

## ***Interactive comment on “Gap-filling strategies for annual VOC flux data sets” by I. Bamberger et al.***

### **Anonymous Referee #1**

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### **General comments**

Bamberger et al. present a comparison of four gap-filling methods designed for compiling continuous and year-round VOC flux data sets. One of their main findings is that gap-filling based on 30-minute flux values (the mean diurnal variation method) yielded lower errors for all studied VOCs than gap-filling based on daily averages. However, all methods produced rather similar cumulative carbon fluxes for the different VOCs in 2009 and 2011. The gap-filling errors were pronounced during the winter periods and the management events at the grassland site. Regardless of the gap-filling method, the root mean square error increased almost linearly when the amount of data gaps was artificially increased.

The paper is well suited to Biogeosciences. It provides new and useful information which can facilitate gap-filling of long-term VOC flux measurements at other sites in

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order to produce year-round time series. The methods are state-of-the-art and the analysis seems adequate. I recommend publication in Biogeosciences after the authors have addressed the few minor comments below.

### Specific comments

P17792, L3: Did the authors use other time windows than  $\pm 8$  days to evaluate how much the window affects the gap-filling results?

P17803, L3: The hailstorm on 16 July 2009 had a substantial effect on the monoterpene fluxes (Fig. 1) and consequently on the total cumulative carbon flux (Fig. 4). Could the authors estimate how the total cumulative carbon flux would change if there had been a long gap (say few days to a week) right after the hailstorm? In general, how long gaps can be filled with the different methods?

P17805, L16: The authors suggest that more effort should be invested in year-round flux measurements (including the winter period) to get a better understanding of annual VOC exchange. This is a good idea. However, based on Fig. 4 it seems that the winter periods had a minor contribution to the total cumulative carbon flux, and one could easily overleap those periods without introducing remarkable errors. Do the authors assume that this contribution could be much higher during other years or at other sites?

### Technical corrections

P17799, L21: It seems that Table 3 is mentioned before Table 2. Please consider switching the order of Tables 2 and 3.

Table 2, year 2011: "error mean cum. flux" or "std cum. flux"

Fig. 1: Please mention in the caption whether the asterisks and circles in the left and middle column present daily averages, medians or something else.

Fig. 1, the y-axis label of the lowest panels: " $C_{12}H_{16}$ " or " $C_{10}H_{16}$ "

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