



Influence of the 11-years solar cycle on the chemistry of MLT-region

Mykhaylo Grygalashvily, Gerd Sonnemann, and Uwe Berger

Leibniz-Institute of Atmospheric Physics, Optical Soundings and Sounding Rockets, Kühlungsborn, Germany
(gryga@iap-kborn.de)

We investigate the influence of the 11-years solar cycle on the chemistry of the mesosphere/lower thermosphere (MLT) based on the example of the last cycle 1996-2008. We use our global 3D-model LIMA (Leibniz-Institute Middle Atmosphere) designed for the investigation of the MLT-region and particularly the extended mesopause region. LIMA uses real tropospheric and lower stratospheric temperatures and horizontal winds up to 35 km altitude from assimilation of ECMWF/ERA-40 data. The variability of the Lyman-alpha flux was parameterized in the chemical part of the model for O₂, H₂O, CO₂ and CH₄, as well as in dynamical part according to Chabrilat and Kockarts (1997).

Two calculations were carried out and analyzed: a) with realistic variation of Lyman-alpha only in dynamical part of the model when the chemical part is assumed at solar minimum, and b) with realistic variation in both, dynamical and chemical parts. The analysis of these 2 cases and the difference between them shows: 1) how strong is the total impact of the solar variability on the distributions of minor chemical constituents, 2) which part is determined by the dynamics, and 3) which part is appointed to direct influence on the photochemical system of the MLT.