Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Surface manifestation of internal waves emitted by an evolving stably stratified turbulent shear flow[1] QI ZHOU, PETER DIAMESSIS, Cornell University — Internal waves (IWs) from submerged turbulent sources may manifest themselves at the sea surface by generating coherent and persistent spatial features. Such IWs emitted by the turbulent wake of a towed sphere in a linearly stratified Boussinesq fluid are investigated numerically. The fully nonlinear three-dimensional simulations resolve both the wave-emitting turbulent wake at Reynolds number $Re \in [5 \times 10^3, 10^5]$ and Froude number $Fr \in [4, 16, 64]$, and the subsurface region where the IWs interact with the sea surface which is modeled by a free-slip rigid lid. As the wake evolves for up to 250 units of buoyancy timescales, IW characteristics such as wavelength and frequency are measured both near the source and at the surface for comparison; the statistics of magnitudes and orientations of IW-induced surface strains are reported. Various IW impacts at the surface, such as local enrichment of surfactant and dispersion of ocean surface tracers, are also discussed.

[1]Work funded by ONR grants N00014-08-1-0235 and N00014-13-1-0665 (Dr. R. Joslin)

Qi Zhou
Cornell University

Date submitted: 25 Jul 2014 Electronic form version 1.4