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Dynamical regimes in rotating Rayleigh-Bénard convection

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We investigate rotating Rayleigh-Bénard convection by means of direct numerical simulations for a wide range of parameter values. Using results from about one hundred simulations covering Ekman numbers $\geq 10^{-6}$, Prandtl number ≥ 1 and Rayleigh numbers $\leq O(10^9)$, we divide the parameter space into distinct dynamical regimes. Characteristic Nusselt-Rayleigh power laws are observed in these regimes, which is shown to be a consequence of rather distinct flow structures. The crossover from rotation-dominated flows to the buoyancy dominated regime is analyzed in detail. We further discuss strongly supercritical low Ekman number convection and investigate the nature of the quasi-geostrophic turbulence occurring in this regime.