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Impact of NO_x in SOA and organonitrates production

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The concentration of nitrogen oxides (NO_x) and their reservoir species, the organonitrates (ON), impacts on the secondary organic aerosol (SOA) production. To estimate the effect of different NO_x levels on SOA, we carried out a series of laboratory experiments at the Harvard Environmental Chamber (HEC) investigating the production and partitioning of total organonitrates from α -pinene photo-oxidation in a NO_x range varying between 1 ppb and 24 ppb. We measured not only the aerosol mass concentration by using a Scanning Mobility Particle Sizer (SMPS) and composition by an on-line aerosol mass spectrometry (AMS), but also the gas phase and particle-phase organonitrates (gON and pON, respectively) by a thermal dissociation laser-induced fluorescence (TDLIF). In our experimental conditions, we found the presence of crossover point of 6 ppb of NO_x between clean and polluted conditions that affect the SOA production: in fact, the SOA yield for 1 to 6 ppb NO_x increased, and for >6 ppb NO_x steadily dropped. The ON partitioning ratio (pON/(pON+gON)) has been estimated, identifying that also this ratio is strongly affected by the NO_x concentrations; in fact, it decreased from 0.27 to 0.13 as the NO_x increased from <1 to 24 ppb.