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The Efficiency of Deep and Abyssal Ocean Turbulent Mixing ALI MASHAYEK, MIT, COLM CAULFIELD, University of Cambridge, RAFFAELE FERRARI, MIT, MAXIM NIKURASHIN, University of Tasmania, RICHARD PELTIER, University of Toronto —

Turbulent mixing produced by breaking of internal waves in the deep ocean plays a primary role in the climate through exerting a control upon the upwelling of deep dense waters formed at high latitudes, thereby driving the global ocean overturning circulation. A key parameter used to characterize turbulent mixing in observations, climate models, and global energy budgets, is the 'efficiency' of mixing, here defined as the ratio of the portion of the tide and wind energy input into the deep ocean that is invested in mixing, to the portion viscously dissipated into heat. Efficiency is conventionally assumed to be a constant of approximately twenty percent. Here we show that it varies significantly in the abyssal ocean, and that mixing is predicted to be most efficient, reaching values as high as fifty percent near topographic features which host vigorous wave generation and breaking. This result suggests a more accurate closure of the bulk ocean energy budget, a goal lying at the heart of understanding the role of the ocean circulation in climate and one towards which the oceanographic community has been striving for decades.

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