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BVOC ecosystem flux measurements at a high latitude wetland site

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Abstract. In this study, we present summertime concentrations and fluxes of biogenic volatile organic compounds (BVOCs) measured at a sub-arctic wetland in northern Sweden using a disjunct eddy-covariance (DEC) technique based on a proton transfer reaction mass spectrometer (PTR-MS). The vegetation at the site was dominated by *Sphagnum*, *Carex* and *Eriophorum* spp. The measurements reported here cover a period of 50 days (1 August to 19 September 2006), approximately one half of the growing season at the site, and allowed to investigate the effect of day-to-day variation in weather as well as of vegetation senescence on daily BVOC fluxes, and on their temperature and light responses. The sensitivity drift of the DEC system was assessed by comparing H₃O⁺-ion cluster formed with water molecules (H₃O⁺(H₂O) at m37) with water vapour concentration measurements made using an adjacent humidity sensor, and the applicability of the DEC method was analysed by a comparison of sensible heat fluxes for high frequency and DEC data obtained from the sonic anemometer. These analyses showed no significant PTR-MS sensor drift over a period of several weeks and only a small flux-loss due to high-frequency spectrum omissions. This loss was within the range expected from other studies and the theoretical considerations.

Standardised (20 °C and 1000 μmol m⁻² s⁻¹ PAR) summer isoprene emission rates found in this study of 329 μg C m⁻² (ground area) h⁻¹ were comparable with findings from more southern boreal forests, and fen-like ecosystems. On a diel scale, measured fluxes indicated a stronger temperature dependence than emissions from temperate or (sub)tropical ecosystems. For the first time, to our knowledge, we report ecosystem methanol fluxes from a sub-arctic ecosystem. Maximum daytime emission fluxes were around 270 μg m⁻² h⁻¹ (ca. 100 μg C m⁻² h⁻¹), and during most nights small negative fluxes directed from the atmosphere to the surface were observed.

[Final Revised Paper](#) (PDF, 1440 KB) [Discussion Paper](#) (ACPD)

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