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Effects of various meteorological conditions and spatial emissionresolutions on the ozone concentration and ROG/NO_x limitationin the Milan area (I)

N. Baertsch-Ritter, J. Keller, J. Dommen, and A. S. H. Prevot
Paul Scherrer Institute, Laboratory of Atmospheric Chemistry, CH-5232 Villigen PSI, Switzerland

Abstract. The three-dimensional photochemical model UAM-V is used to investigate the effects of various meteorological conditions and of the coarseness of emission inventories on the ozone concentration and ROG/NO_x limitation of the ozone production in the Po Basin in the northern part of Italy. As a base case, the high ozone episode with up to 200ppb on 13 May 1998 was modelled and previously thoroughly evaluated with measurements gained during a large field experiment. Systematic variations in meteorology are applied to mixing height, air temperature, specific humidity and wind speed. Three coarser emission inventories are obtained by resampling from 3x3km^2 up to 54x54km^2 emission grids. The model results show that changes in meteorological input files strongly influence ozone in this area. For instance, temperature changes peak ozone by 10.1ppb/°C and the ozone concentrations in Milan by 2.8ppb/°C. The net ozone formation in northern Italy is more strongly temperature than humidity dependent, while the humidity is very important for the ROG/NO_x limitation of the ozone production. For all meteorological changes (e.g. doubling the mixing height), the modelled peak ozone remains ROG limited. A strong change towards NO_x sensitivity in the ROG limited areas is only found if much coarser emission inventories were applied. Increasing ROG limited areas with increasing wind speed are found, because the ROG limited ozone chemistry induced by point sources is spread over a larger area. Simulations without point sources tend to increase the NO_x limited areas.

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