**Atmospheric
Chemistry
and Physics**
Discussions

Interactive comment on "Acetaldehyde exchange above a managed temperate mountain grassland" by L. Hörtnagl et al.

Anonymous Referee #2

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General comments

The manuscript presents another solid study from the Austrian research group, describing OVOC fluxes above the Neustift meadow. The study is strong on the descriptive side but somewhat weak on the interpretive side. The extraordinarily rich, multi-year data base should allow a deeper analysis, but such may still be forthcoming. I suggest publication with relatively minor additions/changes as described below, but suggest a major reanalysis as further benefit to the research community.

Some specific comments 1. The DEC method is now relatively well established; however, I miss a statement in section 2.4 (page 26216) on the estimated flux detection/determination limit and random flux error, based on PTR-MS parameters and am-

bient turbulence. Turbulent fluctuations close to the surface above the (relatively low roughness) meadow are typical much smaller than above a forest. Such a detection limit and random flux error (calculated using, e.g., varying lag times) is important in the interpretation of the flux data presented, such as in functions of VMRs. Possibly some or even much of the discussion on poor regressions can be scrubbed realizing that fluxes during certain periods are simply insignificant?

In addition, the authors had the rare opportunity to measure with a PTR-ToF-MS side by side the standard PTR-MS. Unfortunately, they did not name the two months of overlap, so the reader cannot judge whether the statement about CO_2 fluxes made (page 26125) is actually for months with significant net CO_2 exchange fluxes

2. The authors cover much ground regarding past measurements and results in relation to their own results. One paper they missed was the study by Schade et al. in Denmark (Biogeochemistry, 106, 2011, DOI 10.1007/s10533-010-9515-5), where the authors showed that externally produced acetaldehyde from a mowed hay field was deposited to the neighboring forest, where the measurements were done, with fluxes seemingly dominated by soil deposition. It is unfortunate that soil deposition was not directly investigated by the present authors as part of their project, although past data and their data showed that such deposition was likely important.

3. A soil deposition analysis could still be done with the data. If the authors are so inclined, they could shorten the lengthy regressions discussions in lieu of a Bayesian statistics analysis using the two dominant factors, plant emissions as driven by SWC and NEE or LE, and soil deposition as driven by VMR and SWC (or SHF & T), as priors, and develop posteriors representative of these two individual flux contributors. I think that would be a much stronger analysis to provide to the flux community.

Such analysis could be done for both fluxes and compensation points, although it should be realized that the derived compensation points shown in Figs. 6&7 are net values and thus not representative of either soil or plant values unless one of these

contributing compartments dominated the measured net fluxes. Thus, once the analysis is redone, the posterior compartment flux should be plotted against the VMR values for soil and plant compensation points, presuming the Bayesian analysis is successful.

4. Minor points Page 26149: The statement on top including "our hypothesis" has become unclear due to the long paragraph ahead of it. Thus the "hypothesis" needs re-statement. Same page, last sentence: I disagree; I suggest the Bayesian analysis as a starting point. At the minimum, you do know that soil is most likely a sink while the plants are source and can occasionally be a sink. Even using flat priors might work.

Page 26151, 2nd paragraph: ". . .where decreasing SHF resulted in more acetaldehyde uptake on deposition days." I am not aware of any physical or chemical mechanism by which a heat flux can "result in" (cause?) deposition. The heat flux may serve as a proxy for the actual mechanism, so these sentences should be rewritten. Also: The "unknown process" of acetaldehyde consumption is generally oxidation to acetic acid, so if the authors have m/z 61 and m/z 43 data, they can check on those fluxes to potentially find some clues.

Page 26152, section 5, "Conclusions": This is written as a summary section, not a conclusion section. If you have conclusions, please present them as such.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 26117, 2013.

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