

## ***Interactive comment on “A new estimation of the recent tropospheric molecular hydrogen budget using atmospheric observations and variational inversion” by C. Yver et al.***

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Hello. I've enjoyed reading your discussion paper. It's very useful to have additional inversion analyses for H<sub>2</sub>. I hope you find these comments to be useful.

p. 28968, L. 25. Table 1, not 2, lists the RAMCES flask sites. p. 28970, L. 26. Table 2, not 1, describes UNIURB.

Fig 4: You might plot your S1 map, which as the scaled product of S0 wouldn't show a different pattern, but would be on a comparable scale to S3 and S4. Why are deposition values of zero filled in for some maps with the black color and left blank in others? I would consider not using the black color if it is a zero value.

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p. 76, L. 23: Should be "Ten plant functional types" instead of "Ten plants functional types".

p. 77, L. 5: Section 3.4 could be rearranged a bit to be more clear.

p. 77, L. 15: The emphasis on the minima and maxima, and later on 'hot spots' is somewhat confusing in this discussion. I would emphasize that you are just listing the grid-cell maxima in each plot and not use the word "reaches". Then, it will be more clear when you show that it is the 'mean' or 'total' soil sink that is more important.

p. 77, L. 18: Instead of lower panel, do you mean right panel?

p. 28977, L. 20: It is not clear what a 'summer total', 'yearly total', or 'global total' of deposition velocity is without a definition. It wouldn't make sense to have a cm s<sup>-1</sup> unit for a year's worth of soil uptake, but a mean could make sense. As could integrating over all latitudinal mean bands. Please explain more clearly. Without a clear explanation it's hard to know how the units are in tens of centimeters instead of tenths of centimeters.

p. 77, L. 25: Why are the variations important? It might be useful to explain the derivation of the S0 (Hauglustaine and Ehhalt, 2002) map very briefly on p. 76, L. 6 to give your reader some grounding.

p. 79, L. 18: Re-word or use a quantitative statement instead of 'very close results'.

p. 29003, Figure 6: Where is the S4 scenario results for Soil uptake in this figure? Hidden results could be indicated in the figure legend.

p. 28980, L. 23: It might be better not to imply early on that the S0 soil sink is too weak, if you show later that it might not be the case. Maybe one sentence earlier in the paper explaining that it was assumed to be too weak, but as you'll see, you don't conclusively find that with your analysis. Otherwise, the allusion to it being too weak is a bit confusing.

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Figure 6: The green vs green color scheme for S5, S5fwd and the components of both is confusing in the emissions plots. There is an additional dotted green line above the S0-S4 results - what does it correspond to? There is a faint green dotted line in some of the soil and OH plots too.

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