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*Non-cascade effects in atmospheric turbulence*

The kinetic energy spectrum of the atmospheric mesoscale (scales of 10-1000 km) is an approximately -5/3 power law, which is remarkably similar to the spectrum of three-dimension isotropic turbulence. As a result, attempts to explain this spectral range have been based on the notion of a turbulent cascade. Different cascade mechanisms have been proposed, including inertia-gravity waves, stratified turbulence, and surface quasi-geostrophic turbulence. In this talk, I will present numerical simulations of two non-cascade mechanisms that may contribute significantly to the flux of energy through the mesoscale. The first is a highly non-local transfer of energy from large scales to the buoyancy scale due to the instability of strongly stratified shear layers. The second is the direct forcing of the mesoscale by heating from moist convection. Implications for existing theories of the mesoscale spectrum will be discussed.