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Atmospheric Chemistry and Physics Discussions

Interactive comment on "On the distribution of formaldehyde in the western Po-Valley, Italy, during FORMAT 2002/2003" *by* W. Junkermann

Anonymous Referee #2

Received and published: 28 August 2009

This paper presents measurements of gas-phase formaldehyde from the Po-valley in Italy during summer 2002 and autumn 2003 FORMAT campaigns. Data from in-situ Hantzsch instruments are presented from three ground sites around Milan and also from an ultra-light aircraft.

Aspects of the data set have been published earlier in the instrument intercomparison and modeling papers (e.g. Hak et al., Liu et al.). This paper focuses on differences in overall formaldehyde mixing ratios and diurnal variations among the various sites. Further insights into the differences among the three sites would be an interesting addition. The paper also presents vertical profile measurements both under cloud free conditions and also in the presence of convection. Presentation of more of these vertical profiles would enhance the paper.

Through the previous instrument intercomparison, the dataset has been shown to be of good quality but the biggest problem with the paper is its lack of detail. Possibly because many details have been included in previous publications they are not included within the body of this paper. There are many results stated in the text that are not backed up by figures or details. If they are included elsewhere, then they should be referenced and not described again as a new finding. If they haven't been included, then please add figures. This paper is missing too many details to stand on its own.

The modeling section (Section 4) should be expanded. None of the model output is presented and it is not clear why the modeling section is included at all. Again, the text describes model/measurement comparisons yet nothing is shown. The presentation of the diurnal variations at the three sites is interesting and in particular, the morning rise in formaldehyde. How does this compare with the model output, and are the differences in the slopes of these morning increases reflected in the models?

The data from the three areas with the aircraft addition are interesting and should be published but only after substantial revision.

Specific comments for consideration:

The addition of many commas throughout the paper will also contribute to its readability. I have not included these specific corrections in the following list.

p 14001 The paper will read more clearly if the two campaigns are introduced early in the text.

p 14001, line 11, Wisthaler et al. reference is missing

p 14001, line 23 Junkerman und Burger

p 14002 line 6, "theses"

p 14002, line 19, simpler logistics and easier access

p 14002 – How did the Hantzsch technique perform during the intercomparison phase

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of the experiment? what measures were used to increase the instrument temperature stability?

p 14003 – Include the description of additional aircraft instrumentation and reference to table 1 after line 7, before the description of airspace

p 14003 – include some details about the number of flights and of these, from which flights will data be presented in this paper

p 14003, line 24 “Only one flight led . . .

p 14003, can you include a typical flight track on Figure 1?

p 14003, lines 24-29, this is unclear, do you mean specifically, not respectively?

p 14005, line 6, comma after harvesting, and delete “from”

p 14005, briefly mention the meteorology of a Fohn event

p 14006, line 4-5, how do we know that weather patterns and local emissions are reflected in the HCHO variability? Can you show us?

p14006, lines 6-20, does this description all refer to fig 3? When specifically, are these mixing ratios observed? Add specific dates for all three periods when diurnal variations are calculated.

p14006, line 11, omit “in the morning”

p14006, lines 25-28, were the slopes of the HCHO increases at each site consistent across all types of conditions? Can you give more details on the slopes? Do you have diurnal variation in other measurements to further elaborate on these rise rates? Were these modeled in Liu et al? and if so, did they agree?

p14006, line 28-29, Do you mean that the amplitude of the diurnal variation increases?

p14007, line 5-6, Are you referring to Fig 4f?

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p14007, lines 15-17, were there any measurements of biogenic precursors from FORMAT?

p14007, line 18-20, Again, where are the wind directions? Have the Bresso data been discussed in another paper?

p14008, line 1, Do you mean that the slope of the morning rise is steeper than the afternoon rise? Why? What was the wind direction during the polluted week?

p14008 line 25-27, Can you include the aircraft and ground-site comparisons? What do you mean by "generally in agreement"?

p14009, line 4, can you show the CN in addition to the HCHO?

p14009, line 7, Do you mean the diurnal cycle in the fire emissions or in the PBL?

p14009, line 14, mixing within the PBL is really within a few minutes??

p14009, lines 20-26, given an estimated liquid water content, what fraction of HCHO do you expect to be scavenged by cloud water, most likely less than 30%? Convective transport is important but the higher altitude HCHO need not have been scavenged and then released upon cloud evaporation.

p14010, lines 3-4, this sentence is not clear, what was observed by Korman, 2005?

p14010, lines 6-7, can you add particles and RH to the vertical profile plots?

p14010, line 8, ascents and descents

p14010, lines 21-28, It is not clear how discussion of this episode relates to the data presented.

p14010, line 26, plume-like

p14011, line 2, FORMAT

p14011, line 14, what is a reasonable correlation? Please show the comparison.

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p14011, line 23 and onward, are the comparisons with the three sites for the multi-day periods selected to determine diurnal variations? Have you done this?

p14012, line 5, ascent

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 13999, 2009.