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# Turbulence and Rossby waves in a rapidly rotating sphere

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We use a quasigeostrophic (QG) numerical model to study the turbulence in a rotating sphere, with realistic Ekman friction and bulk viscous dissipation. This QG model handles correctly the mass conservation for finite slopes. The destabilization of an axisymmetric Stewartson shear layer induced by differential rotation of a split sphere, produces turbulence with a rather large scale forcing. The turbulent regime exhibits a steep $m^{-5}$ spectrum in the azimuthal (periodic) direction, at scales smaller than the injection scale. These steep spectra have been recently observed on giant planets as well as in numerical simulations in a shallow water model. This spectrum has been predicted by Rhines resulting from a balance between the non linear term and the $\beta$-effect. To understand this "Rossby wave turbulence", we compute the energy transfer accross different scales. We also compare the QG numerical results with some experiments. For some parameter range, we find a strongly anisotropic and inhomogeneous turbulence regime which exhibits a stationary flow. It is dominated by a single large scale vortex located in the shear layer, reminding the Great Red Spot of Jupiter.