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On The Generation of Oceanic Internal Gravity Waves by Polar Lows

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Polar low pressure systems with strong winds significantly impact the sub-polar gyre circulation, regional sea surface temperature changes and deep water formation. Thus they are expected to play a key role in a variety of energy transport mechanisms. The present study investigates the generation of internal gravity waves by an idealized polar low in a axisymmetric geometry. The wind forcing corresponds to a Rankine vortex with varying strength, radius and duration. The effect upon wave generation of stratification from winter (deep mixed layer) to summer (shallow mixed layer) conditions is also examined.

Results indicate that internal gravity waves are generated during and after the weakening phase of the model storm. These outward radiating waves are close to vertical mode-1 in structure and have frequency close to the inertial frequency. Compared with summer conditions, waves excited in winter conditions have larger radial wave length and group speed. But their amplitude is smaller such that their radial energy flux is smaller.