Abstract Submitted
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Heat transfer analysis in rotating spherical shells[1] ARES CABELLO, RUBEN AVILA, Univ Nacl Autonoma de Mexico — The study of flow patterns within rotating spherical annular geometries with natural convection, is essential to understand the internal dynamics of the planets. We investigate the convective flows and the heat transfer rate in an spherical gap in which a temperature difference between the inner sphere and the outer sphere is present. A self gravity field which varies as a function of $1/r^n$ (where r is the radial position and the integer exponent n has the values 2,3,4,5) is assumed. The Boussinesq fluid equations are solved by using a spectral element method (SEM). To avoid the singularity at the poles, the cubed-sphere algorithm is used to generate the spherical mesh. Heat fluxes at the surface of both spheres are analyzed. We find, for several Ekman and Rayleigh numbers, that there exists a high correlation between the azimuthal motion of both the Busse cells and the zones where the maximum surface heat fluxes occur. The azimuthal position, as a function of time, of the maximum heat flux zones (which are located symmetrically with respect to the equator), allows to speculate on the nature of the phenomena occurring (in geological times) on the surface of the terrestrial planets.

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