



Molecular composition of sugars in atmospheric particulate matter from interior Alaska

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Sugars can account for 0.5-8% of carbon in atmospheric particulate matter, affecting the earth climate, air quality and public health. Total of 33 total suspended particle (TSP) samples were collected from Fairbanks, Alaska in June 2008 to June 2009 using a low volume air sampler. Here, we report the molecular characteristics of anhydro-sugars (levoglucosan, galactosan and mannosan), primary saccharides (xylose, fructose, glucose, sucrose and trehalose) and sugar alcohols (erythritol, arabitol, mannitol and inositol). The average contribution of sugars to the organic carbon (OC) was also determined to be 0.92%. Sugar compounds were measured using solvent extraction/TMS-derivatization technique followed by gas chromatography-mass spectrometry (GC-MS) determination. The concentrations of total quantified sugar compounds ranged from 2.3 to 453 ng m⁻³ (average 145 ng m⁻³). The highest concentration was recorded for levoglucosan in summer, with a maximum concentration of 790 ng m⁻³ (average 108 ng m⁻³). Levoglucosan, which is specifically formed by a pyrolysis of cellulose, has been used as an excellent tracer of biomass burning. The highest level of levoglucosan indicates a significant contribution of biomass burning in ambient aerosols. Galactosan (average 20 ng m⁻³) and mannosan (average 27 ng m⁻³), which are also formed through the pyrolysis of cellulose/hemicelluloses, were identified in all samples. The average concentrations of arabitol, mannitol, glucose and sucrose were also found 14.7, 14.6, 14.1 and 16.8 ng m⁻³, respectively. They have been proposed as tracers for resuspension of surface soil and unpaved road dust, which contain biological materials including fungi and bacteria. These results suggest that there is some impact of bioaerosols on climate over Interior Alaska. We will also measure water-soluble organic carbon (WSOC) and inorganic ions for all samples.