Geophysical Research Abstracts, Vol. 9, 01991, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-01991

Changes to Sudden Stratospheric Warmings in Future Climates

A.J. Charlton (1), L.M. Polvani (2), J. Austin (3) and F. Li (3)

(1) University of Reading, UK (a.j.charlton@reading.ac.uk) (2) Columbia University, NY, USA (3) Geophysical Fluid Dynamics Laboratory, NJ, USA

The dynamical coupling between the Stratosphere and Troposphere are strongest during extreme events in the Stratosphere known as Stratospheric Sudden Warmings (SSWs). Our recent work has focussed on establishing a new climatology of these events and developing, dynamically realistic benchmarks for their simultion in GCMs. Here we use these new tools together with a state-of-the-art coupled chemistry climate model to investigate if either the frequency or character of SSWs is predicted to change over the coming century. Our motivation is simple, to understand what role the Stratosphere might play in future Tropospheric climate we must first understand and quantify the future Stratospheric climate.

We investigate two sets of three ensemble member integrations, the first forced with observed SSTs and climate forcings between 1960 and 2000 and the second forced with SSTs from a coupled model run forced with trace gas concetrations based on the SRES A1B scenario of the IPCC and equivalent climate forcings. As far as we are aware this is the longest set of integrations used for a study of this kind. In contrast to previous studies, we find no statistically significant change to the frequency, timing, type or dynamical characteristics of SSWs, despite significant changes to the mean climate of the Stratosphere and the Brewer-Dobson circulation, between the two runs. This null result has important consequences for prediction of the impact of future Stratospheric climate on the Troposphere and also on future concentrations of Ozone in the Northern Hemisphere Stratosphere.