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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Sources and seasonality of atmospheric methanol based on tall tower measurements in the US Upper Midwest" *by* L. Hu et al.

Anonymous Referee #1

Received and published: 16 August 2011

General comments:
The manuscript "Sources and seasonality of atmospheric methanol based on tall tower measurements in the upper Midwest" presents over 1 year of methanol measurements at the KCMP tall tower together with model evaluations. Reading through the manuscript I was surprised to see 'only' volume mixing ratio measurements to be presented. The problem with this measurements compared to flux measurements is the more complex and uncertain interpretation of the data because of the large source area for VOCs like methanol. However, taking a closer look to the manuscript I understood the VOC measurements as a mean to test the performance of available VOC models for methanol. I think the time has come to take a closer look at (to my opin-

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ion) neglected VOCs like methanol. It is also important to gain knowledge about the agreement of model evaluations in comparison to direct measurements. The comparatively long time series of methanol measurements combined with a comparison of the results to model evaluations makes the manuscript strong. Methanol measurements were performed with a state of the art but well known instrument for VOC measurements. Presuming the consideration of the comments stated below I suggest the final publication of this work.

Specific comments:
Comment 1 (page 17475, line 9-12): This sentence seems to be out of place here and separates the introduction to the topic into two pieces. In my opinion it does not provide information which is not given anywhere else in the introduction and makes the introduction less structured therefore I would suggest to delete it.
Comment 2 (page 17475, line 8-14): This information fits to the field site description but is too detailed for the introduction. Therefore I would suggest changing the sentence accordingly and moving it to the field site description.
Comment 3 (page 17477, line 22): 'using a PTR-MS'
Comment 4 (page 17477, line 23): Please provide the information about the location of Ionicon '(HS-PTR-MS, Ionicon Analytik, Austria)'
Comment 5 (page 17477, line 27): Please provide information about type and manufacturer of the SEM.
Comment 6 (page 17478, line 3): Was the inlet line heated?
Comment 7 (page 17478, line 5): The inner diameter of the Teflon line is the more important information: Could you please provide both outer and inner diameter? Alternatively you could provide outer diameter and wall thickness or only the inner diameter.
Comment 8 (page 17478, line 23): Was the background signal stable within the 2-5 h? If not do you interpolate the background signal which is subtracted in between?
Comment 9 (page 17478, line 25): See comment 8.
Comment 10 (page 17479, line 10): Could you please provide information about

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typical sensitivities during the calibration of methanol and possibly of benzene and toluene?
Comment 11 (page 17480, line 16-17): Explain more detailed - why do you use exactly those four plant functional types and how do needle-leaf trees and herbaceous plants correspond to the land cover map in figure 1.
Comment 12 (page 17480, line 20): Explain why you use identical emission factors of 800 $\mu g\ m^{-2}s^{-1}$? I wonder if this makes sense (the four different ecosystems in use seem to be quite different). Is there any reference? I know emission factors to be uncertain but does it make sense to use different plant functional types if the emission factors for all plant functional types are assumed to be equal?
Comment 13 (page 17481, line 4): In general I would embrace some more information in section 2.4 (GEOS-Chem chemical transport model). For example: do you account (except of temperature and LAI) for other environmental conditions which differ from standard conditions (e.g. PAR) for biogenic emission modeling?
Comment 14 (page 17482, section 3.1): Figure 3 shows the methanol VMR simulated by GEOS-CHEM, MEGAN compared to the measurements. The model seems to underestimate the VMRs continuously but especially during summer (discussed on page 17487, paragraph 2). Wouldn't it be more straightforward to discuss it right away?
Comment 15 (page 17484, line 13): I think you mean 'atmospheric background concentrations' - the use of background concentration in combination with PTR-MS measurements might be misleading.
Comment 16 (page 17486, section 3.3): Temperature is most probably not the only driver for biogenic methanol emissions. Did you try to identify other drivers (e.g. LAI, PAR)?
Comment 17 (page 17497, table 1): Could you provide information about the main vegetation at the different sites all along with the table? The measurement height could be an interesting fact as well.

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Technical comments:
Comment 18 (page 17479, line 9): Please change 'detection limited' to 'detection limit'.
Comment 19 (page 17499, figure 2): Please indicate the northern direction within the wind rose plots.
Comment 20 (page 17500, figure 3): The units belong to the y-axes labeling – is it possible to move them below the compound name? They are hardly readable in some panels.
Comment 21 (page 17501, figure 4) Is it possible to place the tick marks further away from the ticks for x-axis and the right y-axis?
Comment 22 (page 17504, figure 7): It is rather difficult to differ between the blue line (SOS) and the KCMP measurements (black line). Is it possible to use another color or a lighter blue? Is it possible to place the tick marks further away from the ticks for x-axis?
Comment 23 (page 17505, figure 8): The blue shaded area is quite dark therefore it is difficult to recognize the line in between. Could you use a more transparent blue? Is it possible to place the tick marks further away from the ticks for x-axis.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 17473, 2011.