Geophysical Research Abstracts
Vol. 14, EGU2012-9028-1, 2012
EGU General Assembly 2012

Identification of stratospheric intrusion mechanisms over Europe - analysis of GEM-AQ model simulations for 2006

M. Porebska (1), M. Zdunek (1), J. Kaminski (2), J. Struzewska (1), and L. Lobocki (1)

(1) Department of Environmental Engineering, Warsaw University of Technology, Warsaw, Poland, (2) Centre for Research in Earth and Space Science, York University, Toronto, Canada

Stratosphere-troposphere exchange processes influence greatly the composition of the upper troposphere. Filamentary structures containing air originating from the stratosphere can remain in the upper and middle part of troposphere for several days due to relatively weak mixing. Synoptic conditions favourable to stratospheric intrusions occur quite often over the North Atlantic and Europe; however, only a small number of intrusions is detected by routine radiosonde/ozonesonde measurements, rather incidentally.

The reported research aims at supplementing the existing knowledge by a systematic, one-year modelling study. The tool used here is the GEM-AQ, an on-line atmospheric chemistry model coupled with the Global Multiscale Environmental (GEM) model used for operational weather prediction by Environment Canada. In this study, a global variable resolution grid was used, with horizontal resolution over Europe at about $\sim$20 km. The model was integrated on 28 hybrid levels, with the top at 10 hPa.

We will present selected cases of stratospheric intrusion as identified in modelling results. Intrusions are classified into several types, depending on the underlying physical scenario (e.g. tropopause folding near the polar front, cutoff lows, various mesoscale processes). A comparison of model forecasts with measurements and objective analysis, where possible, is presented in order to quantify the predictive model capabilities. Further, an algorithm of intrusion detection based on model results will be presented and several possible options will be compared.