Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

On effects of topography in rotating flows FABIAN BURMANN, JEROME NOIR, ANDREW JACKSON, Institute of Geophysics, ETH Zrich —
Both, seismological studies and geodynamic arguments suggest that there is significant topography at the core mantle boundary (CMB). This leads to the question whether the topography of the CMB could influence the flow in the Earth's outer core. As a preliminary experiment, we investigate the effects of bottom topography in the so-called Spin-Up, where motion of a contained fluid is created by a sudden increase of rotation rate. Experiments are performed in a cylindrical container mounted on a rotating table and quantitative results are obtained with particle image velocimetry. Several horizontal length scales of topography (λ) are investigated, ranging from cases where λ is much smaller then the lateral extend of the experiment (R) to cases where λ is a fraction of R. We find that there is an optimal λ that creates maximum dissipation of kinetic energy. Depending on the length scale of the topography, kinetic energy is either dissipated in the boundary layer or in the bulk of the fluid. Two different phases of fluid motion are present: a starting flow in the from of solid rotation (phase I), which is later replaced by meso scale vortices on the length scale of bottom topography (phase II).

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Date submitted: 31 Jul 2017 Electronic form version 1.4