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Influence of dissipation on the spatial structure of the atmospheric boundary layer

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Large eddy simulations (LES) parameterize dissipation as a sub-grid scale process. The choice of this parameterization scheme inevitably impacts the modeled turbulent dynamics in the atmospheric boundary layer. A series of idealized LES simulations are conducted using the Weather Research and Forecasting (WRF) model with a 1.5 order Turbulent Kinetic Energy (TKE) closure scheme and prescribed TKE heat flux. Results will focus on the impact of changes in dissipation and the thermodynamic entropy production to assess the Maximum Entropy Production hypothesis. Specifically, we will examine how changes in dissipation and entropy impact (1) the universality of the Kolmogorov scaling coefficient using spectral techniques and (2) spatial pattern of resultant scalar and flux fields using multi-scale information theory metrics. We are particularly interested in the maintenance of surface to atmosphere gradients and the role of wind speed perturbations on the spatial scales of convection as a function of changes in the parameterization of dissipation. These results will inform our ability to use general hypotheses such as Maximum Entropy Production to better simulate sub-grid processes related to land-atmosphere exchange.