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Comment

Interactive comment on “ECHAM5-wiso water vapour isotopologues simulation and its comparison with WS-CRDS measurements and retrievals from GOSAT and ground-based FTIR spectra in the atmosphere of Western Siberia” by K. Gribanov et al.

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Dear Reviewer,

We improved the text of our paper in accordance with your remarks and criticism, including change of title as you proposed. Please find answers to your questions below in this letter.

C4730

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“(1) In the introduction previous work on remote sensing of δD should be cited more carefully.”

We added more references, particularly, Steinwagner et al., 2007; Schneider and Hase, 2011; Boesh et al., 2013.

“Does this mean that almost all the δD variability can be explained by Rayleigh distillation? Siberia is a very continental site. What about the importance of evapotranspiration for δD ? I could imagine that in summer evapotranspiration has certain importance. Did the authors asses this? What about the observed δD increase during summer? Is the δD maximum in summer partly due to increased evapotranspiration? “

Answer to the reviewer (Martin Werner): We agree with the reviewer that local evapotranspiration does most likely play an important role for Western Siberia, especially in summer. This process will influence the δD_v signal of both the PICARRO measurements and the ECHAM5-wiso simulation results. However, we have not assessed this effect in detail, yet.

“This means that the authors are varying H₂O as well as δD a priori profiles (see also your Figure 7). This should be considered when comparing to the model: how much of the agreement to the model is due to the varying a priori and how much comes really from the measurement? A very important question;’

Answer to the reviewer (Nikita Rokotyan): We performed retrieval procedure using another reference profile, the comparison of results is shown in Fig. 9 (in revised version of paper). We showed that the retrieval of columnar value of δD from FTIR spectra in near infrared spectral region depends on the shape of initial guess vertical profile weakly.

“(3) The authors’ GOSAT retrieval using thermal nadir radiances is something new. So far GOSAT δD retrievals have been presented only for the near infrared. Can the authors please provide some references on these GOSAT measurements and/or refer to

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other work that uses this GOSAT spectral range? Since there is no reference about this new GOSAT thermal nadir HDO and H₂O retrievals the authors should provide more details about it: spectral resolution/noise in this GOSAT thermal radiances (ideally compared to other thermal nadir sensors like TES and IASI), their intentions/experiences with error estimations, comparison to thermal nadir retrievals using IASI or TES, etc. I think that a paper exclusively dedicated to this GOSAT thermal nadir retrieval would be very welcome. Do the authors have plans for submitting such paper in the near future?

As for retrieval of HDO (and δD) content from thermal infrared GOSAT measurements, we fully removed any mentioning on GOSAT data and the retrieval of some atmospheric parameters from these data As it was reported by J. Gero et al. in their report "GOSAT TIR Band Inter-calibration with Satellite Infrared Sensors" on 5th GOSAT PI Meeting (May 27, 2013, Yokohama, Japan), TIR Band of TANSO-FTS is badly calibrated. This calibration has explicit dependence on spectral coordinate and, probably, each spectral line has wrong shape. This circumstance makes retrieval of HDO (and especially δD) not feasible and, probably, explains our unsatisfying results. GOSAT officials reported to release new corrected version of data products, but this version (V160.160) will be obtained after reprocessing of the data obtained only after spring of 2013. So, retrieval of HDO (delta values) from thermal infrared spectra of TANSO-FTS will be presented in a future paper once the work that we will conduct using new corrected GOSAT data will produce reliable δD retrievals.

Sincerely yours, Konstantin Gribanov

Please also note the supplement to this comment:

<http://www.atmos-chem-phys-discuss.net/13/C4730/2013/acpd-13-C4730-2013-supplement.pdf>

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 2599, 2013.

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