Conditional temperature statistics in anisotropic turbulent thermal convection for Rayleigh numbers up to 10^{15}[1] XIAOZHOU HE, DENNIS P.M. VAN GILS, EBERHARD BODENSCHATZ, MPIDS, Goettingen, Germany, GUENTER AHLERS, UC Santa Barbara, USA — We present systematic measurements of conditional diffusion $r(x) = \langle \ddot{X} | X = x \rangle$ and dissipation $q(x) = \langle (\dot{X})^2 | X = x \rangle$ of the normalized temperature fluctuations $X = (T - \bar{T})/\sigma$ in turbulent Rayleigh-Bénard convection (RBC) at several radial positions where the flow is anisotropic. The data cover the Rayleigh-number range $10^{13} \leq Ra \leq 10^{15}$ for a Prandtl number Pr $\simeq 0.80$. The sample was a right-circular cylinder with aspect ratio $\Gamma \equiv D/L = 0.50$ ($D = 1.12$ m is the diameter and $L = 2.24$ m is the height). We suggest analytic forms for the two conditional means and derived a general formula for the temperature probability-density function. Using $q(x)$ and $r(x)$, we calculated the normalized temperature dissipation Q.

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Date submitted: 01 Aug 2013   Electronic form version 1.4