Geophysical Research Abstracts, Vol. 7, 02300, 2005
SRef-ID: 1607-7962/gra/EGU05-A-02300

C_2-C_{10} hydrocarbon emissions from a boreal wetland and forest floor in Finland

H. Hellén, H. Hakola, and K.-H. Pystynen

Finnish Meteorological Institute, Sahaajankatu 20 E, 00880 Helsinki

e-mail: heidi.hellen@fmi.fi

Emissions of different C_2-C_{10} hydrocarbons and halogenated hydrocarbons from a boreal wetland and forest floor were identified and fluxes to the atmosphere were quantified. Forest floor measurements were conducted at Hyytiälä SMEAR II measurement station (61˚51'N, 24˚17'E, 180m ASL) on the southern boreal coniferous forest zone in the southern Finland and the wetland measurements were carried out on Siikaneva fen located a couple of kilometers from the SMEAR II station.

Measurements were conducted using static chamber technique with Teflon-chambers. Samples from the chambers were taken using Tenax TA-Carbopack B adsorbent tubes and 0.85 L stainless steel canisters. The adsorbent samples were analyzed using a thermal desorption unit together with a gas chromatograph and a mass spectrometer and the canisters using a gas chromatograph with flame ionization and electron capture detectors. VOC-fluxes were determined from the concentration difference between three samples taken at known time intervals during the closure of the chamber. The wetland measurements were performed between June and October 2004 and forest floor measurements between April and October 2004.

Main non-methane hydrocarbon in wetland emissions was isoprene. However, also small emissions of ethene, propane, propene, 1-butene, 2-methylpropene, butane, pentane and hexane were detected. The mean emission potential of isoprene was 121 μg m^{-2} h^{-1} for the whole season. This is lower than the emission potentials published earlier and most likely at least partly caused by wet and cold summer at a time of measurements. No emissions of monoterpenes or halogenated hydrocarbons were detected.

Highest emissions from forest floor were measured in spring and autumn. Main emitted compounds were monoterpenes. Isoprene emissions were negligible. Highest monoterpene emissions were measured in spring after the snow had melted. Emissions dropped in the summer and increased again in autumn. Sum of the measured monoterpene emission rates varied between 0.35 and 373 μg m^{-2} h^{-1}. Probable source for these emissions is decaying plant litter. Also small emissions of chloroform, ethene, propane, propene, 2-methylpropene, cis-2-butene, pentane, hexane and heptane were detected.