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Generation of Internal Waves in the Deep Ocean by Barotropic Tides

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The internal waves generated by tides over rough bottom topography are considered to be the main energy source for the vertical mixing in the deep ocean, which is a critical link in the global overturning circulation. Here the energy flux into the internal wave field due to this mechanism is calculated from first principles, using linear wave theory. The analytic solution of the problem in the form of a Fourier integral over spectral space has long been known. Inverse Fourier transformation shows that the flux density in real space is given by a convolution integral. This integral is here calculated numerically over the global ocean. Three data sets are used as input in the calculations: the Smith and Sandwell bottom topography, the Egbert tidal velocity, and the density stratification from the SAC database.

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