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Atmospheric Measurement Techniques Discussions

Interactive comment on "Retrievals of formaldehyde from ground-based FTIR and MAX-DOAS observations at the Jungfraujoch station and comparisons with GEOS-Chem and IMAGES model simulations" *by* B. Franco et al.

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General comments:

This paper presents a study of the retrieval strategies for the formaldehyde profiles retrieved from the measurements performed using ground based Fourier Transform Infrared (FTIR) solar absorption spectra and the UV-Visible Multi-AXis Differential Optical Absorption Spectroscopy (MAX-DOAS) scans at the high altitude remote Jungfraujoch station. A comparison of the measurement data with two state-of-the-art global

Chemistry Transport Models (CTMs), GEOS-Chem and IMAGESv2 has been shown. The seasonal variability of formaldehyde has been shown from the retrievals using the CTMs output as intermediate input. Furthermore, it is well shown how one can get complementary information about the vertical distribution of formaldehyde by using the two data sets of the IR and UV-VIS instruments which have different vertical resolution and sensitivity. The retrieval results have the potential to improve the accuracy of formaldehyde measurements performed from space based instruments. The paper describes the work very well and in a structured manner. Therefore I recommend it for the AMT publication with some minor additions as outlined below in the specific and technical comments.

Specific comments:

Out of the six microwindows used by Vigouroux et al.only four of them have been selected for the analysis of the FTIR data in this study. It is pointed out in the paper that the reason for discarding the two other microwindows is due to the presence of systematic residuals or very strong interferences blinding the weak formaldehyde absorption. I would suggest including the plots for the two discarded microwindows in figure 1 as this will show the amplitude of the interference in the residual. Additionally you may spare few words on why you have the selected spectrum measured at SZA of 80° for figure 1.

I would appreciate if you could include a figure showing the formaldehyde profile distribution from the combined results of both instruments.

Figure 6 c, lower panel has the y label cut. Please increase the size of the axis-labels and the legends.

Technical comments:

Page 10717: Line 22, “various” – please give the name of the instruments.

Page 10718: Line 16, please modify “IR” to “infrared (IR)”.

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Page 10719: Line 4, here you may include the names of some of the presently orbiting and future proposed satellite missions which can measure formaldehyde.

Page 10720: Line 24, I would change “Bruker IFS-120 HR” to “Bruker IFS 120 HR”.

Page 10720: Line 24, I would change “InSb” to “Indium Antimonide (InSb)”.

Page 10720: Line 24, I would change “HgCdTe” to “Mercury Cadmium Telluride (HgCdTe).

Page 10721: Line 2, inverse of twice the maximum optical path difference is the spectral sampling. Do you apodize the interferograms? What is the reason for the varying spectral resolution?

Page 10721: Line 4, how many spectra are co-added here to improve the S/N?

Page 10723: Line 15, a figure showing the formaldehyde profile would be helpful here.

Page 10724: Line 10, I would change “nadir satellite” to “nadir viewing satellite”.

Page 10725: Line 23, I would change “At ISSJ, a remote station with therefore low HCHO content, these two settings . . .” to “ISSJ being a remote station has low HCHO content, as a result these two settings . . .”.

Page 10725: Line 28, please spare few words on the reason to select a fifth-order polynomial for the fit.

Page 10727: Line 18, please specify what is meant by thin cloud conditions? Which cloud index or threshold has been used?

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 10715, 2014.