Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Wave-induced mean flow at an interface JOHN MCHUGH, University of New Hampshire, ROBERT SHARMAN, National Center for Atmospheric Research — A vertical packet of internal waves that are horizontally periodic will generate a mean flow that has the same sense as the group velocity of the incident waves. When the wave packet impinges on a density-gradient interface the waves are partially reflected and the wave-induced mean flow is enhanced just under the interface. A density-gradient interface has continuous density but discontinuous buoyancy frequency, and is an idealization of Earth's tropopause. Here we consider waves generated by flow past an isolated object, and maintain a vertical packet by introducing the obstacle gradually. The resulting waves are confined horizontally over a narrow interval and hence are not slowly varying in the horizontal. Nonlinear simulations show that the mean flow at the interface has a component with the same sense as the wave group velocity above the mean position of the interface, but also a component with the opposite sense just below the mean interfacial position. This combination establishes a wave-induced circulation at the interface.

John McHugh
University of New Hampshire

Date submitted: 03 Aug 2012 Electronic form version 1.4