

Dear Editor,

In response to the major comments/suggestions of the referees' we made the following major modifications of the manuscript:

- (1) We present a new set of assimilation experiments: for the new experiments we only assimilate observations when the model indicates no mid- and high-level clouds. The data characteristics for these cloud-free conditions are discussed in an additional figure (Fig. 1). We evaluate the analyses on a six hourly time scale, instead of a daily time scale. This requires modifications of all figures.
- (2) Section 3.2: instead of calculating the complementarity of additional T or δD observations (using q and/or {q,T} as the reference), we investigate in detail the observation impact of all three observation types q, T, and δD (using a single reference: {q,T, δD }). This allows quantitative comparisons between the observation impacts of the "traditional observations" (q and T) and the observations impact of the "new" δD observations. This in turn leads to clearer conclusion about the uniqueness of δD observations. This modification requires updates of Table 3, Figs. 3 and 6, and Subsection 3.2. has been renamed from "Complementarity of additional observations" to "Observation impacts of q, T, and δD "
- (3) We investigate the dependency of the skill/observation impact on the vertical velocity instead of the latent heating rate as in the manuscript of the discussion phase, in order to make it more consistent to other studies. This required changes in Figs. 4-6 and also of the title of the manuscript: from "Assessing the potential of free tropospheric water vapour isotopologue satellite observations for improving the analyses of latent heating events" to "Assessing the potential of free tropospheric water vapour isotopologue satellite observations for improving the analyses of convective events"
- (4) We separate Subsection 4.3 ("Discussion and outlook") into two subsections: "Simulations versus real world data" and "Outlook on assimilating real world δD observations". The first subsection discusses the differences between the observations used in the OSSE and real world observations. The second subsections discusses the resulting challenges and possibilities for a future real world δD data assimilation. We think that this modification of the argumentation chain allows for a better understanding of our conclusions.

We also considered the minor comments of the referees (see the respective replies).

Many thanks for your support and best regards,

Matthias Schneider