

## ***Interactive comment on “H<sub>2</sub> vertical profiles in the continental boundary layer: measurements at the Cabauw tall tower in the Netherlands” by M. E. Popa et al.***

**Anonymous Referee #2**

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Review of article by E. Popa et al., H<sub>2</sub> vertical profiles in the continental boundary layer: measurements at the Cabauw tall tower in the Netherlands

General comments:

A topic which has received much attention during recent years both in scientific literature and in general discussion papers has been further studied in the article by Popa et al. The new results for atmospheric H<sub>2</sub> mixing ratio, deposition velocity and H<sub>2</sub>/CO ratio have been obtained at an interesting site in Western Europe well suited for monitoring the long term developments in H<sub>2</sub>. A specific new feature is the use of four monitoring levels in a tall tower ranging from 20 to 200 m altitude. The authors take

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advantage of the versatility of the observations. As referee #1 suggested, the article would benefit from applying the gradient method to determine the H<sub>2</sub> fluxes. Generally the paper is very thorough and well written and can be recommended for publication in ACP.

Specific comments:

p.5598 l.21: Add more information on radon monitor. How did you calibrate your <sup>222</sup>Rn measurement?

p.5601 l. 20: Does the time series include all data or has it been selected somehow?

p.5604 l. 1: To me the April-May secondary maximum in fig. 4 is not very clear for H<sub>2</sub>. Rather it seems that H<sub>2</sub> is gradually decreasing after the winter maximum and then there is a steady period before the minimum in October.

p.5606 l. 22: In fig. 5a the rush hour seems to be best visible in the evening of 18th March and morning of 19th March, where all levels rise for few hours (all levels should rise also according to fig. 7). During 20-21 March only lowest level rises (and stays up throughout the night). Is there something misunderstood here? Fig. 5 is quite hard to read as part of article pdf printout, because the panels are so small.

p.5614 l. 11: It would be nice if you could give a short qualitative description of the seasonal variation of soil moisture in Cabauw. Can the high soil water content prevent H<sub>2</sub> deposition in winter? In addition to the dominating anthropogenic emissions and high atmospheric instability, can high soil moisture be the reason for the rare or nonexistent winter deposition events?

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