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European heatwave 2003: A GEMS-GRG approach with the global CTM MOZART3

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The so-called „European heatwave“ in summer 2003 struck wide parts of Western and Central Europe with record-breaking high temperatures and caused thousands of extra deaths in several European countries. Meteorological conditions during the heatwave were characterised by a stationary high pressure system over the continent with low wind velocities and stagnating air masses. Measurements of Ozone, NOx and other atmospheric pollutants show enhanced values for the heat wave period August 1 to August 14.

In the EU-Project GEMS (Global and regional Earth-System Modelling using Space and in-situ data) the European heatwave 2003 was chosen as a test episode for the evaluation of the GEMS forecasting system. The first offline global CTM calculations (triggered by meteorolgical fields from the ECMWF GEMS reanalysis for 2003) were conducted in the GRG (Global Reactive Gases) subproject and revealed deficiencies in reproducing the observed high concentrations of key species like Ozone, CO, and NOx, while for the periods before and after the heat wave a much better comparison could be achieved. Of course a global CTM is not designed to reflect small-scale weather fluctuations but it should give the right integrated regional concentration levels which are needed as boundary conditions by regional air quality models.

We present comparisons of MOZART-3 results with observations from the Northrhine-Westphalian LUA (Landesumweltamt Essen, Germany) network measuring Ozone and NOx together with meteorological parameters for up to 30 stations and with Central European radiosonde profiles. We will address the effects of introducing more realistic emission variations and of enhancing the frequency of data exchange with the meteorological model in the forthcoming coupled reanalysis and forecast-

ing system. We also assess the impacts of enhanced spatial resolution and present the results from the first MOZART-3 simulation in T106 horizontal resolution (1.125˚ x 1.125˚) spanning three months.