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Further developments and evaluation of the operational ozone forecast model at the ZAMG for Austria

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The operational regional weather forecast model ALADIN of the Central Institute for Meteorology and Geodynamics (ZAMG) is used in combination with the chemical transport model CAMx (www.camx.com) to conduct forecasts of tropospheric ozone over Europe. The operational ozone forecasts have been run since 2005 in cooperation with the University of Natural Resources and Applied Life Sciences in Vienna (BOKU).

The outer model domain expands over large areas of Europe. The model is run with a resolution of 9.7 km for the finest grid covering Austria and parts of neighbouring countries. ALADIN-Austria provides weather forecasts on an hourly basis - 48 hour forecasts are used. Emissions are based on the EMEP 2004 data set as well as on regional inventories for the core domain.

The results of the model forecasts are compared to the observations of about 150 air quality stations in Austria. Evaluations of the last three summers revealed that exceedances of the information threshold can be predicted quite well by the model. The results of the evaluation also show that the model over-predicts the measurements during months with moderate ozone concentrations although the forecasts improved in 2007 because of adapted boundary conditions. In 2007 average monthly mean concentrations were used at the lateral boundaries. These values were obtained by long-term runs performed for the project CECILIA.

During the summer 2005 and 2006 exceedances of the alarm threshold could not be predicted by the model. Concentrations above 240 μg/m^3 occurred in the area of interest for short time periods only, often in the morning when ozone formation should be weaker then in the early afternoon. A detailed investigation of the heat period in July 2006 indicates possible sources of precursors. During the summer 2007 an exceedance of the alarm threshold was predicted the first time by the model.

Additionally to the evaluation of the operational forecasts sensitivity studies with different input parameters were conducted for two months in summer 2007. Model runs with different parameterisation for the vertical diffusion coefficient (Kv) are conducted and experiments with different values of Kvmin in the lower levels show the influence of this parameter on the nocturnal ozone decrease for urban and rural sites. Different model runs with variable boundary conditions at the top of the modelling domain are also performed.