Abstract View

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Scattering of Inertial waves by an Ocean Front

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ABSTRACT

Recent observations suggest that the space-time spectrum of near-inertial motions is strongly modulated by ocean fronts and geostrophic shear. This paper postulates a mechanism that may be responsible for generating much of this variability in the vicinity of fronts. The effective inertial frequency is variable because of gradients in the mean flow associated with a front. As a result, phase differences accumulate in inertial oscillations over short length scales of order tens of kilometers. Inertial pumping ensures, and near-inertial waves propagate away from the front in various directions. Inertial energy in the mixed layer disperses more rapidly in the vicinity of the front, and the mixed layer depth assumes strong across-front variations. In the thermocline, scattered internal waves develop a modulated pattern of amplitude, within the front and in its vicinity.

In order to investigate this mechanism, a two-dimensional numerical model is developed. The model simulates a mixed layer sitting over a stratified interior, and a barotropic jet. Solutions are suggestive of patterns of variability that have been observed in the ocean.