



Nighttime Oxidation in the high NO_x regime: indications from a few Chinese field studies

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The nitrate radical, NO_3 , serves as an important oxidant in nighttime chemistry, especially in the high NO_x regime. Nocturnal NO_3 oxidation affects the regional air quality through its roles in regulating the reactive nitrogen budget and photochemical ozone production. Four campaigns were conducted in Beijing with dinitrogen pentoxide (N_2O_5) measurement by a newly developed cavity enhanced absorption spectroscopy. The four datasets were collected from a winter rural (Huairou, HR), a summer rural (Changping, CP), a summer urban (Peking University, PKU1) and a winter urban site (PKU2). Based on the thermal equilibrium between NO_3 and N_2O_5 , we calculated the concentration of NO_3 in the four campaigns. The full-scale data, covered two seasons and two types of environment, allow us to analysis the seasonal and spatial variations of mixing ratio, production, destruction of NO_3 , as well as the role of NO_3 in nighttime oxidation. We found the spatial variations of NO_3 concentration were not significant compared with these in seasonal scale. The production of NO_3 in summer is much high than those in winter, as well as the NO_3 concentration. We highlight that NO_3 oxidation of VOCs dominates the nocturnal atmospheric oxidation with significant organic nitrate formation in summertime in the high NO_x regime. Additionally, the contribution of N_2O_5 uptake to the soluble nitrate formation and NO_x removal will be presented.