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Saturation Ratio Fluctuations in Rayleigh-Benard Convection: Measurements in the MTU Π-Chamber[1] JESSE ANDERSON, PRASANTH PRABHAKARAN, RAYMOND SHAW, WILL CANTRELL, Michigan Technological University — The saturation ratio is incredibly important for the behavior of atmospheric clouds as it controls the diffusional growth rate of cloud droplets. Turbulent fluctuations in the saturation ratio could induce broadening of the cloud droplet size distribution, leading to precipitation. We report 1Hz measurements of the temperature, water vapor concentration and saturation ratio (ratio of vapor pressure to the saturated vapor pressure) in the Michigan Tech Π-chamber (aspect ratio=2 and Pr=0.7). These experiments were conducted in moist (in the absence of cloud droplets) and cloudy convection. The Π chamber operates as a Rayleigh-Benard convection cell, driven by an unstable temperature and vapor pressure gradient, and is designed to study microphysical cloud processes in a turbulent environment. In moist (cloudy) Rayleigh-Benard convection the fluctuations in water vapor and temperature and their covariance determines the distribution of the saturation ratio. Significant fluctuations were found to be present in both moist and cloudy convection.

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