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Forced-dissipative shallow water turbulence on the sphere RICHARD SCOTT, Northwest Research Associates, LORENZO POLVANI, Columbia University — Geostrophic turbulence and zonal jet formation is examined in the context of the forced-dissipative shallow water equations in spherical geometry. A number of interesting results are presented and compared with previous work on forced-dissipative barotropic turbulence, in both planar and spherical geometries, and freely-decaying shallow water turbulence: (1) Equilibrium states in the forced-dissipative problem exhibit various sensitivities to forcing and large scale dissipation; in particular, for a given total energy the steadiness of zonal jets depends crucially on the strength of forcing and dissipation. (2) Radiative relaxation, a natural dissipation mechanism for planetary atmospheres, leads to equatorial jets (both retrograde and prograde) which are significantly stronger than jets in midlatitudes. (3) A new regime is obtained at small deformation radius (comparable to that of the Jovian atmosphere) in which zonal jets are confined to low latitudes while the high-latitude flow remains approximately isotropic with anomalous intensity of anticyclonic motion.

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