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Formation and transport of photooxidants over Europe during the July 2006 heat wave – observations and GEM-AQ model simulations

J. Struzewska¹ and J. W. Kaminski²¹Faculty of Environmental Engineering, Warsaw University of Technology, Warsaw, Poland²Atmospheric Modelling and Data Assimilation Laboratory, Centre for Research in Earth and Space Science, York University, Toronto, Canada

Abstract. The European heat wave of July 2006 was caused by advection of very hot and dry air from North Africa. Air masses were transported on the western edge of the high pressure system, centred over Eastern Europe, resulting in exceptionally high air temperatures over large areas of the continent. In the first two weeks of July 2006 a severe heat wave affected Central and North-Eastern Europe. We present a synoptic analysis of the July 2006 European heat wave, resulting formation and transport of photooxidants over Europe as simulated by the on-line tropospheric chemistry model GEM-AQ. The model was executed on a global variable grid with ~15 km resolution over the entire European continent. Modelling results have been compared with surface observations and vertical soundings of meteorological and air quality parameters. We find that the calculated error measures, as well as analysis of time series and trends for selected quantities, indicate good model performance over the simulation period. The spatial pattern of two exposure indicators – SOMO35 and AOT40 – showed similarities with the high temperatures distribution. The zone of highest exposure was located over Central Europe along the advection path of the hot African air mass. The exposure to high ozone concentrations in higher latitudes was reduced by the dilution and aging of polluted air masses advected from over Central Europe.

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