

CMG2004: 25th IUGG Conference on Mathematical Geophysics

=====

Samuel Burns  
Poster

Title:  
The Sensivity of a Moist Model of the Hadley Circulation  
to Varying the Surface Latent Heat Flux.

Abstract:  
The goal of this study is to determine the nature of the  
feedback between the surface latent heat flux and the  
strength and width of a moist axisymmetric (Hadley) circulation.

The Quasi-Equilibrium Tropical Circulation Model (QTCM) (Neelin and Zeng, 2000)  
is solved for an aquaplanet domain with a zonally  
symmetric equatorial SST distribution and globally uniform  
insolation. The QTCM calculates moisture explicitly, has a  
Betts-Miller type convection scheme, and projects the vertical  
structure of atmospheric variables on a set of basis functions  
(one each for temperature and moisture, and two for momentum) that  
are designed to optimize the model's representation of  
tropical convection.

The QTCM exploits the idea of statistical  
quasi-equilibrium, in which the factors that influence small scale convection  
are assumed to be in near equilibrium on the timescale of the large scale  
dynamics. This assumption allows the the equations of motion and the complexity  
of the model to be simplified while still producing realistic atmospheric  
circulations.

Two experiments are performed varying the exchange coefficient in the bulk  
formula for the surface latent heat flux, one with a  
fixed SST lower boundary condition and another with a  
slab mixed layer ocean with a parameterized Q-flux.  
In both cases it is shown that the circulation is found to be  
strongly dependent on the exchange coefficient, indicating that  
surface flux feedbacks are important in determining  
the simulated circulation.