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Geophysical turbulence dominated by inertia-gravity waves JIM THOMAS, Woods Hole Oceanographic Institution, USA and Dalhousie University, Canada — Recent evidence from both oceanic observations and global-scale ocean model simulations indicate the existence of regions where low-mode internal tidal energy dominates over that of the geostrophic balanced flow. Inspired by these findings, we examine the effect of the first vertical mode inertia-gravity waves on the dynamics of balanced flow using an idealized model obtained by truncating the hydrostatic Boussinesq equations on to the barotropic and the first baroclinic mode. On investigating the wavebalance turbulence phenomenology using freely evolving numerical simulations, we find that the waves continuously transfer energy to the balanced flow in regimes where the balanced-to-wave energy ratio is small, thereby generating small-scale features in the balanced fields. We examine the detailed energy transfer pathways in wave-dominated flows and thereby develop a generalized small Rossby number geophysical turbulence phenomenology, with the two-mode (barotropic and one baroclinic mode) quasi-geostrophic turbulence phenomenology being a subset of it. The present work therefore shows that inertiagravity waves would form an integral part of the geophysical turbulence phenomenology in regions where balanced flow is weaker than gravity waves.

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