BVOC fluxes from growing and cut grass above a mountain meadow

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Introduction

Volatile organic compounds (VOCs) play a key role in atmospheric chemistry. They are involved in the production of ozone and other secondary pollutants [1]. Up to 90% of the global VOC emissions are natural [2]. Biogenic VOCs (BVOCs) are emitted from processes such as growth maintainance and decay of organic material [3]. The eddy covariance method is a well established method to measure net ecosystem fluxes but especially over grassland, which cover one quarter of the earth's land surface [4], measurements are sparse.

The aim of the measurement campaign was to study the amount of organic trace gases which are emitted and deposited over grassland over a whole vegetation period.

Experimental

The experiments were performed above a mountain meadow which is located 970 m above sea level in the middle of a flat valley bottom in the vicinity of Neustift, Stubai valley (Fig. 1).

Figure 1: *Measuring system at the field site in Neustift. To the left the gas inlet for the PTR-MS and the sonic anemometer and to the right the automated weather station .*

The emission/deposition pattern for selected BVOCs was determined using the disjunct eddy covariance method.

Data analysis

The covariance between the turbulent fluctuations of the vertical wind speed and the VOC concentrations was used to determine the 30 minutes fluxes from the grassland. By optimizing the correlation coefficient between the wind data and the VOC data the measurement time delay of the VOC signal was identified. Frequency response corrections which account for high- and low-pass filtering were applied to the raw flux data.

Results[5]

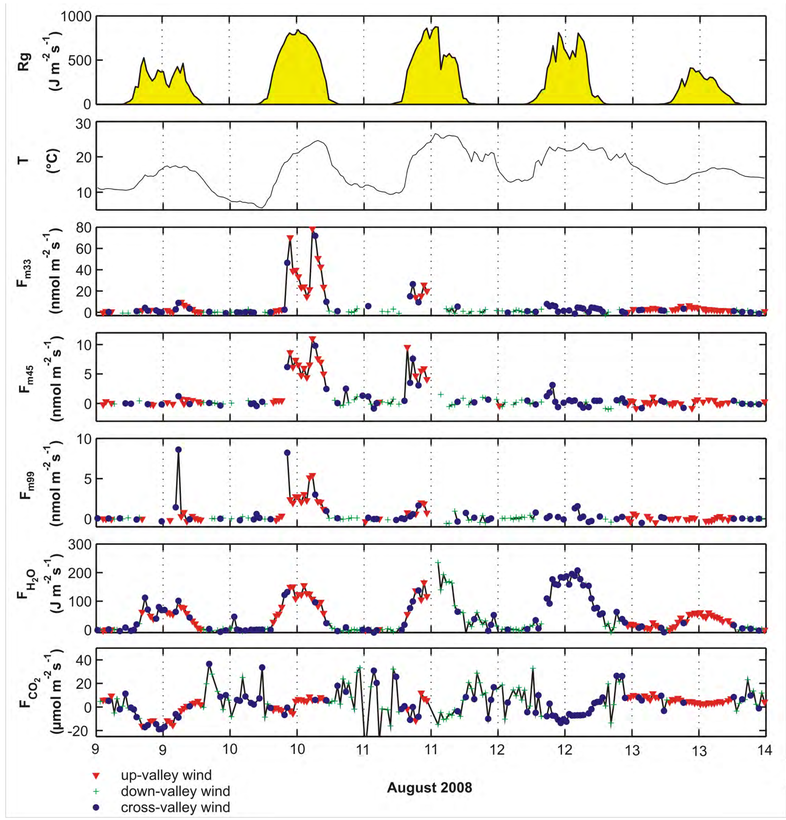

Figure 2: *Time series of the global radiation, temperature, methanol, acetaldehyde, hexenal, water vapour and CO_2 flux during the second hay harvest (August, 10, 2008).*

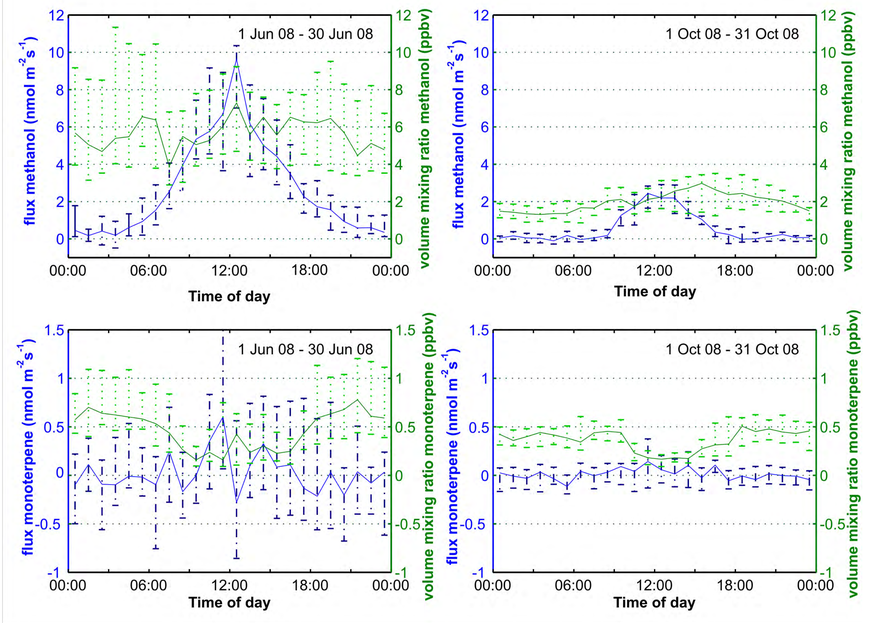

Figure 3: *Median diurnal cycles of methanol (upper panels) and monoterpene (lower panels) volume mixing ratios (green lines) and fluxes (blue lines) including the 25% and 75% percentiles for the months June and October 2008.*

Conclusions

Methanol was the major compound measured with the PTR-MS which was emitted by the undisturbed growing grassland during the whole growing season (Fig. 3). However, fluxes of compounds other than Methanol were visible during cutting events (Fig. 2).

References:

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