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Equatorially localized convection in a rapidly rotating shallow spherical shell BEN MIQUEL, KEITH JULIEN, NICK FEATHERSTONE, University of Colorado Boulder, PHILIPPE MARTI, ETH Zurich, JIN-HAN XIE, University of California Berkeley, EDGAR KNOBLOCH, University of California, Berkeley — We study the convective flow in a rapidly rotating spherical shell that models planet cores or stellar convective zones. Flows in these astrophysical objects are often in a strongly rotationally constrained regime (low Ekman number) which is out of reach of current analytical, numerical, and experimental studies. Rotationally constrained flows tend to develop anisotropic, vertically invariant Taylor columns. In the case of shallow spherical shells, this anisotropy results in the localization of the convective motion around the equator. We present an asymptotically reduced model that captures the non linear dynamics of equatorially localized convection in a rapidly rotating shallow shell. Such an approach is instrumental in investigating low Ekman number regimes that pertains to planets or moons with a shallow fluid layer (such as Jupiter's moon, Europa). We present predictions for the heat flux as a function of the latitude. In the case of conducting fluids, implications for the dynamo effect are discussed.

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