Geophysical Research Abstracts
Vol. 16, EGU2014-9792, 2014
EGU General Assembly 2014

Rotating and non-rotating global radiative-convective equilibrium: A testbed for high-resolution AGCMs

Kevin Reed, Brian Medeiros, Julio Bacmeister, and Peter Lauritzen
National Center for Atmospheric Research, Boulder, United States (kareed@ucar.edu)

With increasing computer power comes the capability of routinely running atmospheric general circulation models (AGCMs) at high horizontal resolutions (i.e. grid spacing less than 0.5 degrees). Moving to such resolutions requires understanding, and likely improving, the performance of many components of these AGCMs, such as parameterizations of sub-grid scale physics and the interaction of physics and dynamics. Of particular interest is the role of convective parameterizations at these spatial scales and its impact on tropical dynamics and precipitation processes.

In this work, the National Center for Atmospheric Research's Community Atmosphere Model 5 (CAM5) is configured in radiative-convection equilibrium (RCE) to better understand tropical climate and extremes. The RCE setup consists of an ocean-covered earth with diurnally varying, spatially uniform insolation. Configurations with no rotation effects and spatially uniform rotation effects are investigated; the latter permitting the formation of tropical cyclones. CAM5 is run with the spectral element dynamics package at two horizontal resolutions: a standard resolution of approximately 1 degree grid spacing and a high-resolution of approximately 0.25 degree grid spacing. Surface temperature effects are considered by comparing simulations using fixed, uniform sea surface temperature to simulations using an interactive slab ocean model. The various CAM5 configurations provide useful insights into the simulation of tropical climate at the high-resolution, as well as the model's ability to simulate extreme events such as tropical cyclones. The RCE setup demonstrates to be a unique testbed for model development.