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# Gaseous products and secondary organic aerosol formation during long term oxidation of isoprene and methacrolein

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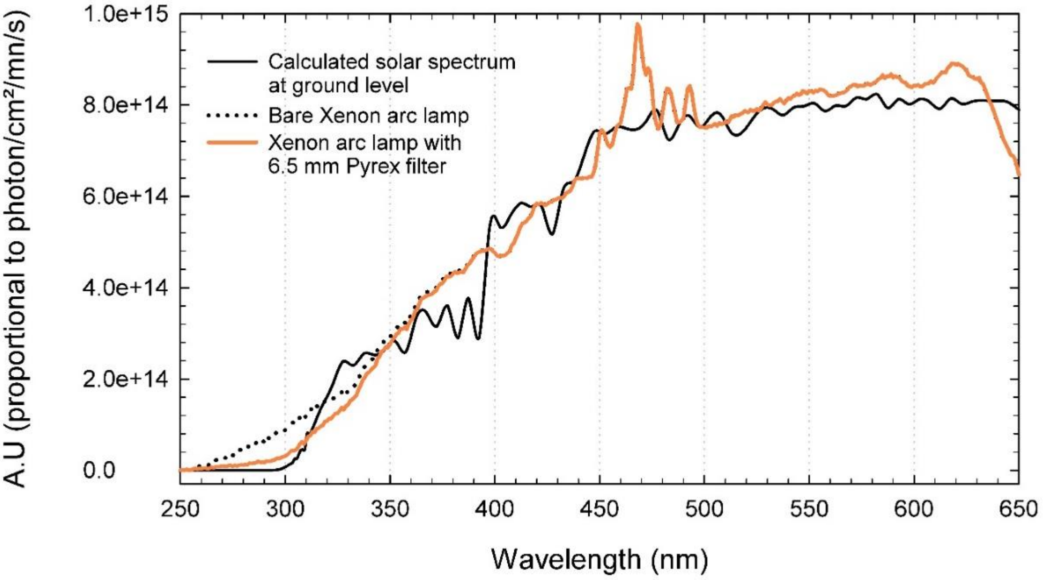

**Figure S1** Solar irradiation spectrum (solid black curve) calculated from TUV NCAR, 12 h, Equator, 21 June compared to irradiation spectra of xenon arc lamp without filter (doted black curve) and with a 6.5 mm thicknesses Pyrex® filter (orange curve). The lamps spectra are scaled to the solar spectrum to facilitate comparison of their shapes.

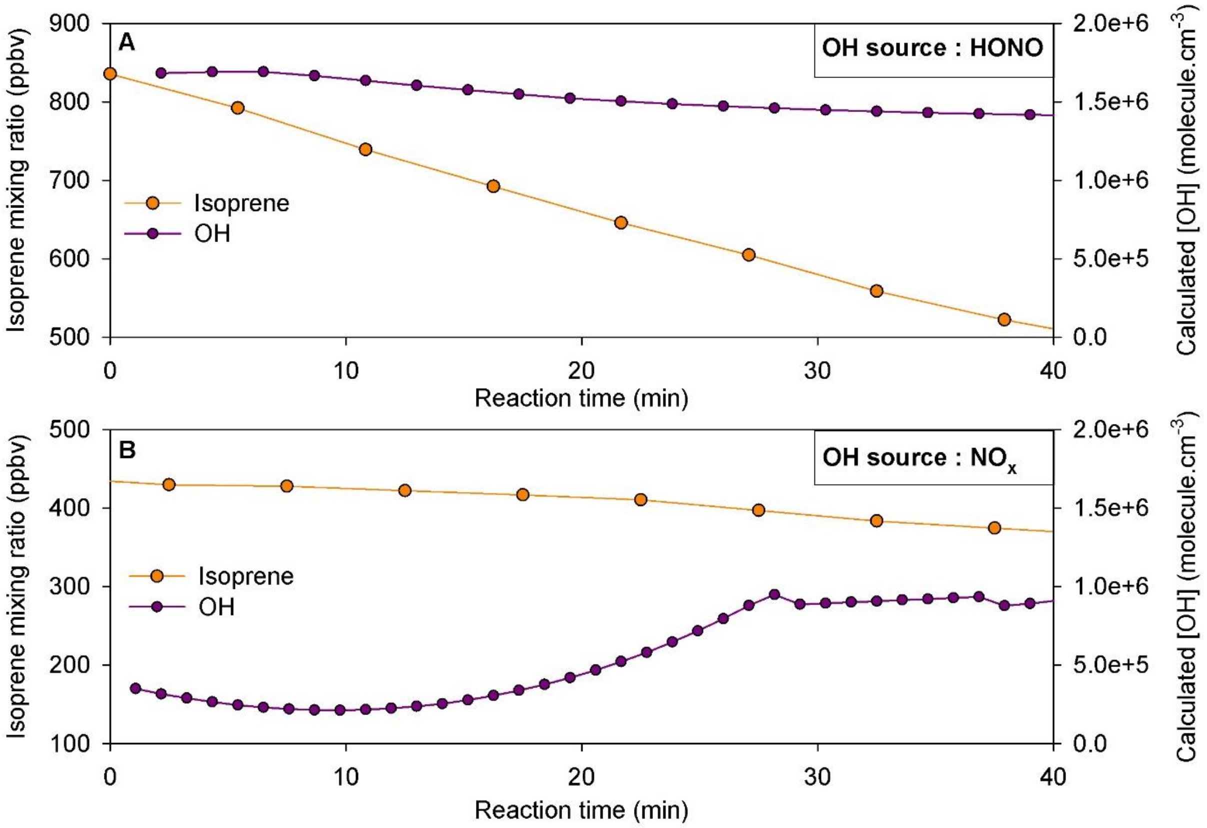

**Figure S2** Time profiles of isoprene mixing ratios and calculated OH concentrations during isoprene photooxidation experiments performed after manual cleaning with (A) HONO (I280113) and (B) NO$_x$ (I210512) as OH source.

**Continuous flow of NO:**

In our experiments, the aim of the continuous flow of NO was to maintain an OH level in the chamber of the same order of magnitude as the one in the atmosphere during the entire experiment length. That is to say to keep sufficient $RO_2$ + NO and $HO_2$ + NO propagating steps while minimizing $RO_2$ + $HO_2$, OH + $NO_2$ and RO + $NO_2$ terminating reactions. Experiments performed without this continuous NO flow showed a fast decrease of OH concentrations due to a fast consumption of NO in the first hours of the experiment. The oxidation level thus became insufficient to lead to SOA formation. Another NOx injection in the system allowing the increase of OH concentration level was thus necessary to observe SOA formation in the chamber as it can be seen in Figure S3.

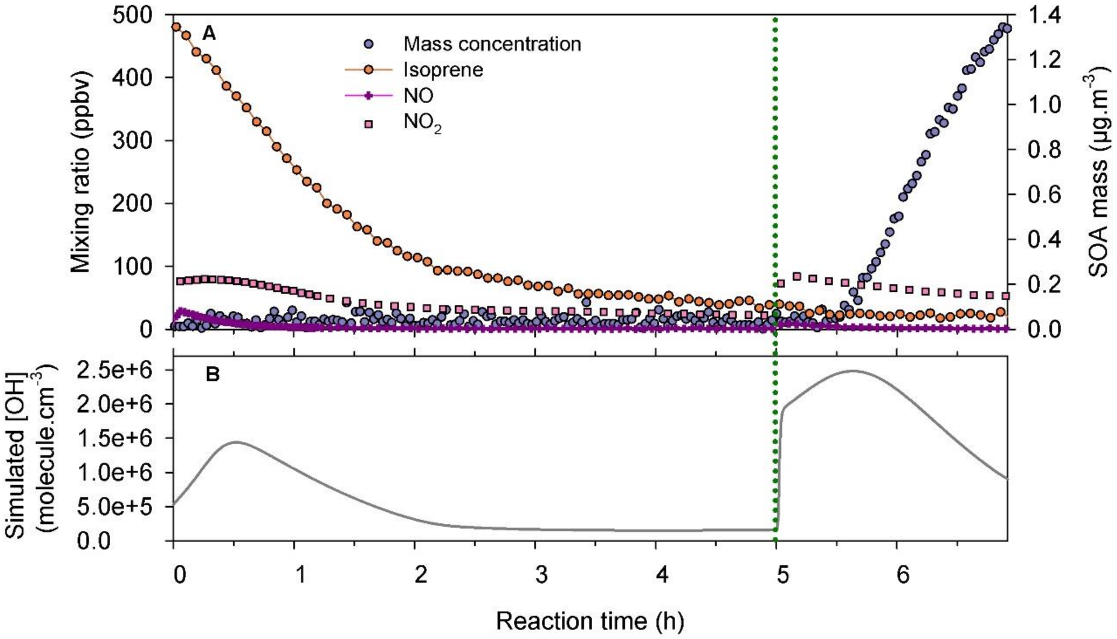

**Figure S3** Time profiles of (A) isoprene, NOx, SOA mass and (B) simulated OH concentrations (determined using MCM V3.1 (Jenkin et al., 1997; Saunders et al., 2003)) during an isoprene photooxidation experiment without NO continuous flow. The green dotted line indicates the time of the second $NO_x$ injection.

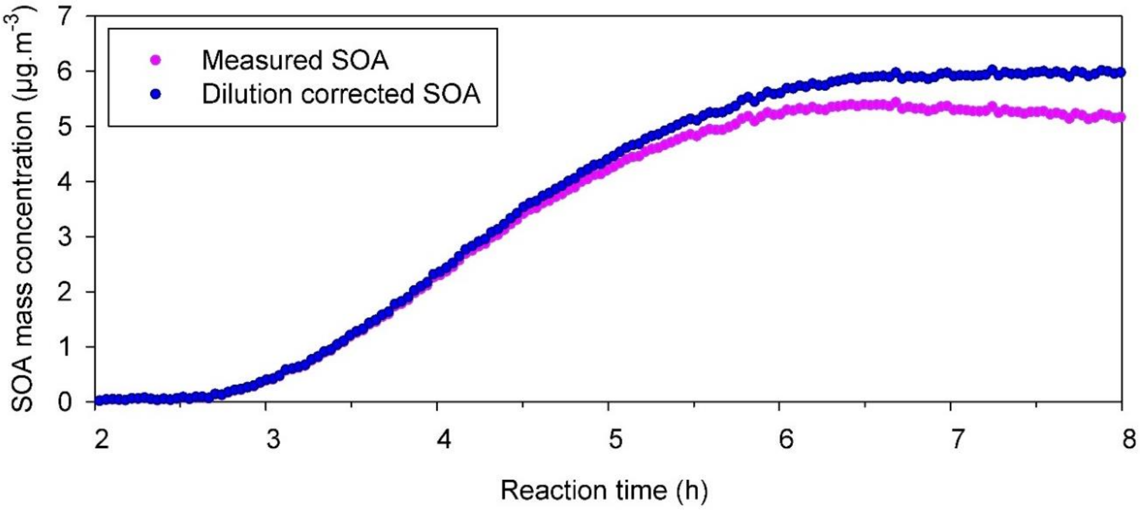

**Figure S4** Time profiles of SOA mass concentration during an isoprene experiment (I150211; table 1) showing the stability of aerosol mass concentration in the chamber when dilution correction is applied (blue curve) : particles wall losses were thus not significant in our experiments.

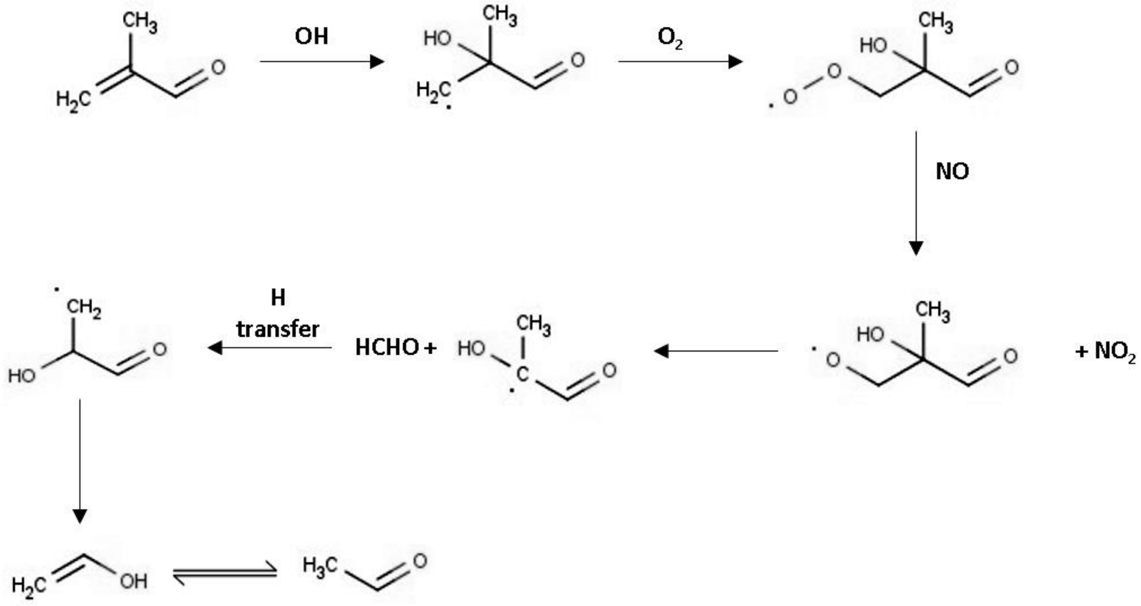

**Figure S5** Suggested primary acetaldehyde formation from MACR which implies an H transfer in gaseous phase.

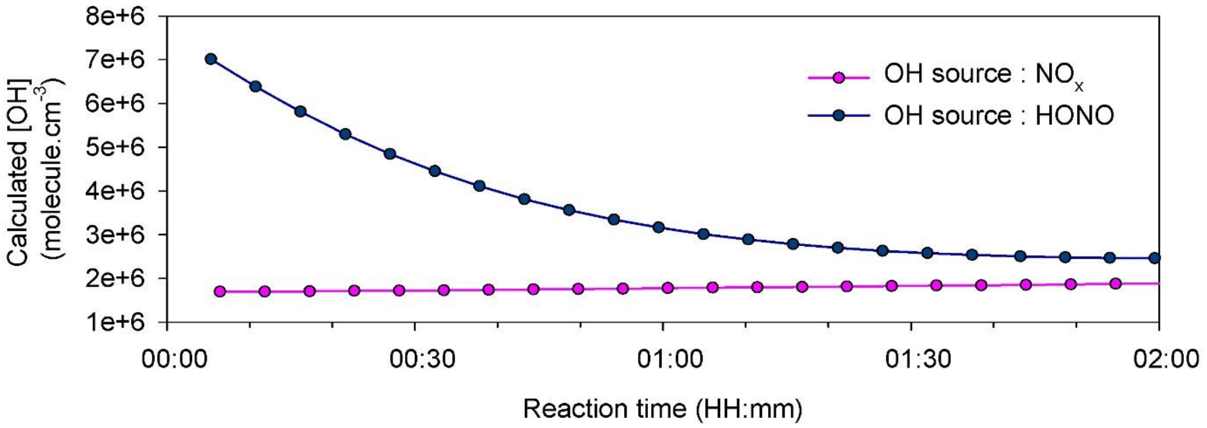

**Figure S6** Time profiles of calculated OH concentrations during MACR photooxidation experiments performed with HONO (blue curve; M230113) and $NO_x$ (pink curve; M240512) as OH source.

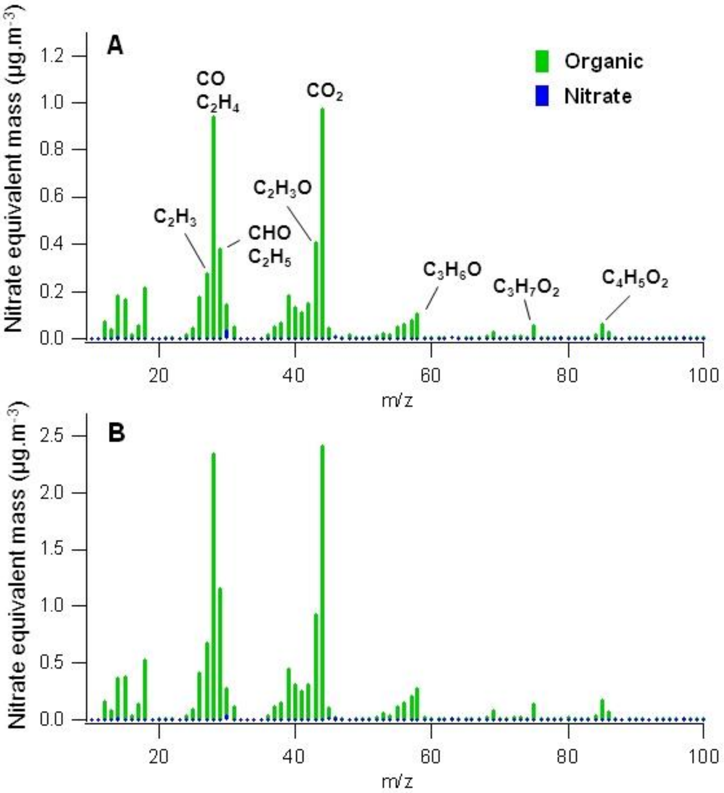

**Figure S7** High-resolution mass spectra of SOA from (A) isoprene (I110411) and (B) MACR (M120411) photooxidation in the presence of $NO_x$. Spectra were taken at the maximum of SOA growth. The contribution of $CO^+$ to the total signal was estimated from the $CO_2^+$ organic signal ($CO_2^+ = CO^+$) like it was proposed by Chhabra et al. (2010) for isoprene experiments.

## References

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