is Rotating Rayleigh Benard convection
and Quasigeostrophic Flows.

Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

The impact of domain aspect ratio on the inverse cascade in rotationally constrained convection KEITH JULIEN, University of Colorado at Boulder , EDGAR KNOBLOCH, University of California at Berkeley, MEREDITH PLUMLEY, University of Colorado at Boulder — Rotationally constrained convective flows are characterized as buoyantly unstable flows with a primary geostrophic balance (i.e. a pointwise balance between the Coriolis and pressure gradient forces). Such flows are known to occur within planetary and stellar interiors and also within isolated regions of the worlds oceans. Rapidly rotating Rayleigh-Benard convection represents the simplest paradigm for investigations. Recent numerical studies, performed in square domains, have discovered the existence of a strong non-local inverse energy cascade that results in a box filling dipole vortex upon which geostrophic turbulent convection resides. Utilizing the non-hydrostatic quasi-geostrophic equations, the effect of domain aspect ratio on the inverse energy cascade is explored. As the domain aspect ratio becomes anisotropy it is demonstrated that the large-scale states evolve from vortical dipoles to jets. Properties of these jets will be presented and discussed.

Keith Julien
University of Colorado at Boulder

Date submitted: 31 Jul 2017 Electronic form version 1.4