Is the abyssal overturning driven by breaking internal waves?

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Abstract

At steady state, Antarctic Bottom Water (AABW) must be consumed in the ocean interior at the same rate it is produced around Antarctica. To understand how and where this consumption is achieved, we estimate deep water mass transformation by internal wave-driven mixing and geothermal heating. Using parameterizations of lee wave and internal tide energy dissipation combined with two different models for the mixing efficiency, we show that near-field mixing by breaking internal tides and lee waves cannot account for the full strength of the abyssal overturning, inducing only _˜ 4 Sv of AABW upwelling north of 30°S. This is comparable to the _˜ 5 Sv of AABW upwelling caused by geothermal heating. The possible role of remotely-dissipating internal tides in complementing AABW consumption is explored.

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