



Total OH reactivity emissions from Norway spruce

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Forest emissions represent a strong potential sink for the main tropospheric oxidant, the hydroxyl radical (OH). In forested environments, the comparison of the directly determined overall sink of OH radicals, the total OH reactivity, and the individually measured OH sink compounds often exposes a significant gap. This "missing" OH reactivity can be high and influenced by both direct biogenic emissions and secondary photo-oxidation products.

To investigate the source of the missing OH sinks in forests, total OH reactivity emission rates were determined for the first time from a Norway spruce (*Picea abies*) throughout spring, summer and autumn 2011. The total OH reactivity was measured inside a branch enclosure using the Comparative Reactivity Method (CRM) with a Proton Transfer Reaction-Mass Spectrometer (PTR-MS) as the detector. In parallel, separate volatile organic compounds (VOC) emission rates were monitored by a second PTR-MS, including the signal of isoprene, acetaldehyde, total monoterpenes and total sesquiterpenes.

The comparison of known and PTR-MS detected OH sink compounds and the directly measured total OH reactivity emitted from Norway spruce revealed unmeasured and possibly unknown primary biogenic emissions. These were found to be highest in late summer during daytime coincident with highest temperatures and ozone levels.