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Biogeosciences Discussions

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

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We thank Christof Ammann for the constructive comments and have considered them in detail and have improved the manuscript as described below.

Comment 1) In the introduction the authors point out the importance of long-term flux measurements for the understanding of the dynamics of grassland VOC emissions. However the results shown are limited to two mean monthly diurnal cycles (June and October) and one short period covering a cutting event. It would be very useful to show more detailed data on the day-to-day variation of the methanol flux during growth (and its dependence on environmental parameters) as well as on the variation over full growing periods. In addition I think the mean diurnal cycle for 1-30 June in Fig.8 is difficult to interpret since it averages cutting and growing phases.
Reply: We agree with Christof Ammann that it is important to study methanol data

in combination with the environmental parameters in more detail. This would help to identify driving factors for methanol emissions. However, we think that this is beyond the scope of this manuscript. Currently we are preparing a separate manuscript that will address this important issue for the 2-years data set (Hörtnagl et al., 2010, in preparation).
Fig. 8 shows the median diurnal cycles rather than the mean diurnal cycles. The cutting does not affect the median values.

Comment 2) Important information on the vegetation are missing for the interpretation of the observed fluxes: i) development of LAI and/or biomass over the measurement period(s) in order to analyse the influence of the plant development stage on the methanol emission (see e.g. Fall and Benson, 1996; Brunner et al., 2007); ii) was there a third cutting event in 2008 beside 10 June and 10 August? iii) what was the plant composition of the grass vegetation, particularly the contribution of clover species which are supposed to show a higher methanol emission than graminaceous species (see Galbally and Kirstine, 2002; Brunner et al., 2007)
Reply:
i) The development of the vegetation during 2008 will be described in more detail in (Hörtnagl et al., 2010, in preparation); general vegetation development at the Neustift field site has been described e.g. in Wohlfahrt et al. (2008) or Hammerle et al. (2008)
ii) We included the three growing periods and all the time periods of the cutting events in the site description (2.1)
iii) We added a brief overview of the vegetation composition in the site description (2.1)

Comment 3) In my opinion there is not enough evidence given in this paper for the conclusion, that the vDEC "requires less corrections...is easier to use and more reliable" than the gap filling method (P91,L20-21 & P95,L1-2). At least, it should be quantified how large the difference in the high-frequency damping correction was

between the two methods. Additionally it has to be considered that the lag-time determination is more difficult for the vDEC method with the much noisier covariance functions.
Reply: Additional information regarding high-frequency damping correction has been added in chapter 3.2. A more detailed comparison of vDEC calculations versus the gap-filling method is given in the cited paper by Hörtnagl et al. (2010).

Comment 4) P90,L11-13: It has to be considered that the distance of the maximum of the footprint function (used here as a quality criterion) usually comprises less than 50% of the flux footprint area.
Reply:
Using the maximum of the footprint function instead of e.g. the 90% cumulative footprint is done as a compromise between the need to control the quality of the data with regard to the footprint and the limitations of footprint models - in order to satisfy both needs we, as e.g. Novick et al. (2004), are using the maximum of the footprint function.

Comment 5) P90,L6-8: The term 'background concentration' is misleading in this context. As indicated in section 2.3, the 'instrumental background' was determined by analyzing zero-air. Thus the corresponding concentration is equal to zero by definition. The raw signal output of the PTR-MS when measuring zero-air may be denoted as 'zero-air signal' or 'signal offset'.
Reply: The term 'background concentration' was corrected to 'background signal' and now it reads: "...by removal of time periods with (1) ambient concentrations of VOCs which are (averaged over half an hour) lower than the measured background signal..."

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