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The dissipation of the internal tide inferred from a global ocean model, altimetry, and in-situ observations

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In this presentation we combine several model and observational data sets to better understand the dissipation of the diurnal and semidiurnal internal tide in the global ocean, which is relevant for maintaining the global overturning circulation. We compute depth-integrated internal tide dissipation rates from a realistically-forced global HYbrid Coordinate Ocean Model (HYCOM) simulation with a horizontal resolution of 4 km (1/25 degrees) and 41 layers. We also compute dissipation rates from altimetry in two ways: 1) from the low-mode flux divergence away from topography and 2) by fitting exponential decay curves along low-mode internal tide beams. The internal-tide sea-surface height amplitude is computed with a least-squares harmonic analysis over a 20+ year altimetry data set. Hence, the altimetry-inferred dissipation rates both reflect the tidal dissipation and the energy scattered from the stationary to the nonstationary internal tide. To account for the dissipation of the nonstationary tide, we apply a spatially-varying correction factor to the stationary dissipation inferred from altimetry. This correction factor is computed from a global 8-km HYCOM simulation with a duration of 6 years, from which the stationary and nonstationary internal tides can be easily isolated. We compare the simulated and the corrected altimetry-inferred dissipation rates with dissipation rates from finescale and microstructure observations. Preliminary results show that the simulated dissipation is up to a factor of two larger than the depth-integrated dissipation rates inferred from finescale methods, but smaller than the dissipation rates from microstructure.

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