1035-76-817 **Tapio Schneider*** (tapio@caltech.edu), California Institute of Technology, MC 100-23, 1200 E. California Blvd., Pasadena, CA 91125-2300. *Macroturbulence and the General Circulation of the Atmosphere.*

Large-scale eddies exert a fundamental control on Earth's climate, for example, through their control of the mean surface winds and the pole-to-equator surface temperature gradient. Tropical circulations—often thought to be independent of large-scale eddies—are likewise influenced by them. Understanding how both the tropical and extratropical climate responds to changes in the concentration of greenhouse gases requires an understanding of how atmospheric macroturbulence responds to such changes.

I discuss the nature of atmospheric macroturbulence and scaling laws for its dependence on mean flows. Theory and simulations show that, unlike in homogeneous turbulence, the dominant nonlinear interaction in atmospheric macroturbulence is the interaction between eddies and the mean flow and that nonlinear eddy-eddy interactions are weak. This allows us to derive scaling laws of atmospheric macroturbulence, which exhibit regime transitions that imply qualitatively different responses of climate to perturbations in different regimes. Simulations with a general circulation model illustrate that this may also allow us to use truncated expansions to calculate climate statistics directly, rather than through numerical simulation of atmospheric macroturbulence. (Received September 16, 2007)