Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Horizontal transport of Lagrangian particles by basin-scale internal waves in a continuously-stratified circular lake TAKAHIRO SAKAI, LARRY REDEKOPP, University of Southern California — Horizontal transport of Lagrangian particles under the influence of wind-generated, basin-scale internal waves in a circular lake is studied by employing field solutions of the linear hydrostatic model and by simulations of the weakly-nonlinear, weakly-nonhydrostatic evolution model for continuous stratification subject to wind stress forcing over a basin of uniform depth. Both the azimuthal mode-one Kelvin and the gravest Poincare waves of the first two vertical eigenmodes are accounted for in the specification of the advection field. It is found that Kelvin waves play the dominant role in along-shore transport. Although vertical mode-two (V2) waves are usually considerably smaller than those of vertical mode-one (V1), yet V2 Kelvin waves possess sufficient ability in driving along-shore transport for a distance comparable with that of V1-only transport. This arises because of the longer residence time of disparately slow V2 Kelvin waves confined in the vicinity of the basin perimeter. Poincare waves, on the other hand, play a dominant role in off-shore transport, stretching and squeezing the particle cloud in radial directions with fast, near-inertial frequencies. These transport features are compared for different wind forcing strengths and different horizontal scale of the basin.

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Date submitted: 28 Jul 2010

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