Abstract

In this study, two days were selected to simulate biogenic emissions from a forest. A model system is used, which is adapted to the microscale. It consists of the microscale transport and stream model MITRAS and the microscale chemistry transport model MICTM. First of all, both models were adjusted to handle vegetation. MITRAS was extended by a parameterisation of a forest stand, while MICTM was upgraded with an algorithm for biogenic emissions. Data from the AFO2000-project ECHO ("emission and chemical transformation of biogenic volatile organic compounds") is taken as a basis to compare the model simulations with measurements. Two field campaigns were carried out in ECHO in a forest on the area of the Research Centre Jülich. The data obtained from different towers in different heights provide a good basis for the comparison with the model output. Meteorological data, i.e. temperature and wind, were well simulated with MITRAS, the boundary conditions at the inflow were taken partly from measurements. A modified Guenther-algorithm was used in MICTM to calculate diurnal cycles of isoprene corresponding to the meteorological parameters which were determined with MITRAS. If realistic isoprene concentrations at the inflow boundary were provided, the emissions of isoprene could be simulated by the model system in the right magnitude. They were underestimated by a factor of 3, if the concentrations were unknown and therefore assumed too low. Besides isoprene, OH could be simulated properly. With appropriate inflow conditions, NO, NO_2 and O_3 were also well simulated. These species were strictly dependent from the boundary conditions. The model area was too small for the model system to predict them self-dependant and in the correct magnitude. The simulation of SF_6 as a tracer is associated with great uncertanties, because the gradient of the concentrations was very high and the location where SF_6 was measured could be defined within an uncertainty of $25\,\mathrm{m}$ which is equivalent to a radius of 5 grid boxes.