

## ***Interactive comment on “NDACC harmonized formaldehyde time-series from 21 FTIR stations covering a wide range of column abundances” by Corinne Vigouroux et al.***

### **Anonymous Referee #1**

Received and published: 5 March 2018

This paper describes the production of a harmonised data set for HCHO column abundances from 21 FTIR stations located across the globe. First of all, I must commend the authors for pulling this off. I cannot imagine it was an easy task. Bringing together the HCHO measurements from these different stations/groups is an important achievement, and it will be a valuable resource for modelling studies and for satellite validation purposes. It is a great step forward. I urge the authors to create an online repository where the data can be download easily by others.

Overall I recommend the paper for publication, the science and methods are sound, the results important, and it is well-written. I only have minor comments that need

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clarifying.

Minor comments

Please ensure all figures are large in the final version of the manuscript – they are very small and difficult to resolve; it is frustrating. Maybe they could be enlarged by breaking them into separate figures

I noticed that in Table 1 the observing period is very long for some of these stations (e.g., Ny-Alesund). Could the authors possibly comment on the instrument stability and performance over such long periods, and if it affects the HCHO retrievals at all? HCHO is difficult to retrieve is not?

Page 7, line 25. The a priori HCHO profile. The approach used here seems sensible, but how sensitive are the retrieval total columns to the a priori – especially as the DOFs is low.

Figure 3. The use of atm16 is clearly necessary; HITRAN 2012 needs some corrections. . . .

Table 3: The ‘DIFF30’ is a useful metric, it is given in %, but relative to what? Please be explicit. I’m actually surprised its values are so low (<25%) which is encouraging. Can you also indicate which sites are PROFFIT.

Page 13, lines 14-16. Some units are missing?

Page 13, last line. Variability faster than 30 mins. Is there any evidence for this in the literature (e.g., from models, campaigns).

Page 14, line 34: Typo – capital needed at “.this matrix. . .”

Page 15, line 7, Typo. “1E13” should be x1013

Figure 5: I can understand why this has been plotted but I think it would also probably be good to show the individual measurements for a single (common) year, rather than

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over the entire time record at each location. That way you can look at the day to day variability more closely – maybe put such a figure in the supplementary material.

Figure 6. The variability in the HCHO observations poses some interesting questions. There is a lot of science in here.

Page 19. The 45% yield reduction – this maybe indeed correct – but can you provide a little more explanation/justification.

Page 23: High mountain sites – at such locations it might be wise to quantify the difference between the station elevation and the model elevation for the 2x2.5 degree grid cells (maybe add information to Table 4). Is there any correlation between this difference and the bias?

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Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2018-22, 2018.