

Abstract Submitted  
for the DFD15 Meeting of  
The American Physical Society

**Rotating Rayleigh-Bénard convection with Ekman pumping**

MEREDITH PLUMLEY, KEITH JULIEN, PHILIPPE MARTI, University of Colorado, Boulder, JONATHAN AURNOU, Department of Earth, Planetary and Space Sciences, University of California, Los Angeles, STEPHAN STELLMACH, Institut für Geophysik, Westfälische Wilhelms Universität Münster, Germany — Rotating Rayleigh-Bénard convection is of interest in many geoscience applications, with examples like deep ocean convection or the magnetic field generation of planets occurring in the regime where convectively driven motions are dominated by the effects of rotation. To better understand the dynamics of these large physical systems, several techniques are used including asymptotic methods, DNS and experiments. While these three methods have seen good agreement in results for stress free boundary conditions, the case of rigid no-slip boundaries presents an interesting difference. Along the no-slip boundaries, Ekman layers form and Ekman pumping occurs. It has been thought that the effect of these boundary layers is negligible for small Ekman number because of how thin they become. However, new DNS of the 3D Boussinesq equations have provided evidence that this is not the case. A new asymptotic model has been developed to include these boundary layers and verify the impact of the Ekman boundaries on the flow. Results from simulations of this new model will be compared with DNS and experimental results. The results support the findings of increased global heat transfer due to the presence of Ekman pumping.

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Date submitted: 31 Jul 2015

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