Supplementary Material

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Title of the Paper

Eulerian and Lagrangian characterization of a high-amplitude convectively unstable shoaling internal solitary wave in two dimensions.

General Notes

- All three panels of the animation are based on simulations performed using the in-house developed, high-accuracy Spectral-Element-Method non-linear non-hydrostatic flow solver, coupled with a high-accuracy particle tracking scheme.
- The animation is provided in "MP4 format" and can be viewed using standard media players.

File Name: *OcDynSupplementaryAnimationBolioudakisetal.mp4*

Description of Animations

Top Panel: Density animation

Middle Panel: Vorticity animation

Bottom Panel: ISW trough location animation

Description:
The animation depicts the synchronized evolution of the density and vorticity fields, zoomed into the wave region and presented in a wave-following frame of reference. The bottom panel shows the position of the wave trough as it propagates over the South China Sea (SCS) bathymetry. Isocontour levels are matched to those in Figure 3 of the manuscript for direct comparison. In the top panel (density visualizations), the gray isopycnal indicates the pycnocline for reference. Two groups of particles are overlaid: the magenta-colored group represents 3,306 particles initialized within

the ISW interior at the onset of the particle-tracking simulation A (see manuscript Sec. 2.4), while the black-colored group comprises particles initially seeded near the pycnocline and later filtered to include only those exhibiting a shoreward horizontal drift of at least 10 km. Lastly, note that the vertical axes indicate Depth as a negative quantity, in contrast to the manuscript figures, which represent depth as positive distance below the surface.

Relevance to the Study:
This animation supports the findings discussed in Section 3 of the manuscript by providing a visual representation of the dynamic evolution of the flow structure and its interaction with neutrally buoyant particles, as the ISWs shoal towards the continental slope.

Contact Information

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