



Baroclinic waves in the rotating annulus: a laboratory/model comparison

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We compare laboratory observations of baroclinic waves in a rotating two-layer annulus experiment, with simulations from a fast numerical model named QUAGMIRE (QUAsi-Geostrophic Model for Investigating Rotating fluids Experiments). Unlike other quasi-geostrophic models, which approximate the annulus as a periodic rectangular channel, QUAGMIRE retains the effects of cylindrical geometry. The model generally reproduces the laboratory results very well, apart from several systematic biases which are well-understood consequences of the model's misrepresentation of boundary layers and neglect of surface tension. We conclude that quasi-geostrophic dynamics provides a reasonably accurate description of the laboratory flow. This statement holds even though the laboratory flow lies well outside the quasi-geostrophic regime, and adds to the evidence that quasi-geostrophy may continue to apply well outside its formal bounds.