Weekly Seminar: Spring 2011

Speaker: Dr. Amy H. Butler (Climate Prediction Center | NOAA/NCEP)

Title: *"The Atmospheric Circulation Response to Idealized Thermal Forcings in a Simple GCM."*

Date: Friday, March 18, 2011

Time: 11:00 AM

Location: Gilman Hall 50 (Marjorie M. Fisher Hall)

Abstract

Using a simple dry dynamical model, we examine the large-scale atmospheric circulation response to idealized thermal forcings designed to mimic three key aspects of anthropogenic climate change: (1) warming in the tropical troposphere associated with increased latent heating by condensation of water vapor at low-latitudes; (2) cooling in the polar stratosphere associated with polar ozone depletion; and (3) warming at the polar surface associated with the ice/albedo feedback in the Arctic. We find that enhanced warming in the tropical troposphere drives a poleward shift of the extratropical tropospheric storm tracks and a weakened stratospheric Brewer-Dobson circulation. Polar stratospheric cooling enhances the poleward shift of the jets, although the tropospheric response is sensitive to the location of the forcing in the stratosphere. Warming at the polar surface, on the other hand, causes an equatorward shift of the storm track.

Focusing on the tropospheric circulation response to tropical heating, we argue that the response of the mid-latitude jets is driven fundamentally by the effect of the heating on the meridional slope of lower tropospheric isentropic surfaces. The response of the eddy fluxes of heat and potential vorticity are subsequently consistent with a diffusive model of the eddy fluxes.

Bio

Dr. Amy Butler received a Bachelor of Arts in Physics and Astrophysics from the University of Colorado in 2003, T and M.S. and Ph.D. degrees in Atmospheric Sciences from Colorado State University in 2006, and 2009 respectively. Upon graduation, she joined the National Oceanic and Atmospheric Administration (NOAA) Climate Prediction Center, as a research meteorologist. Dr. Butler's research includes studies of large-scale patterns of climate variability and climate change.