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The Collapse of an Axisymmetric Mixed Patch and Internal Wave Generation in Uniformly Stratified Fluid AMBER HOLDSWORTH, BRUCE SUTHERLAND, University of Alberta — Hurricanes are responsible for mixing localized patches of the upper ocean leaving cooler waters in their wakes. The region collapses into a stratified ambient forming an gravity current and generating internal waves beneath the mixed patch. In an effort to understand the axisymmetric collapse of a mixed patch into uniformly stratified fluid laboratory experiments are performed and wave properties are determined using a non-intrusive technique called Synthetic Schlieren. We find internal wave frequencies are set by the buoyancy frequency, ($\omega \approx 0.8N_0$) and that the horizontal wavelength is set by the radius of the cylinder so that $k_r \approx 2R_c$. Vertical displacement amplitudes scale with the depth of the mixed patch according to $|\xi|/H_m = .016 \pm .001$ and we find that about 2% of the available potential energy of the mixed region is extracted by vertically propagating internal waves. The work presented here is a precursor to the more complicated rotating case which will more realistically simulate the oceanic example. Extrapolation of these results is certainly premature, but a conservative estimate of the energy extracted by internal waves through the process of mixed region collapse is on the order of 1 GW. That is an estimated 2 TW of power over the generation time and is comparable to the power exerted by tides and winds over the ocean.

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