Field observations of internal ship wakes in a fjord

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Abstract

This study presents new observations of ship-generated internal waves collected in the stratified waters of the Saguenay Fjord, Canada. The internal wave signature of nine cargo ship passages were captured from a mooring equipped with thermistors and an acoustic Doppler current profiler (ADCP), as well as from shore-based georectified images. Furthermore, en-route ADCP and echo-sounder measurements were collected from a research boat that steamed across the wake of two passing ships, revealing the internal wake structure shortly after being generated. The analysis shows that some ships first generated a single 3 m amplitude internal wave with a phase speed around 1.1 m/s followed by a wavetrain composed of 2 to 5 waves of slightly smaller amplitudes (≈2.5 m) and slower phase speeds (0.41 to 0.75 m/s). Attempts are made to relate the properties of the observed ship-generated internal waves to ships characteristics in the hope of establishing empirical relationships that could help develop and test future theories on ship-generated internal wakes.

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