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Heat Transport and Local Temperature Measurements of Geostrophic Rotating Thermal Convection ROBERT ECKE, SCOTT BACKHAUS, SRIDHAR BALASUBRAMANIAN, Los Alamos National Laboratory — Rotating Rayleigh-Benard convection is an idealized model of geophysical convective motions where buoyancy and rotation compete. The parameters governing such flows are the Rayleigh number Ra proportional to ΔT across the cell height h, the Taylor number Ta proportional to Ω^2 where Ω is the angular rotation rate, and the Prandtl number Pr. In the turbulent state, experiments have demonstrated that normalized heat transport Nu for the rotating state at small $Ro = \sqrt{Ra/(PrTa)}$ scales in the same manner as the non-rotating heat transport with a small enhancement of heat transport that depends on Ra and Pr. We explore global heat transport and local temperature measured at multiple vertical positions along the cell center line of a square convection cell with aspect ratio $\Gamma = L/h \approx 4$ where L is a lateral side and $h = 12.1$ cm is the cell height. We focus on the Ra range $5 \times 10^6 < Ra < 5 \times 10^8$ for $5 \times 10^8 < Ta < 5 \times 10^{10}$ from onset up to the crossover to turbulent scaling where $Nu \sim Ra^{0.29}$. We report on the scaling of Nu with Ra at constant Ta in that range and infer local convective structure from vertical spatial correlation of temperature fluctuations.

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