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Biogenic VOCs including monoterpenes and functionalized aromatic compounds within mid-troposphere boreal biomass burning plumes

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Boreal forest fires are a significant source of chemicals to the atmosphere including numerous VOCs (volatile organic compounds) such as monoterpenes and aromatics compounds. These compounds can have a significant effect on the formation of ozone in the atmosphere and some are implicated in the generation of secondary oxidation products, which can lead to the formation of secondary organic aerosols.

Observations made during the BORTAS (Quantifying the impact of Boreal forest fires on Tropospheric oxidants using Aircraft and Satellite) campaign are presented. Data was collected onboard the UK Research Aircraft using a fast response in situ GCMS; this campaign was the first time this instrument was deployed in the field.

Enhanced mixing ratios of aliphatic hydrocarbons, isoprene and monoterpenes were observed in both fresh and aged biomass burning plumes, in addition to a range of aromatic compounds such as naphthalene, benzaldehyde and acetophenone. Secondary oxidation products were also observed including methacrolein and methyl vinyl ketone. Emission ratios of organic compounds to carbon monoxide concentrations were calculated and where possible compared to literature. For most simple hydrocarbon emission ratios a very good agreement with previous measurements were observed.