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Energy flux quantification in the oceanic internal wavefield

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The rate of diapycnal mixing, largely due to internal-wave breaking, is a key ingredient to understanding upwelling and horizontal circulation in the ocean. Here, we show a first-principles quantification of the downscale energy flux in the internal wavefield, that ultimately feeds the wave-breaking, shear-instability energy sink responsible for mixing. The approach is based on the wave kinetic equation that describes the inter-scale energy transfers via 3-wave nonlinear resonant interactions. Our results compare favorably with the phenomenological 'Finescale Parameterization' formula, by which deep ocean mixing is commonly implemented in the global models, and provide novel insights in the complex problem of oceanic energy transfers.