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Low mode internal wave energy fluxes in a tidal beam south of the Azores

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Low mode internal waves in the ocean are generated by interaction between barotropic tides and seafloor topography and by the wind field in the near-inertial range. They are crucial for interior mixing and for the oceanic energy pathways, since they carry a large portion of the energy of the entire internal wave field. The aim of this work is to study the propagation of low mode internal waves inside a tidal beam south of the Azores. For this we use 12 hydrographic time series stations (each lasting between 36h and 48h) and 10 month of mooring data that provide information on the spatial and temporal variability of the energy flux due to internal tides. These data sets are combined with output from a 1/10° global ocean tide and circulation model and internal tide energy fluxes based on satellite altimetry.
All independent data sets show a distinct tidal beam originating from a group of seamounts south of the Azores. Close to the main internal tide generation sites, the Plato and Hyères Seamounts, vertically integrated internal tide energy fluxes reach their maximum amplitude. A distinct surface eddy damped the energy flux in the first and second mode while a deep eddy (highest velocities at 2000m) reduced the energy mainly in the second mode. At the mooring position a very good agreement of moored energy fluxes with the model was found for the first two modes in the semidiurnal component. Moving southward along the beam the energy flux decreases with increasing distance to the generation sites. The satellite altimetry based flux estimates are slightly lower compared to results from the hydrographic time series stations but are energetically consistent with the inferred energy dissipation rates from a finestructure parametrization and upper ocean microstructure profiles. In the model high energy dissipation results in a faster decrease in the energy flux.