

Interactive comment on “Long term BVOC fluxes above mountain grassland” by I. Bamberger et al.

I. Bamberger et al.

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Received and published: 2 April 2010

We thank Boris Bonn for the constructive and helpful comments on the manuscript.

Comment 1: Please give more information about the site, such as size and surrounding vegetation, since your approach would display a fraction of the emissions nearby as well.

Reply: we added more detail to the site description: "Along the dominant daytime and nighttime wind directions the valley bottom is dominated by intensively managed meadows. Coniferous forest is the predominant vegetation on the slopes of the surrounding mountains."

The size of the footprint can be seen in figure 1. Data where the maximum of the footprint function is outside of the boundaries of the meadow fail the quality control. This should minimize the influences from nearby emissions for the flux data.

Comment 2: As stated above I would be glad if the authors could provide more details in section 2.

Reply: Section 2 now gives more information on the site, more details have been added.

Comment 3: What about the soil conditions such as wetness, rain fall etc during the measurement period? This would cause different stress response of the grassland. Could you provide a plot with a higher resolution than the statement 85 mm (p. 92)?

Reply: We added more detailed rain information to the site description:

"During the measurements from 22nd May 2008 until 31st October 2008 (163 days) at 71 days measurable rain was registered with a total precipitation of 428.8 mm."

This clarifies that the grassland was not under drought stress during the measurements.

Comment 4: You describe the site as manged by a farmer. Were there any sorts of nitrification used? If so, when have they been applied? Any effect on the emissions and compounds detected?

Reply: we added information about fertilization. "The study site is fertilized with manure once per year, typically in autumn." We didn't cover the fertilization period with the PTR-MS.

Comment 5: You concentrate on three different VOCs, i.e. methanol, acetaldehyde and hexenal and mention other VOCs? Were these the only one? Any chance to learn more about the other VOCs? As it is apparent from Figure 8 monoterpenes were not emitted by the grassland maybe from trees in the vicinity but deposit at the site.

Reply: We added: "Due to the sequential detection of each mass only a limited set of 15 compounds was measured. Other methods could complement the range of

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compounds that are measured to determine alkene and halogenated VOC fluxes." Apart from the cutting periods the PTR-MS data in 2008 showed no significant fluxes of compounds other than methanol throughout the whole growing season. A detailed discussion of the monoterpene sources is now included: "There was no indication for monoterpene emissions. The monoterpene fluxes from the grassland were close to zero and calculated emissions were always below $0.6 \text{ nmol m}^{-2}\text{s}^{-1}$. This is several times lower than average daytime emissions from forest ecosystems e.g., from a mixed deciduous forest (Spirig et al., 2005)." and "When the boundary layer height decreases in the evening and during night, monoterpenes emitted by the nearby forest are transported to the valley bottom. Therefore the highest monoterpene volume mixing ratios are reached during nighttime."

Comment 6: Methanol is known as a stress emission of grasslands. But what about acetaldehyde? Is this compound emitted straight away or potentially an oxidation product of a different faster reacting species maybe hexenal?

Reply: To clarify we added more references of acetaldehyde emission measurements from plants: "Similar to methanol emissions, acetaldehyde emissions can be activated by leaf wounding (Fall et al., 1999; Davison et al., 2008) or other stress situations like dark-light transitions (Karl et al., 2002a)."

Interactive comment on Biogeosciences Discuss., 7, 83, 2010.

BGD

7, C399–C401, 2010

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