Geophysical Research Abstracts, Vol. 9, 05796, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-05796

Analysis of synoptic and air quality conditions during July 2006 heat wave over Europe

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The trend of the temperature changes over Europe suggests that prolonged periods with high summer temperatures are likely to occur more frequently than in the past. According to the analysis undertaken in the frame of IPCC, in Central Europe eight of the ten warmest years in the period from 1851 to 2004 have been observed from 1989 to 2003. Heat waves, often associated with the strong, blocking high pressure systems, are also favourable for generation of photochemical episodes. Higher temperature and insolation result in enhanced biogenic VOC emission and more intensive photochemical processes which increase ozone formation.

An exceptionally hot weather period began in mid June 2006. It is already confirmed by the weather services that in most European countries, July 2006 was the warmest month since official measurement started. The pressure patterns allowed for an inflow of the hot sub-tropical continental air which caused significant temperature increases even in the north-eastern part of Europe. Ozone pollution was very high, especially during days with extremely high air temperature and low wind speed. Large scale subsidence, weak ventilation and clear sky conditions lead to the accumulation of pollutants near the surface.

In this study we will discuss the synoptic context of the development and strength of the European heat wave and the air pollution in July 2006. The analysis will be undertaken with the state-of-the-art, on-line tropospheric chemistry model GEM-AQ. The model domain will cover the entire European continent with the resolution of 35 km.

The pressure and circulation patterns that governed transport processes will be investi-

gated to establish the origin of air masses influencing the hot weather conditions. The occurrence of high temperature will be linked to hourly and daily maximum ozone concentration. The photochemical pollution over Europe will be analysed with respect to the exceedences of the information threshold (180 ug/m3) and the maximum 8-h running average concentrations higher than 120 ug/m3. The accumulated exposure will be also calculated for AOT40 and SOMO35.