Geophysical Research Abstracts, Vol. 9, 01562, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-01562

The impact of latent heat release in extratropical storms on polar climate

A. Solomon

NOAA/ESRL/PSD/CIRES-University of Colorado (amy.solomon@noaa.gov)

Projections of climate change due to increased greenhouse gases predict significant warming of the Polar Regions. These projections also predict an increase in tropospheric water vapor and the frequency of mid-to-high latitude deep convection, potentially providing more energy for the development of extratropical storms. For synoptic-scale eddies, case studies suggest that latent heat release associated with condensation augments rapid surface cyclogenesis and acts as a source of upper-tropospheric enstrophy over the storm track regions.

To what extent is the projected warming of the Polar Regions due to increased dynamical heat transports forced by increased moisture availability in storm tracks?

In this study, we use model output from a range of coupled climate models, as well as, focused AGCM experiments to demonstrate that latent heat release in developing extratropical cyclones causes an increase in poleward heat transport over regions of the North Pacific, North Atlantic by over 30%. The results of this study indicate that the dynamical response to an increase in extratropical moisture needs to be considered in order to understand the mid-to-high latitude climate response to an increase in greenhouse gases.