Geophysical Research Abstracts
Vol. 14, EGU2012-10845, 2012
EGU General Assembly 2012

A model study on the downward propagation of the 11-year solar signal in a warming climate

A. Kubin (1), J. Abalichin (1), B. Ayarzagüena (1), U. Langematz (1), and P. Jöckel (2)

(1) Freie Universität Berlin, Institut für Meteorologie, Berlin, Germany (anne.kubin@met.fu-berlin.de), (2) DLR, Institut für Physik der Atmosphäre, Oberpfaffenhofen

The 11-year solar cycle influence on temperature, zonal wind and geopotential height during the solstice seasons is investigated in a chemistry climate model (CCM) simulation covering the period 1960 to 2100. In particular, the downward transfer of the initial stratospheric signal to the troposphere is studied using multiple linear regression results representative for the 20th century and the second half of the 21st century, respectively. We find a downward propagation of the solar signal in the past which is much weaker in the future. The impact of a changing background climatology and an altered wave-mean flow interaction due to anthropogenic climate change are discussed as possible reasons with the help of composite analyses of strong and weak vortex events in the past and the future period.

The EMAC-FUB (i.e. EMAC CCM with T42L39 resolution and FUBRad parameterization) simulation was forced with prescribed modelled sea surface temperatures and sea ice, projected abundances of greenhouse gases according to the SRES A1B scenario and ozone depleting substances following the adjusted WMO A1 scenario. Spectral solar irradiance data from the solar cycles 20 to 23 were repeated to prescribe solar variability in the future.