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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Formaldehyde and its relation to CO, PAN, and SO_2 in the Houston-Galveston airshed" *by* B. Rappenglück et al.

Anonymous Referee #1

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The manuscript describes concurrent measurements of formaldehyde, Sulphur dioxide, PAN and CO in the Houston metropolitan area. The advection of differently polluted and emission dependent air masses controls the formaldehyde levels in the city (Moody tower). As formaldehyde contributes significantly to air chemistry and production of secondary photochemical compounds, the different contributions to enhanced formaldehyde levels might have an important impact on Houston air quality. The authors relate the meassured formaldehyde mixing ratios in town (Moody Tower) to individual sources, urban traffic, industry in the ship channel and photochemical production from undefined precursors. This source appointment is based on multivariant statistical analysis.

The paper is relevant within the scope of ACP. It's presentation is fairly well structured but some of the descriptions require a bit more detail. Especially the chemistry behind the source appointment regarding the industrial emissions could be improved. The paper would benefit from a more detailed description of how the sulphur dioxide emissions are linked to formaldehyde. Is this just an accidental local co-allocation of the emitters? The data presented in Wert et al for the same region indicate that high levels of sulphur dioxide are not really stringent coincident with high formaldehyde.

Section 3.2, 'Possible contributions to ambient HCHO levels' needs to be reshaped and checked for correct references within the text. Line 12, which ratio??, in all cases this?... Line 16. Consequently the HCHO/CO ratio

Page 2420, line 6, 'Previous studies have used CO. . .. (citation is missing) Paragraph in line 6-15 describes PNA HCHO relations but SO2 is simply given as an indicator for industrial activities.

The section about the diurnal patterns, 3.3. 'Illustrative examples for regression model fit' is not convincing. Very similar patterns of HCHO have been observed in the MILAGRO experiment (DeGouw et al, 2009) and could be explained solely by vertical mixing and photochemical decomposition. Vertical mixing would reduce CO levels as described but downward mixing of very high concentrations of SO2 and HCHO would need extremely high mixing ratios. Additionally the high SO2 and HCHO mixing ratios have been observed already a few hours prior to the decline of the CO mixing ratios, on Sept. 29 for two hours, on September 14, for three hours. SO2 in industrial emissions is typically a product of fossil fuel consumption which is also accompanied by a emission of nitrogen oxides. An analysis of the concurrent NO/NO2/NOy measurements could be helpful for a further discussion.

Figures,

Most figures are basically acceptable with the exception of Figures 11 and 12. The wind roses in figures 11 and 12 are very difficult to read especially Figure 12 with too

many different data within one figure.

Literature

de Gouw, J. A., Welsh-Bon, D., Warneke, C., Kuster, W. C., Alexander, L., Baker, A. K., Beyersdorf, A. J., Blake, D. R., Canagaratna, M., Celada, A. T., Huey, L. G., Junkermann, W., Onasch, T. B., Salcido, A., Sjostedt, S. J., Sullivan, A. P., Tanner, D. J., Vargas, O., Weber, R. J., Worsnop, D. R., Yu, X. Y., and Zaveri, R.: Emission and chemistry of organic carbon in the gas and aerosol phase at a sub-urban site near Mexico City in March 2006 during the MILAGRO study, Atmos. Chem. Phys., 9, 3425-3442, 2009.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 24193, 2009.