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EVALUATION OF THE HIGH RESOLUTION DEHM/UBM MODEL SYSTEM OVER DENMARK AND ASSESSMENT OF TRENDS IN AIR POLLUTION LEVELS OVER 25 YEARS

Ulas Im, Jesper H. Christensen, Matthias Ketzel, Thomas Ellermann, Camilla Geels, Kaj M. Hansen, Ole Hertel, Ole-Kenneth Nielsen, Marlene S. Plejdrup, Jørgen Brandt

Department of Environmental Science, Aarhus University, Roskilde, Denmark.

ABSTRACT

Integration of observations and air pollution models is a powerful method in the assessment of air quality and associated impacts. However, in order to have reasonable integration, air pollution models should first be evaluated against the available measurements. In this study, we simulate the air pollutant levels over Denmark using the high resolution DEHM/UBM model system for the years 1990 to 2014. The system employs a hemispheric chemistry-transport model, the Danish Eulerian Hemispheric Model (DEHM; Brandt et al., 2012) that runs on a 150 km resolution over the Northern Hemisphere, with nesting capability for higher resolutions over Europe, Northern Europe and Denmark on 50 km, 16.7 km and 5.6 km resolutions, respectively. Here DEHM is coupled to the Urban Background Model (UBM; Berkowicz, 2000; Brandt et al., 2001; 2003) that covers the whole of Denmark with a 1 km x 1 km spatial resolution. Over Denmark, the system uses data from the SPREAD emission model (Plejdrup and Gyldenkœrne, 2011) that distributes the Danish emissions for all pollutants and all sectors in the national emission database on a 1 km x 1 km resolution grid covering Denmark and its national sea territory. The study will describe the model system and will evaluate the performance of the model system in simulating hourly, daily and monthly mean ozone (O3), carbon monoxide (CO), nitrogen dioxide (NO2) and particulate matter (PM10 and PM2.5) concentrations against surface measurements from eight monitoring stations. We will then investigate the spatial and temporal variability of air pollutants and emissions in order to better understand the observed air pollution trends over Denmark during this 25-year period.

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