Air Quality Modelling on Urban Scale over Munich

E. Khorsandi [1], F. Baier [2], T. Erbertseder [2], and M. Bittner [1,2]

1 Augsburg University, Institute for Physics, Augsburg, Germany, E-mail: ehsan.khorsandi@physik.uni-augsburg.de
2 German Aerospace Center (DLR), German Remote Sensing Data Center (DFD), Oberpfaffenhofen, Germany

Chemical-transport models are a persuasive tool to predict and study air pollution on different temporal and spatial scales. However, due to the complexity of physics and chemistry of air pollutants' interactions and lack of precise input data, these models have uncertainties. In particular, most of the emission data have a too coarse resolution and are not appropriate for application in urban scale air quality modelling. In this study, a downscaling approach is utilized for emission data in order to improve the air pollutants concentration simulation over Munich city using the POLYPHEMUS/DLR chemistry-transport model (CTM). Traffic emission from the Bavarian Emission Kataster (EKATBY) 2004 anthropogenic emissions dataset with 2 km resolution is downscaled to 100 m with regard to the high-resolution OpenStreetMap roads paths and areal emission sources are relocated on the most populated and active sites which have been determined from VIIRS NOAA satellite-derived night light data. In addition, the position and level of emissions from the source points are corrected in anthropogenic emission maps, and the EEA CORINE 2012 land use data is implemented with 100 m grid resolution to improve e.g. the biogenic emissions. The CTM is driven by WRF 3.5 meteorological forecasts. In order to have reliable simulations, the one-way grid nesting method with four domains is employed, where the coarsest domain covers Europe and the finest covers Munich city area.

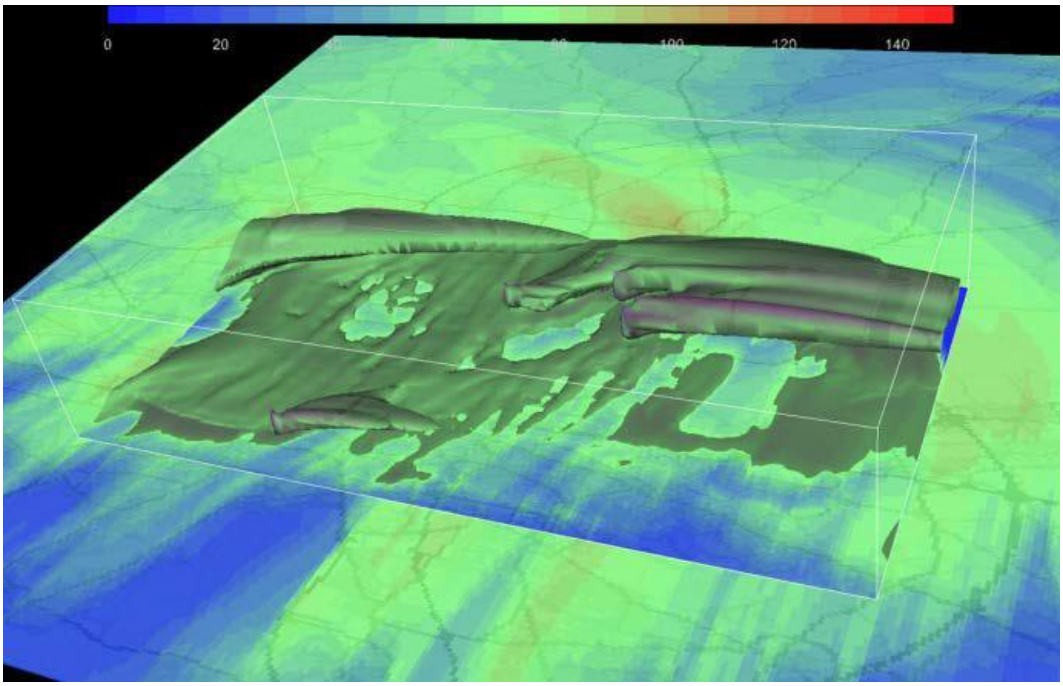

Fig. 1: Simulated NO2 concentration over Munich for the evening second of Feb. 2015