



Direct Observation of a Breaking Unsteady Lee Wave Generated by Diurnal Tides and an Estimate of its Global Occurrence

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Diapycnal mixing caused through breaking of large-amplitude internal lee waves generated by subinertial diurnal tides, which are modulated with the 18.6-year nodal cycle, is hypothesized to be fundamental to both the intermediate-layer ventilation and the bi-decadal oscillation around the North Pacific Ocean. The first observational evidence of such wave breaking is presented here. The breaking wave observed had ~ 200 m height and ~ 1 km width. Its associated diapycnal mixing was estimated to be $\sim 1.5 \times 10^4$ cm²/s, while typical values found in the open oceans are $O(0.1$ cm²/s). Our estimate suggests that a similar mixing process occurs globally, particularly around the Pacific and Antarctic Oceans.