

## ***Interactive comment on “Ground-based FTIR and MAX-DOAS observations of formaldehyde at Réunion Island and comparisons with satellite and model data” by C. Vigouroux et al.***

**Anonymous Referee #2**

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The paper by Vigouroux et al. reports on the comparison of ground-based observations of HCHO data with satellite and model data. This study comprises three major topics: 1) Sections 2 to 5 describe in detail the different data sets and their retrieval: ground-based observations with FTIR and MAX-DOAS, satellite observations with SCIAMACHY and model calculations of HCHO using the chemistry-transport model IMAGESv2. 2) The results section 6 details the comparison between the different data sets where 3) the discussion section 7 gives an eclectic effort to interpret the results. In general the paper is very well written and an interesting and scientific important piece of work and definitely merits publication in ACP. This is in particular true since only a very few studies are available where the very useful satellite observations

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are validated with complementary observations from the ground. Similar to reviewer #1 I have only minor points to be addressed by the authors to make the publication a bit easier to read. Restructuring sections 2 to 5: I would prefer to have the description of all data sets in one section with some sub-sections. Like reviewer #1 I see in particular for the description of the ground-based FTIR and MAX-DOAS data sets several similarities which should be explained in one subsection. This holds also for different tables (e.g. Tables 2 and 4) and figures (e.g. Figures 2 and 7) where one can have the information for both instruments in one common table/figure.

Reading the very good result and discussion sections for me only one critical point is missing: The authors did a lot of work to retrieve the right aerosol extinction from their MAX-DOAS observations and correct for that in the MAX-DOAS retrieval of HCHO (by the way, would it be possible to show a time series for the AOD during the 2004 period). But what might be the impact in particular on the satellite results? Depending on the aerosol type and its location (e.g. reflecting aerosol below the HCHO “plume”) it should have a huge effect and might explain part of the high day-to-day variability in the satellite data.

Minor points: In the introduction the reference to Wittrock et al., (Wittrock, F., A. Richter, H. Oetjen, J. P. Burrows, M. Kanakidou, S. Myriokefalitakis, R. Volkamer, S. Beirle, U. Platt, and T. Wagner, Simultaneous global observations of glyoxal and formaldehyde from space, *Geophys. Res. Lett.*, 33, L16804, doi:10.1029/2006GL026310, 2006) is missing, where satellite and MAX-DOAS observations of formaldehyde have been presented.

Figure 10: The total column averaging kernel for SCIAMACHY looks a bit odd. I would expect a smooth curve.

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