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Atmospheric Chemistry and Physics Discussions

Interactive comment on "First ground-based FTIR-observations of methane in the tropics" *by* A. K. Petersen et al.

Anonymous Referee #2

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General comments:

The authors present measurements of CH4 retrieved from ground-based FTIR observations in the tropics. These data are compared with SCIAMACHY satellite and TM5 model data.

CH4 is an important greenhouse gas and measurements in the tropics are quite sparse and are important to investigate the atmosphere. I agree with referee #1, the observations are important, but should be discussed in more detail. In particular, different sampling may affect the comparison with SCIAMACHY and model data. See also specific comments.

The subject is fully appropriate for publication in ACP. I recommend publication after

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major revisions.

Specific comments:

The title of the paper and the content of the paper differ. While the paper hints to an investigation of the tropical atmosphere the paper itself mainly discusses the validation of SCIAMACHY data. If the paper is intended to validate SCIAMACHY data this should be reflected in the title, too.

Several times 'validation of SCIAMACHY retrievals' is stated. At the current stage it is a comparison rather than a validation. For a validation a quantitative analysis of the comparison is missing as well as an error budget of the FTIR data and a comparison of the sensitivity of both sensors. Furthermore, due to the different sampling a quantitative validation is quite difficult to perform. Since the scatter of the SCIAMACHY data is quite large (in particular in 2007 and 2008) a 15 days average is given. Maybe a 15 days average of the FTIR data can be used as a measure to compare with.

Since the FTIR data have been taken during 2 short periods per year only, an annual cycle cannot be recorded with the FTIR data. Therefore, such an annual cycle cannot be compared with FTIR data. Furthermore, the scatter of the SCIAMACHY data is quite large. The statement of 'good agreement' needs some quantitative justification.

The comparison with model data is a bit hidden in Fig. 1. At least a link to Fig. 1 should be added or even better add the FTIR data points in Fig. 3. Then it might be easier to follow the argument 'The good agreement also in 2007 of the TM5 model with the "clean air" surface in situ measurements as well as with our FTIR observations is consistent . . .'

'. . . the first CH4 total column measurements showing this anomaly.': The FTIR time series doesn't show an increase in 2007. Again, an average value for each campaign might be a measure to see a variation from campaign to campaign.

A few times 'the first tropical ground-based FTIR measurements . . .' is stated. On

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Hawaii FTIR measurements of CH4 have been performed and reported (Rinsland et al. (1988), Infrared Measurements of Atmospheric Gases Above Mauna Loa, Hawaii, in February 1987, J. Geophys. Res., 93(D10), 12,607–12,626).

What is the typical column amount of methane in the tropics and how does it compare with the sub-tropics or mid-latiudes? There are several measurements (and also satellite comparisons) made in the sub-tropics and mid-latitudes to compare with, for example Payan et al., ACP, Vol. 9, 413-442, De Mazière et al. ACP, Vol. 8, 2421-2435, and Sussmann et al., ACP, Vol. 5, 2419–2429.

A figure of the spectral fit is missing. Since a wide spectral window is used a graph would be nice to illustrate the fitting quality in a broad window.

Technical corrections:

- products represent (instead of represents)

- with respect to (instead of 'of')?

- A break is needed in line 16 on page 2308 and in line 14 on page 2309 since the topic shifts.

- 'a priori' instead of 'prior' '

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 2303, 2010.