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The spectral kinetic energy budget in dry convective turbulence

Over the last few years there have been several attempts to explain the atmospheric kinetic energy spectrum using turbulent inertial subrange ideas. However, several meteorological phenomena have the potential to directly inject kinetic energy, complicating the inertial range picture. In this talk, we consider the effect of surface buoyancy fluxes. High-resolution large eddy simulations of dry convective boundary layers will be presented, and the various terms in the spectral kinetic energy budget will be analyzed. A broad heat flux spectrum develops, causing the energy spectrum to be shallower than it would otherwise be. Only at very high resolutions (grid spacings of 5 m) does an inertial range begin to emerge. This is work with James Sandham (University of Waterloo).