

Measurements of total hydroxyl radical reactivity during the UCAS winter campaign 2016 at Huairou (northeast Beijing)

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The total OH reactivity is the total OH loss rate coefficient that can be calculated from the sum of the concentration of all OH reactive species weighted by their rate coefficient with OH. The total loss rate is an important parameter as it allows the investigation of the budget of the atmosphere's primary oxidant (OH), placing a constraint on the OH production processes. Typically, calculations of this parameter are challenging in ambient air due to the lack of measurements for all the OH reactive species and, therefore, direct measurements of the total OH reactivity are desirable. Many studies have shown a discrepancy between the measured and the calculated OH reactivity indicating our understanding of both OH chemistry and volatile organic compound composition is not complete. Measurements of the total OH reactivity were performed with a laser photolysis – laser induced fluorescence (LP-LIF) technique during the winter season, from January to March 2016, in the densely populated North China Plain. The site was located northeast of Beijing (Huairou) and was impacted by the alternation of relatively clean air coming from the mountains and highly polluted air characterized by high particle concentration transported over populated areas in the North China Plain. This allowed the investigation of the OH reactivity budget in chemically distinct conditions. Total OH reactivity was on average 18 s⁻¹ in polluted wind sectors with a contribution from nitric oxide and dioxide (NO_x) and carbon monoxide (CO) of more than 60%. In contrast, the cleaner sectors showed an average value of 6 s⁻¹ with a larger fraction of unexplained OH reactivity. The comparison between the measured and the calculated (from a large number of ancillary measurements) OH reactivity together with the particle concentration in different chemical regimes will be presented.