

Jupiter's Great Red Spot: compactness condition and stability (*)

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Abstract. Linear Rossby wave dispersion relationships suggest that Jupiter's Great Red Spot (GRS) is a baroclinic structure embedded in a barotropic shearing zonal flow. Quasi-geostrophic (QG) two-layer simulations support the theory, as long as an infinitely deep zonal flow is assumed. However, once a finite depth of the lower layer is assumed, a self-interaction of the baroclinic eddy component produces a barotropic radiating field, so that the GRS-like eddy can no longer remain compact. Compactness is recovered by explicitly introducing a deep dynamics of the interior for the lower layer, instead of the *shallow* QG formulation. An implication of the result is a strong coupling of the GRS to a convectively active interior.

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