

Multiple Jet Formation in a Convectively Driven Flow on a Beta-plane

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We present results from laboratory experiments carried out on the Coriolis rotating platform in Grenoble, France, to investigate the influence of a topographic beta-plane (obtained via a sloping bottom) on convectively-driven geostrophic turbulence. Dense, salty water is sprayed continuously onto the surface of the tank, which leads to the formation of a field of convective vortices. In the presence of a sloping bottom, the vortices interact nonlinearly, leading to the formation of a series of quasi-steady, parallel azimuthal jets on a scale comparable with the so-called Rhines scale $L_R = \pi\sqrt{2U/\beta}$. Such jets are not found with a flat bottom. Statistics of jets and vortices appear to be broadly consistent with the theory of Rhines et al. and some recent numerical models of geostrophic turbulence on a sphere. Implications will be discussed in the context of various geophysical problems, including the atmospheres of the outer planets and the Earth's oceans.

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