

## ***Interactive comment on “Methane cross-validation between three Fourier Transform Spectrometers: SCISAT ACE-FTS, GOSAT TANSO-FTS, and ground-based FTS measurements in the Canadian high Arctic” by G. Holl et al.***

**Anonymous Referee #2**

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General comments:

The authors present a validation study of methane data from two satellite sensors with ground-based FTIR in the Arctic. In order to study Arctic methane emissions satellite data are required. Before doing so a comprehensive data validation is needed. Therefore, the subject of the paper is an important topic. In this paper the cross-validation is conducted carefully and described in detail.

The subject is fully appropriate for publication in AMT.

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I recommend publication after minor revisions as listed below.

Specific comments:

- The data products used are described in some detail in Section 2. However, the spectroscopic data set used for the retrieval is not specified. If different spectroscopic data have been used for the different sensors a sensitivity study of these data sets based on ground-based retrievals might be useful.

- In Section 3.3 the influence of different potential vorticity (PV) on the inter-comparison is investigated. For this study profiles have been compared. Given the limited vertical resolution (partial) column amounts might be a better choice to look for influences of PV. In particular, a correlation plot of differences in (partial) columns with difference in PV might show such an influence more clearly.

- In case of TANSO-FTS the number of DOFs is very limited (see Fig. 3). In this case a validation of (partial) columns as presented in Section 3.4 might be more appropriate as compared to a validation of profiles (Section 3.5). So, maybe Figs. 3, 11-14 might be omitted in favor of correlation plots, see next comment.

- I miss a correlation plot of satellite versus ground-based partial column data to investigate whether those instruments show a similar response to variability.

- In Chapter 4 Kiruna and Poker Flat are specified as sub-Arctic sites. ('... at the only other Arctic site, Thule, ... Kiruna and Poker Flat, which exist in different climatic zones'). At least Kiruna is located within the polar circle. The 'inconsistency' with an earlier study (DeMaziere et al., 2008) is probably not really due to 'different climatic zones' but more likely due to different data versions or spectroscopic data sets used in the retrievals.

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