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## Emission of trace gases and organic components in smoke particles from a wildfire in a mixed-evergreen forest in Portugal.

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### **Abstract**

On May 2009, both the gas and particulate fractions of smoke from a wildfire in Sever do Vouga, central Portugal, were sampled. Total hydrocarbons and carbon oxides (CO(2) and CO) were measured using automatic analysers with flame ionisation and non-dispersive infrared detectors, respectively. Fine (PM(2.5)) and coarse (PM(2.5-10)) particles from the smoke plume were analysed by a thermal-optical transmission technique to determine the elemental and organic carbon (EC and OC) content. Subsequently, the particle samples were solvent extracted and fractionated by vacuum flash chromatography into different classes of organic compounds. The detailed organic speciation was performed by gas chromatography-mass spectrometry. The CO, CO(2) and total hydrocarbon **emission** factors (g kg(-1) dry fuel) were  $170 \pm 83$ ,  $1485 \pm 147$ , and  $9.8 \pm 0.90$ , respectively. It was observed that the particulate matter and OC emissions are significantly enhanced under smouldering fire conditions. The aerosol emissions were dominated by fine particles whose mass was mainly composed of organic constituents, such as degradation products from biopolymers (e.g. levoglucosan from cellulose, methoxyphenols from lignin). The compound classes also included homologous series (n-alkanes, n-alkenes, n-alkanoic acids and n-alkanols), monosaccharide derivatives from cellulose, steroid and terpenoid biomarkers, and polycyclic aromatic hydrocarbons (PAHs). The most abundant PAH was retene. Even carbon number homologs of monoglycerides were identified for the first time as biomarkers in biomass burning aerosols.

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