

Dear Editor,  
Dear colleagues,

In accordance with the comment of Referee #1 we correct the cited number of current TCCON sites from about 10 to about 15.

In accordance to the comments of Referee #2 we made the following modification to the revised manuscript:

(1) Spectroscopic parameters and circular argument concerning good FTIR-RS92 agreement:

- At the end of Section 3 we add a detailed description of the spectroscopic parameters that we applied:

“As spectral parameters for the line-by-line modelling we use the HITRAN 2008 parameters (with 2009 updates, Rothman et al., 2009), whereby we slightly modified the  $\text{H}_2^{16}\text{O}$  and  $\text{HD}^{16}\text{O}$  parameters in the 790-1330 $\text{cm}^{-1}$  range in order to minimize the systematic differences between simulated and measured signatures: a modification of 1-2% of the pressure broadening coefficients  $\gamma_{air}$  and of line strength coefficients  $S$  of less than 5% (Schneider and Hase, 2009a). These modifications are all within the uncertainty ranges given in the HITRAN parameter file. Furthermore, we adjust the line parameters for a speed-dependent Voigt line-shape model, since different laboratory studies clearly reveal the superiority of the speed-dependent Voigt line shape model over the commonly applied Voigt line shape model when simulating high resolution spectra in the infrared (e.g., D’Eu 2002; Tran et al., 2007; Wagner and Birk, 2009). In addition Schneider and Hase (2009a) and Schneider et al. (2010c) demonstrate that applying a speed-dependent Voigt instead of a Voigt line shape model is strongly recommended for ground-based water vapour profile remote sensing in the infrared. For further details about adjusting the HITRAN line parameters for speed-dependence please refer to Schneider et al. (2010c).”

- When discussing the comparison between RS92 and FTIR we add:

“Please note that such good agreement is only achieved by applying the adjusted for speed-dependence as described by Schneider et al. (2010c).”

- The important reference Schneider et al. (2010c) is now in press and has a DOI.

(2) Error analysis:

- We added a subsection 4.2 (“Propagation of uncertainty sources”) with 4 new Figures and 4 new Tables which describe in detail the error estimation (method and results).

- The Abstract and the Summary Section are adjusted accordingly.

(3) More information regarding the retrieval set-up:

At the beginning of Section 3 we add detailed information about the used microwindows, interfering species, simultaneous temperature retrieval, and other particularities of the retrieval method.

- (4) Retrievals in different spectral filter regions, previous work:
- We cite the work of Sussmann et al. (2009) and Palm et al. (2010) in the introduction Section.
  - We split the  $790\text{-}1330\text{cm}^{-1}$  region in two regions ( $790\text{-}880\text{cm}^{-1}$  and  $1090\text{-}1330\text{cm}^{-1}$ ), since within NDACC this region is often measured by two different filters. This means that for the revised manuscript we compare four spectral regions instead of three spectral regions. We adapted all the Figures to this modification.
  - The Abstract, the Introduction Section, and the Summary Section are adjusted accordingly.
- (5) We considered all the other comments of Referee #2 when writing the revised manuscript (for more details see reply to Referee #2).

Best regards, Matthias