1050-00-65 **Paul A O'Gorman*** (pog@mit.edu), Massachusetts Institute of Technology, Cambridge, MA 02139. *Understanding the relative humidity distribution of the atmosphere using a simple model.*

The distribution of water vapor in the atmosphere is crucial for the maintenance of the Earth's climate. The amount of water vapor that the atmosphere can hold at saturation is very sensitive to changes in temperature. The extent to which atmospheric water vapor content responds to changes in temperature depends on whether the relative humidity remains constant. Observations and climate model simulations suggest that relative humidity will remain approximately constant when averaged over very large regions. But climate model simulations of global warming do indicate local changes in relative humidity. We discuss a stochastic model for the relative humidity distribution based on Lagrangian trajectories driven by Ornstein-Uhlenbeck processes. The stochastic model is reduced to a partial differential equation for the mean relative humidity, and is shown to reproduce the major features of the observed relative humidity distribution in the extratropics. Further work is needed to understand how solutions of the stochastic model relate to the relative humidity distributions found in climate model simulations. (Received February 23, 2009)