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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Seasonal cycles of biogenic volatile organic compound fluxes and concentrations in a California citrus orchard" *by* S. Fares et al.

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We want to thank referee 1 for the revision which will certainly help increase the scientific quality of the manuscript. We edited a new version of the manuscript taking into account the referee comments. Below are our answers to the specific comments:

SpeciïňĄc comments P17993, L23–25: What kind of method was used for determining the transmission curve for such a wide mass range? Could you maybe give a reference?

> The method to create the transmission curve has been described by Holzinger et al. (2005) In the revised version this is mentioned, we also pointed out that the in-

terpretation of concentration of masses with molecular weight higher than 140 can be overestimated, since after this limit the transmission efficiency is poor due to insufficiently tuned mass scale of the mass spectrometer and aging of the secondary electron multiplier (SEM).

P17995, L17: What was the response time of the PTR-MS instrument?

>We cite in the manuscript a reference to Lindinger et al. (1998), who declared a response time of 0.1 s for our instrument.

P17997, L12–24: Does the reasoning in this paragraph apply to all compounds and all measurement periods? See e.g. Fig. 2.

>Yes this is quite evident for most compounds, especially for those with low atmospheric concentrations and low emission sources. However, in this introductory section we remarked that for certain OVOC during winter we observed higher concentrations during the day, as a consequence of emission and lower boundary layer height. More details on daily dynamics of concentrations are provided later in the specific sections.

P17999, L26–28: How do the authors know that this statement is true for acetaldehyde, a qualitative interpretation based on Fig. 2?

>We thank the reviewer for this important comment. We indeed did not directly measure acetaldehyde fluxes, but the concentration dynamics were similar to that of acetone, therefore we hypothesize in the text that the orchard is also a source for acetaldehyde.

P18001, L9: Does the mean wind data support this hypothesis?

>Thanks again for this important remark. A wind rose analysis for the same experimental areas (references now provided in the text) showed prevailing wind directions from the west. This suggests that isoprene was transported to the orchard through advection plumes from a source far away from our flux measurement footprint. This source was not the foothills, which are on the E-NE side of the orchard, but likely the

nearby urban areas of Farmerville and Exeter, where we observed scattered oak trees in the non-cultivated areas.

P18004, Sect. 3.3: Is there confusion about the C-6 compounds detected at m/z 83 and 99 in this section and in the caption of Fig. 8? The legends in the ïňĄgure itself seem right. Please refer to Davison et al. (2009) or de Gouw and Warneke (Mass Spectrometry Reviews, 26, 223–257, 2007). Only the results based on m/z 83 are discussed in the text. Please add information on m/z 99 and the dates for the harvesting period.

>Thanks for noticing a misspelling in the figure legend. We corrected the legend to indicate the correct masses. A citation has been included as suggested, and m/z 99 is also introduced in the discussion, together with m/z 83.

P18007, L15–18: Was the intensity of turbulence so low (even during the day) that the turbulent mixing time scale was longer than 360 s?

>Yes, the turbulence was very low in the Citrus site, similarly to Ciccioli et al. We remarked in the text now that calculations were performed for the central hours of the day.

Technical corrections P17988, L15: ”characterize” or ”characterized” >”characterized” was the right term, thanks for the suggestion. P17991, L28: Please check the unit of LAI. >LAI in this work corresponds to m2 leaves on m-2 soil projected from the canopy boundaries. Thanks for highlighting this typing mistake. P17993, L19–21: Please check the units of ”measured sensitivity” and ”normalized sensitivity” (see Table 1). >We wrote now ppb instead of concentration, in agreement with measured and normalized sensitivity. P17995, L1: Please add a reference which explains ”the principle of the maximum covariance”. >We rewrote this sentence, since we cannot really define it as a principle but rather as a reasonable approach to use to identify lag time. We referenced the Russkanen et al paper. P17995, L5: ”horizontal” or ”vertical” >Vertical is the right term, thanks. P17996, L6–8: The time series in Figs. 1 and 4 seem to

be from around 40 to 290 in the DOY scale. Are there some data missing from these ïňĄgures or were there gaps in the measurements? Would it be good to use the same notation in Figs. 1 and 4 as in Fig. 7? >we thank the reviewer for this important observation. The sentence in lines 6-8 P17996 refers to a previous version of the manuscript, with fall observation collected in 2009 which have been discarded due to some instrumental failure. Therefore we deleted that sentence. P17997, L2–11: There are more compounds in Table 1 than in the ïňĄgures. Please modify the text. The dates for the different periods (ïňĆowering, summer, etc.) might help the reader. >We specified in the text that some of the compounds reported in table 1 have not been discussed in detail since their concentration was close to or below the detection limit of the instrument. This is the case for acetonitrile (m/z 42), the unknown m/z 111, 113, 139 and 151, here reported only for comparison with previous work where these masses have been observed in higher amounts (Holzinger et al. 2006), and methylchavicol (m/z 149), another compound emitted in large amount from pines and palms, but relevant here (Bouvier-Brawn et al; Misztal et al. 2010).We indicate now time references for the three periods here mentioned: flowering, summer, winter. P17999, L18: Is this a correlation between acetaldehyde and acetone concentrations? >We specify in the text that the correlation was performed between concentrations. P18000, L8: ”Fig. 8” or ”Fig. 5” >We corrected figure 8 to figure 1-5, thanks for the remark. P18001, L27: ”directed” or ”directly” >Directly is the right word, thanks. Captions of Figs. 2, 3, 8, and 9: ”1. m” or ”1 m” >The point has been removed, thanks. Captions of Figs. 3, 4, and 5: Please remove the extra (line?) numbers (816, 817, etc.) >extra line brakes removed.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 17987, 2012.