



Cloud-Edge Dynamics and Mysterious Holes in the Sky

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A holepunch cloud is a curious phenomenon where a disturbance in a thin cloud layer, as can be caused by aircraft penetration, leaves behind a growing circular hole of clear air. Observed since the dawn of aviation, only in 2011 was the holepunch feature simulated in a full-physics numerical weather model. Although the initiation process has been clearly attributed to ice crystal formation, we explain that the continued expansion of the hole is a travelling front between two phases of moist air — unsaturated and weakly-stratified (clear) intruding into saturated and moist-neutral (cloudy). Our investigations into this phenomenon are leading us toward the development of a more general free-boundary theory for the evolution of cloud edges by gravity wave motions.

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