ABSTRACT

In order to develop emission inventories and profiles, the chemical composition of biomass burning smoke particles were measured during a combustion chamber experiment. Comparing the chemical properties of smoke particles from different types of biomass and combustion conditions can help us to understand more about the impact of combustion derived fires in Russia. Therefore, smoke particles were characterized in terms of organic and inorganic components, including inorganic ions (measured by ion chromatography, IC), water-soluble organic species such as levoglucosan, mannosan and galactosan (quantified by high performance anion exchange chromatography, HPAEC), and total carbonaceous species (determined by thermo optical analysis). Selected organic molecular tracers, including dehydroabetic acid and syringic acid were measured by gas chromatography coupled with mass spectrometry (GC-MS) in order to identify unique patterns in their abundance as a function of different source emissions. Specifically, the chemical fingerprint of the smoke particles was evaluated as a function of fuel type (wood versus leaves and needles), combustion phase (smoldering versus flaming), particle size (fine versus coarse), and the degree of processing of the smoke emissions (fresh versus aged).

In this study, we also investigated the aerosol emissions from Siberian wildfires during summer time (the end of July to the middle of August) in 2012 and 2013. Analysis of organic carbon, element carbon, ions and anhydrosugars have also been performed for the ambient samples.