



## Decadal scale stratosphere-troposphere coupling in MPI-ESM and CMCC-CMS

J. Kröger (1), E. Manzini (1), W. A. Müller (1), A. Bellucci (2), C. Cagnazzo (3), and P. G. Fogli (2)

(1) Max Planck Institute for Meteorology, The Ocean in the Earth System, Hamburg, Germany (juergen.kroeger@zmaw.de),  
(2) Centro Euro-Mediterraneo per i Cambiamenti Climatici, Bologna, Italy, (3) Istituto di Scienze dell'Atmosfera e del Clima, CNR, Rome, Italy

A potential role of the stratosphere in decadal prediction was recently proposed by Manzini et al. (2012). Based on composite analyses with the output of a 260 year control run of one particular coupled climate model (CMCC-CMS), Manzini et al. (2012) established a connection -via the troposphere- of long lasting occurrences O[20 yrs] of weak and strong polar vortices in the stratosphere to anomalous surface properties such as temperature or sea level pressure. Furthermore, a lead-lag correlation analysis revealed weak but significant correlation between the polar vortex and the Atlantic MOC when the MOC lags behind the vortex by 3-4 yrs, indicative of a downward atmosphere to ocean coupling.

Here, we extend the investigation of the stratosphere-troposphere coupling by applying correlation analysis instead of composites to recently available, longer time series of CMCC-CMS data. Moreover, we add another suite of experiments to the analysis that is based on the Hamburg Max-Planck-Institute Earth System Model (MPI-ESM). By adding control experiments from both the coarse (MPI-ESM-LR) and the medium (MPI-ESM-MR) resolution Hamburg models that are part of the CMIP5 effort (as is CMCC-CMS), we are able to identify to what extent the proposed decadal connections are robust features among the models and to advance our understanding of limitations in the individual model set-ups.

Manzini E., Cagnazzo C., Fogli P.G., Bellucci A., Müller W. A., (2012). Stratosphere-troposphere coupling at inter-decadal time scales: Implications for the North Atlantic Ocean. *Geophysical Research Letters* 39, DOI:10.1029/2011GL050771.