Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

The $k_h^{-5/3}$ energy spectrum in the open ocean: a new interpretation JAMES RILEY, University of Washington, Seattle, ERIK LINDBORG, Royal Institute of Technology, Stockholm — Previously, the kinetic and potential energy spectra in the open ocean on horizontal scales of roughly 100m to 10's of km's have usually been interpreted in terms of inertial internal gravity waves following Garrett-Munk scaling. In particular, many spectra display an approximately $k_h^{-5/3}$ dependence on the horizontal wave number k_h. Based upon theoretical arguments[1,2] and numerical simulations[1,3], we present an alternative interpretation. It is postulated that, under the low Froude number, high Rossby number conditions generally holding at these scales, there is a forward cascasde of energy to smaller scales, leading to local turbulent patches at scales where the local Froude number is order 1. Using Kolmogorov-like arguments, this leads to horizontal kinetic and potential energy spectra, analogous to the KOC spectra,

$$E_k(h_k) = C_1 \epsilon_k^{2/3} k_h^{-5/3}\,, \quad E_p(k_h) = C_2 \epsilon_p \epsilon_k^{-1/3} k_h^{-5/3}\,,$$

where ϵ_k and ϵ_p are the corresponding dissipation rates. Field data and theoretical arguments will be presented to support this hypothesis.

[1]E.Lindborg,2005,*Geophys.Res.Ltrs.*,**32**,L01809.
[2]E.Lindborg,2005,submitted to *J.Fluid Mech.*
[3]J.J.Riley,S.M.deBruynKops,2003,*Phys.Fluids*,**15**,2047.

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Date submitted: 11 Aug 2005 Electronic form version 1.4