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Turbulent exchanges between near-inertial waves and balanced flows JIM THOMAS, Department of Mathematics, University of North Carolina at Chapel Hil — Observations collected over the past few decades reveal that the strength of wind generated near-inertial waves in the upper ocean can vary depending on the geographic region and season. Inspired by these observations, we investigate turbulent interactions and energy exchanges between near-inertial waves and balanced flows in different wave-energy regimes. We find accelerated vertical propagation and dissipation of the waves in regimes where balanced and wave fields have comparable strengths. In such regimes we also find that near-inertial waves directly extract energy from balanced flows, with O(10%)being the amount of balanced energy loss. In contrast, we find that near-inertial waves transfer energy to balanced flows in regimes where balance-to-wave energy is small, with the gain in balanced energy being dependent on the relative strength of waves. Furthermore, these regimes are characterized by relatively weaker vertically propagation and dissipation of the near-inertial wave field. One of the key outcomes of this study is the demonstration of the lack of a unique direction for near-inertial wave-balanced flow energy transfers. Depending on the balance-to-wave energy ratio, waves can act as an energy sink or energy source for balanced flows.

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