Geophysical Research Abstracts
Vol. 16, EGU2014-846-5, 2014
EGU General Assembly 2014

Observed temporal correlations between mesoscale currents and near inertial wave and non-wave motions in the World Ocean

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Motions in the near-inertial band are not all internal gravity waves. Here we use polarization relations, especially rotary spectrum, applied to 3500 current meter records, representing 41,000 months of data, throughout the World Ocean to differentiate motions that are consistent or not with linear internal waves. A remarkable contrast was found between the wave and the non-wave components' temporal correlation with respect to the monthly mean currents. The near-inertial internal wave energy was found to be weakly anticorrelated with the mesoscale energy while the near-inertial non-wave motion was significantly correlated with the monthly mean currents. The counter-rotating two near-inertial components were also positively correlated to each other. A simple stochastic model with white-noise forcing and linear coupling between the monthly mean and two near-inertial components was constructed and used to explain the observed correlations.