



Application of the Online Coupled Large-Eddy Simulation Model with Chemistry PALM-4U

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The micro scale model with atmospheric chemistry PALM-4U is applied to an area of Berlin around the Ernst-Reuter-Platz. PALM-4U is based on the Parallelized Large-Eddy Simulation Model (PALM; Maronga et al, 2015, *Geosci. Model Dev.*, 8, doi:10.5194/gmd-8-2515-2015), which has been extended by a gas phase chemistry module within the joint project MOSAIK (Modellbasierte Stadtplanung und Anwendung im Klimawandel/Model-based city planning and application in climate change, <https://palm.muk.uni-hannover.de/mosaik>). In order to obtain the necessary flexibility in the choice of the chemistry mechanisms the gas-phase chemistry was implemented using the Kinetic PreProcessor KPP. Currently a sample of about ten mechanisms is available as well as the sectional aerosol module SALSA (<https://palm.muk.uni-hannover.de/trac/wiki/doc/app/salsa>). The approach is to go beyond the simulation of single street canyons to chemical transformation, advection and deposition of air pollutants in the larger urban canopy. The simulation results illustrate the impact of resolved turbulent motions within street canyons and short term fluctuations on pollutant concentrations. The performance of different chemistry mechanisms and the impact of lateral boundary conditions from a regional scale model are tested and discussed.