Session: C36 Poster: Th36A

Stratosphere-troposphere coupling: Low frequency variability

Elisa Manzini[+]; Chiara Cagnazzo; Pier Giuseppe Fogli; Marco Giorgetta; Lorenzo Tomassini
[+] Max-Planck-Institut f_r Meteorologie, Germany
Leading author: elisa.manzini@zmaw.de

The stratospheric flow is known to be characterized by considerable variability of dynamical origin at inter-annual time scales. For instance, dynamical processes are responsible for the occurrence of sudden stratospheric warming events in the extra-tropics and the quasi-biennial oscillation in the equatorial stratosphere. At longer timescales, the 11-yr solar cycle is a major driver of stratospheric variability. However, given the nonlinear nature of the climate system, there is also the possibility of internally (dynamical) driven inter-decadal variability of the stratospheric flow. Here, the status of knowledge of inter-decadal variability in the stratosphere is briefly reviewed. Thereafter, the possibility of inter-decadal stratospheric variability is examined in pre-industrial simulations performed with coupled atmosphere-ocean general circulation models that include a well-resolved stratosphere. These simulations - a few 100-years each - are subject to no external forcing. In addition, the coupling to the ocean lets the troposphere - stratosphere evolution and variability to be consistent with the sea surface temperature evolution and variability, at the resolved time scales. Within this setting, it is found that internal inter-decadal variability of the northern stratospheric flow reaches up to about a third of the total modelled variability. The spatial characteristics of the inter-decadal variations are investigated.