Geophysical Research Abstracts
Vol. 13, EGU2011-11275, 2011
EGU General Assembly 2011

Stratified inertial subrange as inferred from in situ measurements in the bottom boundary layer of Rockall Channel

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Deep-ocean high resolution moored temperature data are analyzed with a focus on super-buoyant frequencies. A local Taylor hypothesis based on the horizontal velocity averaged over two hours is used to infer horizontal wavenumber spectra of temperature variance. The inertial subrange extends over fairly low horizontal wavenumbers, typically within $[2\text{x}10^{-3}; 2\text{x}10^{-1}]cpm$. It is therefore interpreted as a stratified inertial subrange for most of this wavenumber interval while in some cases the convective inertial subrange is resolved as well. Kinetic energy dissipation rate, ϵ, is inferred using theoretical expressions for the stratified inertial subrange. A wide range of values within $[10^{-9}, 4\text{x}10^{-7}]m^2s^{-3}$ is obtained for time periods either dominated by semi-diurnal tides or by significant sub-inertial variability. A scaling for ϵ that depends on the potential energy within the IGW frequency band, PE_{IGW}, and the buoyancy frequency, N, is proposed for these two cases. When semi-diurnal tides dominate, $\epsilon \simeq (PE_{IGW}N)^{3/2}$, whereas $\epsilon \simeq PE_{IGW}N$ in the presence of significant sub-inertial variability. This result is obtained for energy levels ranging from $[1-30]$ times the Garrett-Munk energy level and is in contrast with classical fine-scale parameterization in which $\epsilon \sim PE_{IGW}{}^2$ that applies far from energy sources. The specificities of the stratified bottom boundary layer, namely a weak stratification, may account for this difference.