



## Studies of the General Circulation of the Atmosphere with a Simplified Moist General Circulation Model

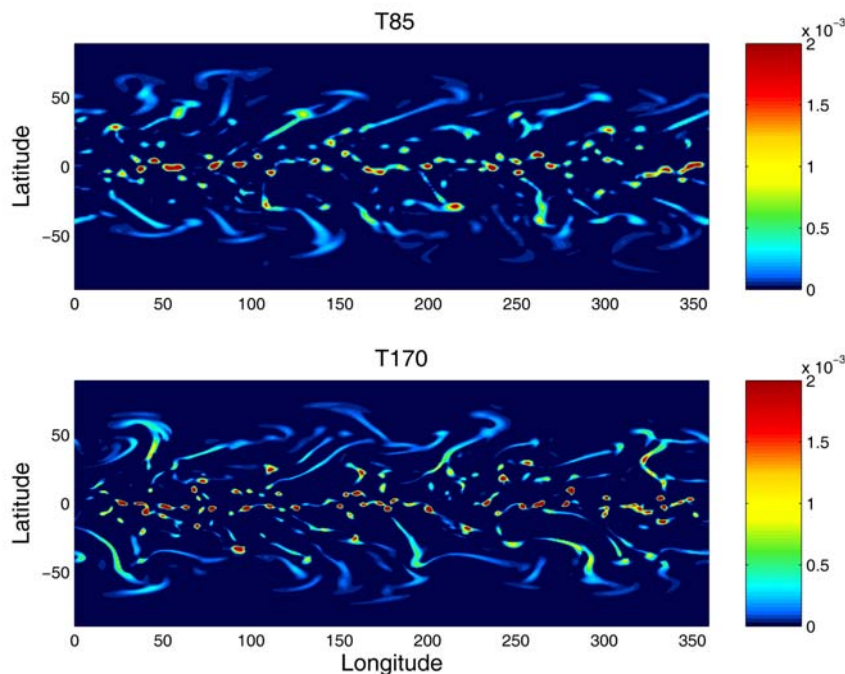
*Ph.D. Advisor:* Isaac Held

*Career Path:* Postdoctoral Fellow, University of Chicago

*Contact Information:* frierson@geosci.uchicago.edu

### Dargan M. Frierson

In my thesis, I develop a new mathematical model to study the effect of water vapor on the Earth's climate. A robust result of global warming forecasts is that the water vapor content of the atmosphere will increase with increased temperatures; in our work we study the dynamical implications of this humidity increase from a theoretical perspective. Our model consists of the equations for fluid motion on a rotating sphere, with simplified parameterizations of physical processes which facilitate clean numerical experiments and allow for ease of interpretation of results. The simplifications include an ocean-covered Earth, no clouds, and a simplified treatment of moist convection. I then studied the effect of increases in water vapor content on the simulated climate: static stability and eddy length scales in midlatitudes, as well as energy and moisture transports in the tropics and midlatitudes. The results I have obtained with this model have implications on what determines the equator-pole temperature gradient and the location and intensity of rainy and dry regions.



Instantaneous precipitation distribution (in  $\text{kg m}^{-2} \text{s}^{-1}$ ) for the control simulation of our model with an 85 wave spectral truncation (top) and a 170 wave spectral truncation (bottom).