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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Temporal and spatial variability of the stable isotopic composition of atmospheric molecular hydrogen: observations at six EUROHYDROS stations" *by* A. M. Batenburg et al.

Anonymous Referee #1

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General comments:

The authors present data sets for time series of both mixing ratio and isotopic ratio (δD) of atmospheric molecular hydrogen at six different locations and discuss the seasonal variations and latitudinal gradients. The data presented in this study are of great quality and are very comprehensive. Considering the limited data on atmospheric molecular hydrogen, particularly for δD, the data presented in this paper will contribute significantly to understand the global budget of molecular hydrogen. In general the paper is well written, concise and data interpretation is very clear. I thus recommend publication

without major revisions.

Specific comments:

Page 10091, line 14: Could you provide more information about sampling? Did you preevacuate the glass flask and fill air sample or did you flush the flask several times with air sample? What's the initial pressure in the glass flasks after the sampling? Did you wrap the flask with something such as aluminum foil to prevent photochemical production since CH4/VOC oxidation is H2 source?

Page 10092, line 1: Have you tested the stability of H2 in the glass flask since "several months passed between sample collection and isotope analysis"? What's the initial pressure in the glass flasks before isotope analysis?

Page 10093, line 14: What's the δD value of the blank? If it is very different from that of the air samples, the 4% blank signal will have a significant impact on the results. Is this blank always taken into account and subtracted from the air sample signal?

Page 10094, line 18: Is there any criteria used to determine the outliers instead of "visual inspection"? Sometimes special local events such as wildfires could give a very strong signal.

Page 10095, line 22: VOC oxidation also has a seasonal variation. Will this contribute the seasonal variations of the signals at Alert except for the combustion source and removal processes? For example, in winter, H2 accumulates from depleted combustion source and contribution from VOC oxidation (enriched source) is very small, thus leading to the H2 peak and δD minimum in spring.

Page 10099, line 21-22: I am not sure if it is appropriate to compare the amplitude in the harmonic fit at Cape Verde with that at Mace Head and Alert. Since it is pointed out that "This is in contrast to the TM5 model results (Pieterse et al., 2011) where the seasonal variation in δ(D) at Cape Verde is somewhat smaller than for Mace Head and Alert" and "The harmonic fit does not seem to underestimate the amplitudes as it does for

the Alert and Mace Head datasets", it seems more reasonable to compare the original data instead of the harmonic fits. From the original data and on visual inspection, the seasonal variability of δ(D) at Cape Verde is not larger than that at Mace Head or Alert. The interannual variations at Mace Head and Alert indicate comparison of original data is more reasonable.

Page 10100, line 1: Can you explain why the trend of mixing ratio and δD of H2 at Amsterdam Island is like that? Is it related to sources, sinks, or transport?

Page 10105, line 6: Can you define "αapp"?

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 10087, 2011.