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HO_x recycling *via* HO_2 + isoprene-derived RO_2: *Direct* experimental evidence

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Recent results from field, lab and theoretical work suggest that the atmospheric oxidation of isoprene and other important NHMCs is still inadequately represented in atmospheric models. In low NO_x conditions organic peroxy radicals (RO_2) – the key intermediates in these processes – react mainly with HO_2. Depending on the substitution pattern of the RO_2 these reactions either terminate or propagate radical chemistry. The propagating reaction channels recycle HO_x by direct production of OH and thus contribute to the maintenance of the atmosphere's oxidative capacity.

In this work for the first time OH yields for reactions of HO_2 with RO_2 formed during isoprene oxidation were measured directly. We deployed a laser-based experiment with multidiagnostic spectroscopic tools including direct detection of OH, HO_2 and RO_2 as well as on-line determination of precursor concentrations. Branching ratios were derived by numerical simulations of the photochemical systems. For the reactions of HO_2 with $CH_3C(O)O_2$ and $HOCH_2C(O)O_2$ substantial OH yields were determined.