make in the atmosphere, because an instrument similar to an oceanic microstructure profiler is not available. However, measurements have recently been made in the atmosphere using very high-resolution balloon-borne sensors. It is now possible to use these data to obtain a unified picture of turbulence in the oceans and the atmosphere. However, without knowledge of the scales involved, it is hard to assess the reliability of the observational data. By appealing to closure models of turbulence and imposing appropriate limits on turbulence scales, it is possible to remove questionable data and obtain a more accurate picture of mixing. In this talk, we will describe our approach and the results that lead to a Grand Diagram of Turbulence in the oceans and the atmosphere.

Keywords: Microstructure, Turbulent Mixing, Mixing in the Oceans, Mixing in the atmosphere