Abstract Submitted
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Sea-surface manifestation of a submerged stratified turbulent wake via wake-emitted internal gravity waves[1] QI ZHOU, PETER DIAMESSIS, Cornell University — A submerged turbulent wake in the stratified ocean may become visible at the sea surface due to the internal gravity waves (IGWs) which are emitted by the wake and propagate towards the surface. In a linearly stratified Boussinesq fluid, we examine such a wake and wake-emitted IGWs at wake Reynolds number $Re \in [5 \times 10^3, 10^5]$ and Froude number $Fr \in [4, 16, 64]$ using three-dimensional implicit Large Eddy Simulations. A spectral multidomain penalty scheme in the vertical enables finer resolution of both the IGW-emitting wake and the subsurface region where the IGWs interact with a free-slip sea surface. At various wake parameters, including Re, Fr and the evolution stage of a wake, we report the length- and time-scales of reflecting IGWs at the surface, statistics of magnitudes and orientations of IGW-induced surface strains, and mean momentum fluxes due to IGWs. A case study concerning the visibility of the surfacing IGWs from remote sensors is performed by considering possible local enrichment of surfactant due to the surface IGW currents/strains.

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