Abstract Submitted
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The effects of Mach number and rotation on heat transport in stratified convection[1] EVAN H. ANDERS, BENJAMIN P. BROWN, Dept. Astrophysical Planetary Sciences, University of Colorado – Boulder, Boulder, CO 80309, USA, KEATON J. BURNS, Dept. Physics, Massachusetts Institute of Technology, Cambridge, MA 02139, USA, DANIEL LECOANET, Princeton Center for Theoretical Science, Princeton University, Princeton, NJ 08544, USA, GEOFFREY M. VASIL, School of Mathematics Statistics, University of Sydney, NSW 2006, Australia, JEFFREY S. OISHI, Dept. Physics Astronomy, Bates College, Lewiston, ME 04240, USA — We use the Dedalus pseudospectral framework to study fully compressible convection in the context of plane-parallel, polytropically stratified atmospheres. We perform a suite of 2D and 3D simulations in which we vary the initial superadiabaticity and the Rayleigh number (Ra) while fixing the initial density stratification, aspect ratio, and Prandtl number. The evolved value of the Mach number (Ma) is primarily controlled by the superadiabaticity. The evolved heat transport, quantified by the Nusselt number (Nu), follows scaling relationships similar to those found in the well-studied, incompressible Rayleigh-Bénard problem. This scaling holds up in both 2D and 3D and is not appreciably affected by the magnitude of Ma. First results on rotating atmospheres are presented.

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