TROPOMI/S5P formaldehyde validation using an extensive network of ground-based FTIR stations

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This paper describe an extensive validation of HCHO TROPOMI operational product (version 1.1.[5-7]) by using twenty five ground-based solar absorption FTIR stations around the world, most of them affiliated to NDACC. The results found an overestimation of +26±5% of TROPOMI products for columns below $2.5x10^{15}$ molec/cm^2 and an underestimation of about -30.8±1.4% for columns larger than $8x10^{15}$ molec/cm^2. These results satisfy the pre-lunch requirements for TROPOMI. They present clear and detail description of the method used for the validation between satellite and ground-based measurements.

Although, the main finding are very well described, my main concern with the paper is the missing discussion on the reasons of main difference between TROPOMI and FTIR formaldehyde BIAS for some stations (large offsets) and also difference in seasonal cycle (e.g. Paramaribo, Paris, UNAM…) (See Figure 5.).

The topic of this work fits well within the scope of AMT. Although the paper is well structured, the text needs to be carefully revised in order to be more precise in some sections.

I recommend acceptance to AMT after addressing the comments above and few minor comments below.

Page 2, line 5, confusing sentence, "accuracy is below the upper limit of the pre-launch requirements of 80%, and below the lower limit of 40% for 20 of the 25 stations", it does not make sense to write that HCHO TROPOMI retrievals are below lower and upper limits. Please clarify it.

Page 3, line 1, is there any study of validation of satellite HCHO observation with ship-based measurements?

Page 3, line 8, please define what is "TROPOMI Cal/Val"

.Page 3, line 15, would you please mention what are the differences among versions from v.1.1.5 to v.1.1.7?

Page 4, line 12, why to use OMI albedo climatology?

Page 4, line 13, "(Kleippol et al., 2008)".

Page 4, line 20, please define all the quantities of the equation (e.g., M and M0)

Page 6, line 6, what is the main difference between PROFITT9 and SFIT4.0.9.4?

Page 7, line 7, please be consistent between names used in the text "Maïdo" and used in the figure 1.

Page 8, line 3,what are the reasons for the lowest smoothing systematic uncertainties in the 5 added sites.

Page 8, line 25, please remove "so"

Page 11, line 29, would be nice if you include one or two sentences describing the main differences between OFFL, RPRO and NRTI products. Are they different at all.

Page 16, line 31, would you please clarify how the collocation plays a role in Maïdo? Fire emissions are included in the calculation of the a-priori profiles? Could fire emissions enhanced the HCHO amounts? What is the effect of changing the collocation radius in this station?