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Generation of a large-scale barotropic circulation in rotating convection[1] ANTONIO RUBIO[2], KEITH JULIEN[3], JEFFREY WEISS[4], University of Colorado, Boulder — We recently reported on the existence of a slow-growing large scale barotropic mode in DNS of rotating Rayleigh-Benard convection using the non-hydrostatic balanced geostrophic equations (NHBGE) (Julien et al 2012). Such large scale modes had been previously observed as an inverse cascade in stable layer quasi-geostophic dynamics or via instability mechanisms of thermal Rossby waves occuring in presence of sloping endwalls (i.e quasi-geostrophic beta-convection). In this talk we report on the early time history of this large scale mode and discuss the generating physical mechanism as a "symmetry-breaking" forcing function of the barotropic vorticity equation. Impacts of the large scale barotropic mode on the smaller scale baroclinic components of the flow are detailed with a specific emphasis on the changing nature of the heat transport as the barotropic mode evolves.

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[2]Department of Applied Mathematics
[3]Department of Applied Mathematics
[4]Department of Atmospheric and Oceanic Sciences

Antonio Rubio
University of Colorado, Boulder

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