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Heat flux in moist and cloudy Rayleigh-Bénard convection<sup>1</sup> RAYMOND SHAW, SUBIN THOMAS, PRASANTH PRABHAKARAN, WILL CANTRELL, Michigan Technological University — Heat flux in moist and cloudy Rayleigh-Bénard convection consists of both sensible heat flux (temperature flux) and latent heat flux (water vapor flux and condensation/evaporation growth of cloud droplets). Under cloudy conditions, condensation of water vapor away from the boundaries is a source term for temperature and a sink term for water vapor. Thus, the condensation of water vapor reduces the mean water vapor concentration in the bulk and increases the mean bulk temperature. This in turn enhances the latent heat flux and lowers the sensible heat flux passing through the system. We investigate the effect of condensation rates in a cloudy Rayleigh-Bénard convection system, using an experimentally validated LES model. We propose a modified heat flux that remains conserved under these conditions, and we explore the influence of varying cloud properties such as cloud droplet concentration (modulated via the aerosol properties) and liquid water mixing ratio.

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