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Stratospheric Sudden Warmings in the ECHAM5/MESSy CCMVal Ref.1 Simulation

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The northern stratosphere in wintertime is characterized by a large interannual variability, particularly the occurrence of large stratospheric warmings. This phenomenon consists of a rapid increase of temperature in the polar stratosphere, which leads to an abrupt weakness of the intensity of the stratospheric polar vortex (cyclonic circulation in polar latitudes) and occasionally even the reversal of the westerly circulation.
In this study, we assess the ability of the chemistry-climate model ECHAM5/MESSy to simulate the northern stratospheric variability in the CCMVal Ref1 simulation of the years 1960 to 2000. An analysis of the stratospheric sudden warmings (SSWs) has been carried out by examining for example the intensity and seasonal distribution. Moreover, possible trends in the wintertime polar stratosphere, such as intensity and lifetime of the polar vortex, have been studied.
Preliminary results show an agreement between the model simulation and the NCEP/NCAR reanalysis. In fact, ECHAM5/MESSy seems to be able to simulate quite accurately SSWs events but with some deficiencies in, for example, the distribution of vortex displacement and splits (bias towards displacement) and the seasonal distribution (too many SSWs in early winter).
On the other hand, the modeled polar vortex tends to have a longer lifetime, being weaker in mid-winter and stronger in March, than in the reanalysis. However, all these tendencies are not statistically significant.