Geosci. Instrum. Method. Data Syst. Discuss.,
doi:10.5194/gi-2015-38-AC3, 2016

Geoscientific Instrumentation Methods and Data Systems Discussions

Interactive comment on "FTS measurements of column CO_2 at Sodankylä" *by* R. Kivi and P. Heikkinen

R. Kivi and P. Heikkinen

rigel.kivi@fmi.fi

Received and published: 31 May 2016

We thank the Referee for the comments, which are very helpful to improve the paper. We have updated the Figures and revised the text according to the comments by the Referee. Below we provide answers to all comments and questions.

Suggestion to include other data series and other trace gases such as XCH4, XCO, XN2O, XH2O.

Authors: We agree that it is useful to add information on additional gases. Therefore we have included an additional figure, which provides XCH4, XCO, XN2O, XH2O measurements. In addition we have also included relevant references. The text has been amended.

Referee: "please make sure to use CO2 vs. XCO2 vs. column CO2 correctly throughout the text" Authors: This has been corrected.

Referee: "the use of tense is inconsistent: very often present tense is used for descriptions of past events." Corrected in the revised version.

Referee: "Title and abstract: FTS actually measures XCO2 instead of CO2" Authors: We have used CO2 in the title and abstract, because with the FTS we are retrieving column abundances of the CO2. More precisely we measure solar intensity as a function of optical path difference, derive IR spectra from that, and subsequently retrieve column abundances of gases such as CO2 and some other gases. We agree that XCO2 is the final product provided by the retrieval.

p. 1, l. 26: XCO2: "column averaged dry-air mole fraction"

The text has been corrected.

p. 2, l. 14: start a new sentence after "in early 2009".

Done

p. 3, l. 6: I guess 45 cm OPD is the typical value and not the maximum - as "up to" implies.

The text has been corrected.

p. 3, l. 7:" rather talk about XCO2, XCH4, ..."

The text has been revised.

p. 4, l. 6: "Given that you have easy access to your instrument: why are there so few ILS measurements?"

Authors: We have collected more ILS measurements than shown in Figure 1. We have selected a set of measurements from each year, because the results are overlapping the previous ones. There is an outlier measured in July 2012, which we think is due to

the faulty scanner board. The scanner board was replaced and afterwards we haven't seen this kind of deviation in phase error.

Fig. 1: better also label x-axis of top plot (even though it is the same as the lower)

Has been corrected.

Fig. 2: "please mark the time when the laser was changed" An additional table has been included in the revised version (Table 2). The table provides information on the laser board changes.

Fig. 4: "I am confused by the y axis: how can you have up to 600 spectra per day? At 10 kHz scanner velocity, a full forward-backward scan should take around 3-4 minutes."

Authors: We record 2 spectra during each forward-backward scan. The collection time for a single scan is 78 seconds. 600 spectra is possible during the long clear summer days at high latitudes, given the solar zenith angle < 82 deg.

Interactive comment on Geosci. Instrum. Method. Data Syst. Discuss., doi:10.5194/gi-2015-38, 2016.