Observations of the interaction between near-inertial waves and mesoscale eddies

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Abstract

Trajectories of drifters dragged at 50-100 meters depth and current meter data from a mooring are used to analyse the interaction between near-inertial waves and mesoscale eddies. Drifters were deployed within eddies generated downstream of Canary and Madeira islands between 1998 and 2011 (Sangra et al., 2005; Caldeira et al., 2014). The mooring was installed in the passage of cyclonic eddies induced by Gran Canaria island during 2006 (Piedeleu et al., 2009). Rotatory wavelet analysis of Lagrangian velocities shows a clear relationship between the near-inertial waves' intrinsic frequencies and the eddy angular velocities. The results reveal that near-inertial waves reach a minimum frequency of half the planetary vorticity (f/2) in anticyclonic eddies rotating with its maximum absolute angular speed. The highest amplitudes of the observed inertial motions are found in the inner core of young anticyclonic eddies evidencing strong trapping of inertial waves. Finally, the analysis of the current meter series show frequency fluctuations of the near-inertial currents in the upper 500 meters that are related to the passage of cyclonic eddies. These fluctuations appear to be consistent with the variation of the background vorticity produced by the eddies.

References

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