Abstract Submitted
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The parameter space of windy convection[1] DAVID GOLUSKIN, University of Michigan — In horizontally periodic Rayleigh–Bénard convection at large Rayleigh numbers (Ra), wavenumber-zero horizontal winds can arise spontaneously and dramatically alter the flow. The resulting "windy convection" has been observed in 2D domains and horizontally anisotropic 3D domains. As Ra is raised, the fraction of total kinetic energy contained in the wind approaches 100%. Vertical heat transport is greatly depressed by the wind and grows very slowly (if at all) as Ra is raised. Two different types of windy convection have been observed at different Prandtl numbers (Pr). At smaller Pr, heat is vertically convected almost exclusively during discrete bursts that are separated by long quiescent phases. At larger Pr, convective transport remains significant at all times. Convection can thus be identified as either windy or non-windy, and windy states can be either bursting or non-bursting. The regions of the Ra–Pr parameter plane in which each type of convection can occur remain poorly understood, as do transitions between these regions. This talk will summarize the phenomenon of windy convection in 2D and 3D and present a preliminary exploration of the Ra–Pr plane in the 2D case.

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