Geophysical Research Abstracts
Vol. 14, EGU2012-9735, 2012
EGU General Assembly 2012

Oxygenated VOC and monoterpene emissions from a boreal coniferous forest

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Compared with terpenoids, emissions of oxygenated volatile organic compounds (VOCs) from boreal ecosystems have been poorly characterized. We measured ecosystem scale emissions of three oxygenated compounds (methanol, acetaldehyde, and acetone) and monoterpenes from a Scots pine dominated forest in southern Finland during the summers 2006–2008. The measurements were conducted using the disjunct eddy covariance method combined with proton transfer reaction mass spectrometry. The contribution of the three oxygenated compounds to the measured total emissions was 40–60 %. The highest oxygenated VOC emissions were those of methanol, comprising 20–30 % of the total, followed by acetone with a share of 10–20 %. The acetaldehyde emissions were 5–10 % of the total. This emission composition will be compared with that obtained from shoot enclosure measurements. Methanol showed deposition during some periods although its overall flux was towards the atmosphere. The monoterpene emissions had a light dependent component, suggesting that part of the emissions originated directly from monoterpene biosynthesis. Diurnal, seasonal, and inter-annual variations in the emissions, along with temperature and light dependencies, will be discussed.