



Large scale circulation in connection with the solar cycle forcing

Petr Pisoft, Aleš Kuchař, and Petr Šácha

Charles University in Prague, Faculty of Mathematics and Physics, Department of Meteorology and Environment Protection, Czech Republic (petr.pisoft@mff.cuni.cz)

The presented study combines linear and nonlinear attribution analysis together with a study of the Brewer-Dobson circulation variations. We compare the dynamical impact (amplification) of the solar signal from the lower mesosphere or upper troposphere towards surface levels. The dynamical impact was examined throughout special focusing on the planetary waves and their role in the coupling between these layers.

Besides the attribution study, an analysis of the large-scale circulation is applied to determine the role of the solar cycle. We analyze the circulation characteristics like the residual velocities together with study of the wave activity (including e.g. the eddy heat or momentum fluxes).

The analysis is applied for the period 1979-2013 on the up-to-date reanalysis data: MERRA, ERA-INTERIM and JRA-55. In comparison with previous generation of reanalyses, it is possible to observe better representation of the stratospheric conditions. This improvement is considered to be connected with increasing the height of upper boundary of model domain. To study the future evolution of detected patterns, the analysis is also applied on selected outputs of the CMIP5 model runs.