

## ***Interactive comment on “FTS measurements of column CO<sub>2</sub> at Sodankylä” by R. Kivi and P. Heikkinen***

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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 XCH<sub>4</sub>, XCO, XN<sub>2</sub>O, XH<sub>2</sub>O.

Authors: We agree that it is useful to add information on additional gases. Therefore we have included an additional figure, which provides XCH<sub>4</sub>, XCO, XN<sub>2</sub>O, XH<sub>2</sub>O measurements. In addition we have also included relevant references. The text has been amended.

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Referee: "please make sure to use CO<sub>2</sub> vs. XCO<sub>2</sub> vs. column CO<sub>2</sub> 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 XCO<sub>2</sub> instead of CO<sub>2</sub>" Authors: We have used CO<sub>2</sub> in the title and abstract, because with the FTS we are retrieving column abundances of the CO<sub>2</sub>. 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 CO<sub>2</sub> and some other gases. We agree that XCO<sub>2</sub> is the final product provided by the retrieval.

p. 1, l. 26: XCO<sub>2</sub>: "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 XCO<sub>2</sub>, XCH<sub>4</sub>, ..."

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

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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.

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