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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

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Many thanks to the reviewer for helpful comments to improve the paper. The manuscript now contains more data and a more detailed discussion and revised figures. See supplement. The specific comments of the reviewer are commented below.

Anonymous Referee #1 Received and published: 6 August 2009

Referee comment This paper presents formaldehyde measurements from the FORMAT campaigns in the Po Valley, Italy from 2002 and 2003. Formaldehyde is central to tropospheric photochemistry and the Po Valley is the most industrialized and populated area in Italy and thus the topic of the paper is of significance to tropospheric chemistry. The formaldehyde observations are of high quality and they present a valu-

able data set. There exist a number of previous papers discussing formaldehyde from the Po Valley, including from the FORMAT campaigns, in particular Liu et al. (2007a, b referenced by the author). The work by Liu et al. already contains some description of some of the measurements presented here as well as a model measurement comparison. Thus, it is this reviewer's opinion that it would be helpful and necessary to present a clear delineation of what the new findings in this work are. I would suggest this should be done with some detail in the introduction, e.g. what are the findings of Liu et al. and others and what are the goals of this paper that go beyond this (e.g., discussion of the areas north and south of Milan, some aspects of the airborne observations, etc.) and to also make it clear in the abstract what the new aspects are. This is particularly important with respect to section 4.

Author reply The two modelling papers by Liu et al present only about 60 percent of the full data set and only a very short comparison of model and experiment with respect to formaldehyde. Model and experimental results are presented but neither differences in the two campaigns nor in the diurnal variability are discussed. Although available the data from the southern station were completely omitted. The current manuscript closes this gap. In the introduction the rationale of this paper is now included

Referee comment It is unfortunate that the other (non-Hantzsch) formaldehyde measurements from FORMAT are not included as this would provide a very comprehensive review of the distribution of formaldehyde in this important region and thus strengthen the paper. However, this likely is beyond the scope of this work.

Author reply: The other formaldehyde measurements were in agreement with the Hantzsch instruments as long as the same airmass was measured. Hantzsch instruments were used at all sites and on the aircraft. The exclusive use of these data gives already a fairly comprehensive picture on the formaldehyde distribution. Its beyond the scope of the paper to discuss differences between long path and point measurements additionally, which is already included in the Hak et al (2005) paper. The paper focuses more on the regional distribution and the diurnal variability which is also part of a similar

measurement and modelling manuscript (unpublished) for Mexico City.

I recommend this paper for publication if the author revises the manuscript to highlight the new aspects being presented and their relevance. I have a few minor comments for the author to consider:

Minor Comments

P. 14003 lines. 9, 14 and 16. Although it is fairly clear within the context the m.s.l. and a.s.l. and their relationship could be made clearer. Author reply: The description was harmonized throughout the paper. P. 14005 line 7. What is meant with a visible source of formaldehyde?, Author reply: modified in the text to . . . Clearly visible and localized sources for CH2O and small particles P. 14005 line. 14. The text refers to Fig. 3a and 3b. The figure does not state a and b although it contains the year and thus is clear. Author reply: corrected P.14005 line 17 states that the "trends can be attributed to changes in local emissions". It could be helpful to explain how this can be done. Is there evidence for changes in local emissions that supports this, or is the rational that based on the formaldehyde there have to be changes. Author reply: Explained in the text in more detail. In the two first weeks of august traffic in the city is marginal and even some industry is shut down. Thus anthropogenic emissions are very low. Figure 2: Is it possible to indicate the measurement sites in the figures? Author reply: Yes, included Figure 3: It would be helpful to have the x-axis on the 3-plots from the same year match, as this will make it easier to compare them. Author reply: corrected Figure 5: It would be helpful to indicate, which color is ascent and which one is descent . Author reply: included in the figure caption and provide some means of assessing time of day for these (e.g. as in figure 6), Author reply: included in the text Figure 6: It would be helpful to indicate, which color is ascent and which one is descent. Author reply: Indicated in the figure caption also including timing I would further recommend going over the manuscript to consider some of the phrasing of the paper for clarity. Author reply: Proofread by a native speaker to avoid phrasing errors and misunderstanding

Please also note the Supplement to this comment.

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