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Convection in the Full Sphere: Predicting the Rossby Number of Mean Fluctuating Flows EVAN ANDERS, Northwestern University, BENJAMIN BROWN, University of Colorado, Boulder, JEFFREY OISHI, Bates College, GEOFFREY VASIL, University of Sydney, KEATON BURNS, MIT, DANIEL LECOANET, Northwestern University — We use Dedalus to study numerical simulations of rotating, Boussinesq convection in a full-sphere geometry which fully resolves the singularity at the origin. In order to understand the behavior of convection in the fully-molten cores of young terrestrial planets and the cores of massive stars, it is crucial to understand the behavior of convection in this full-sphere geometry. In this work, we study a large suite of simulations in which the strength of convective driving and planetary rotation (quantified by the Rayleigh and Ekman numbers) vary by many orders of magnitude. We explore the structure and magnitude of mean flows, such as differential rotation, as well as the fluctuations away from these mean flows. We show how to *a priori* predict the importance of rotation (quantified by the Rossby number) on these flows, and we ground these predictions in a fundamental understanding of the forces balances which appear in the simulations.

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