

Turbulent mixing feature above the Chukchi Plateau and the Canada Basin

Eun Yae Son¹, and Yusuke Kawaguchi¹

¹*Atmosphere and Ocean Research Institute, University of Tokyo*

The Arctic Ocean is well known for low turbulence energy by lack of atmospheric kinetic energy input from the sea surface (Rainville and Winsor, 2008). Especially, the western Arctic including Chukchi and Beaufort Sea is known for the low kinetic energy, where the turbulence dissipation rate and eddy diffusivity are comparable to the molecular level (Son et al., 2022). The main purpose of this study is to figure out the hot spot of turbulent mixing in the western Arctic and to suggest comparison of turbulent related factors such as dissipation rate, thermal variance dissipation rate and mixing efficiency between the low and high kinetic energy area. In order to investigate it, we analyzed the data obtained using Turbulence Ocean Microstructure Acquisition Profiler (JFE Adventech), conductivity-temperature-depth sensor (SBE911 plus, Sea-Bird Scientific), XCTD (Tsurumi-Seiki), and Shipborne 75 kHz ADCP (Ocean Surveyor, Teledyne RD Instruments) during R/V Mirai arctic expedition in 2019 and 2020. In this study we focus on the values over the Chukchi Plateau where the topography is rough. In the area, the turbulence dissipation rate and diffusivity were more than 100 times elevated than those of Basin, which were at the order of $O(10^{-10} \text{ W/kg})$ and $O(10^{-7} \text{ m}^2/\text{s})$, respectively (Figure 1). The thermal variance dissipation showed about 100 times higher value than the turbulence dissipation rate at the overall area. The detailed information will be displayed during the presentation.

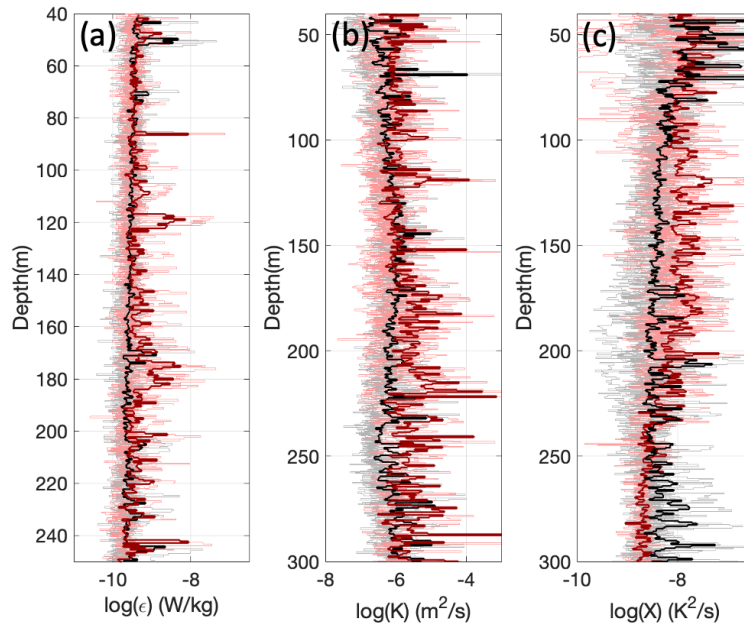


Figure 1. Vertical profiles of (a) turbulent dissipation rate, (b) eddy diffusivity, and (c) thermal variance dissipation. The red profiles are obtained near Chukchi Plateau and the gray profiles are obtained in the Canada Basin. The mean profiles are displayed with thick lines.

References

- Rainville, L. and Winsor, P. (2008), Mixing across the Arctic Ocean: Microstructure observations during the Beringia 2005 expedition, *Geophysical Research Letters*, 35, L08606.
- Son, E., Kawaguchi, Y., Cole, S., Toole, J. and Ha H.K. (2022) Assessment of Turbulent Mixing Associated With Eddy-Wave Coupling Based on Autonomous Observations From the Arctic Canada Basin, *Journal of geophysical research*, 127, e2022JC018489.