



Seasonal to daily patterns of VOC concentrations in boreal forest, over a year of continuous measurements

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Ambient concentration levels of VOC and their diurnal behaviour vary annually and seasonally. Season affects VOC sources and sinks, e.g. level of biogenic activity and photochemistry, and thus seasonal variation is larger than year to year variation. In order to understand VOC concentrations and to describe them correctly e.g. for atmospheric models, long measurement time series with sufficient time resolution are needed.

We have conducted on-line measurements of atmospheric VOC concentrations and emissions in the European boreal region by a proton transfer reaction - mass spectrometer (PTR-MS) from spring 2006 to fall 2007 at SMEAR II station in Hyytiälä, south-western Finland. Ambient air concentrations were measured inside and above canopy, during every second or third hour. The PTR-MS was calibrated weekly or every second week using a VOC standard mixture and VOC-free air produced from ambient air with a zero-air generator. The background signal of VOCs was measured every second hour from the zero-air and subtracted from the measured concentration.

Daily average concentrations of methanol (protonated atomic mass, M33), acetone (M59) and monoterpenes (M81 and M137) were higher during summer and lower during winter. Benzene (M79), on the other hand, exhibited higher concentrations during winter. The seasonal differences are explained by different sources and slower removal by photochemistry during winter. Methanol, acetone and monoterpenes have biogenic

sources and are emitted by the forest, while benzene is from various anthropogenic combustion processes.

We will present seasonal and daily behaviour for measured masses of calibrated compounds: methanol, acetonitrile, acetaldehyde, acetone, isoprene, MACR and MVK, MEK, benzene, monoterpenes, toluene, hexanal and cis-3-hexenol.