

Buoyancy storms in a zonal stream on the polar beta-plane: Experiments with altimetry

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ABSTRACT: Results from a new series of experiments on flows generated by localized heating in the presence of a background zonal current on the polar b -plane are presented. The flow induced by a heater without the background zonal flow is in the form of a b -plume. Zonal jets of alternating directions are formed within the plume. The westward transport velocity in the plume is proportional to the upwelling velocity above the heater in agreement with linear theory. When the background flow in the form of the eastward zonal current is present, the b -plume can be overwhelmed by the eastward current. The regime diagram shows the area where a b -plume can exist in the parameter space. The critical value of the velocity of the zonal flow below which the b -plume can exist is obtained by considering barotropic Rossby waves emitted by the baroclinic eddies in the heated area.

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