Strong vertical mixing in the Urup Strait, Kuril Islands

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Urup Strait

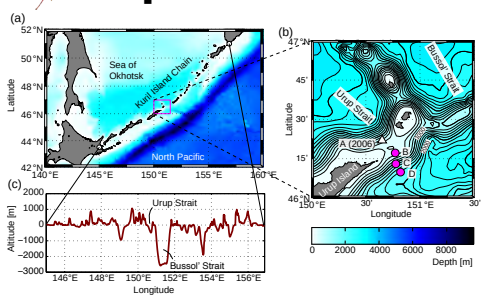

Fig. 1. Geographical characteristics of the study site.

Mixing intensity

- Very strong turbulence ($\varepsilon > 10^{-5}$ W kg^{-1} / $K\rho > 5000$ m^2 s^{-1})
- Homogeneous layer with a thickness of 300–600 m on the slope
- Strongest turbulence occurred mainly during periods of down-sill flows

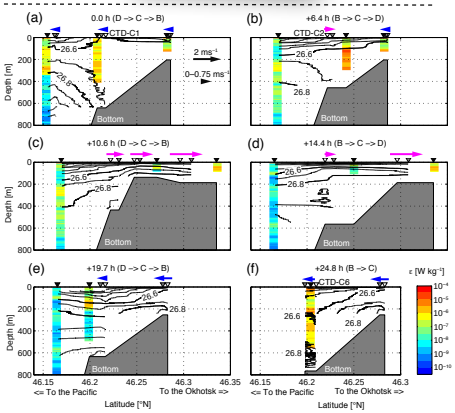

Fig. 2. Surface velocity, potential density and energy dissipation rate during the 1-day observation

Observation

Research cruises within the Urup Strait in the summer of 2006 and 2007

НИСП "*Профессор Хромов*"
R/V "*Professor Khromov*"

Vertical Microstructure Profiler (VMP500)

1-day continuous microstructure observations were conducted at Sts. A (2006: △) and B–D (2007: ●) (See Fig. 1)

Estimation of diapycnal volume transport

1-D density balance on an isopycnal surface (McDougall, 1984)

$$w_d \frac{\partial \sigma_\theta}{\partial z_d} = -\frac{\partial}{\partial z_d} \overline{w_d' \sigma_\theta'} = -\frac{\rho_0 \Gamma}{g} \frac{\partial \varepsilon}{\partial z_d} \qquad (1)$$

Diapycnal velocity is calculated as:

$$\langle w_d \rangle = -\frac{\rho_0 \Gamma}{g} \left\langle \frac{\partial \varepsilon}{\partial \sigma_\theta} \right\rangle \qquad (2)$$

- Mean ε took a peak between 26.6–26.7 σ_θ, indicating the injection of diapycnal flows to this layer
- Possible contribution to southward intrusion of intermediate water into the subtropical gyre

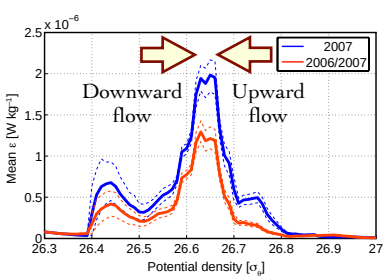

Fig. 3. Mean turbulent energy dissipation rate ε [W kg^{-1}]

Reference Itoh, S. et al., *JGR.*, **115**, doi:10.1029/2009JC005629, 2010 / Itoh, S. et al., *GRL.*, **38**, doi:10.1029/2011GL048507, 2011

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