Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Nonlinear Harmonic Generation During the Interaction of an Internal Wave Beam with a Sharp Oceanic Pycnocline PETER DIAMESSIS, PAUL RICHTER, Cornell University, SCOTT WUNSCH, Johns Hopkins University — The phenomenon of nonlinear harmonic generation upon the encounter of an internal wave beam with a sharp oceanic pycnocline underlying a well-mixed layer is examined using 2-D direct numerical simulation. Use of a spectral multidomain penalty scheme enables the detailed resolution of phenomena within the pycnocline. Values of the ratio, r, of pycnocline to lower layer Brunt-Vaisala (BV) frequency and pycnocline thickness, h/λ_x, normalized by the incident horizontal wavelength are considered in the ranges [1,10] and [0.1,1], respectively. Nonlinear harmonic generation is enhanced with increasing values of r/h, i.e. the gradient of the BV frequency within the pycnocline. We provide scaling laws for the content of the first two harmonics as a function of environmental parameters and explore the possibility of a non-monotonic dependence which indicates particular regimes for resonance.

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Date submitted: 28 Jul 2011 Electronic form version 1.4