Review of "The SPARC water vapour assessment II: Biases and drifts of water vapour satellite data records with respect to frost point hygrometer records" by Kiefer et al.

April 24, 2023

1 General comments

The measurement of water vapour in the stratosphere is an important and difficult process; the comparison of the various ways of achieving it is an important task. This paper takes on that task and does so with a great deal of care and of attention to detail. It should be published, subject to some minor corrections, mostly to do with the figures.

2 Specific comments

- Most figures: it would be an improvement if all figures with a logarithmic pressure axis had that axis labelled in the same way. As it is, some figures (e.g. B1) have many labelled ticks between 100 and 10 hPa. Some have many ticks but few labels (e.g. Fig A4, right column) while others (e.g .fig A4, left column) have no labels or ticks between 100 and 10 hPa.

- Figure 1: The colour used for SGP/HUN/FTS is very similar to that used for TMF/LSA/HOU. The authors might like to consider revising their colour scale to ensure that all groups of three stations which share a colour are easily distinguished from the other groups.

- Figure 2 (and every other figure which shows SAGE-III) data: The pure yellow colour used for SAGE-III is almost invisible against a white background. Another colour should be substituted.

- Figure 4: The size of the left-hand panel, and the scales used, makes it quite hard to see both the MLS and TMF data clearly.

- Figure 5: It might be helpful to the reader to add the latitude of BLD to the caption to save the reader having to look back to Figure 1 to work out whether the station is tropical or not. Alternatively, this information could be in the running text at line 283, as has been done for HIL at line 297. The figure and the symbols in it are rather small; the authors might consider making the figure wider (there is plenty of sideways space on the page) or making it a single column figure with the two panels one above the other.

- Figure 7: The caption might remind the reader to look at figure 1 for the meaning of the colours and symbols.

- Figures A1 to A3: The running text includes nearly five pages of text discussing these figures. It therefore does not seem appropriate to relegate them to an appendix.

3 Technical corrections

- Line 58: Should be open quotes rather than close quotes before "Water ...". (In LaTeX, use ‘‘ for open quotes and ’’ for close quotes. Never use the double quote character ".)

- Line 155: Use open and close quotes properly around "SAT"; see comment for line 58, above. Also occurs in lines 543, 574, 718, and possibly elsewhere.

- The use of "exemplarily" is really clunky. The authors might want to re-write that sentence.

- Line 253 The use of "mutatis mutandis" is well established in some legal and mathematical circles in a variety of European languages. However, its usage in scientific writing in general is rare enough that I had to look

up what it meant. The authors might want to find a way of expressing themselves that does not require medieval Latin. (Note that the use of "a priori" should remain as that is an established technical term in the area of science covered by the paper.)

- Line 253, line 261 and elsewhere: A spelling question to which I do not know the anwer. Why does 'collocations' have two 'l's, but 'colocated' has only one?

- Line 546: (n-1) should be in LaTeX math mode: `$(n-1)$` to get $(n-1)$.

- Line 847: Should "Gauss-shaped" be "Gaussian-shaped"? (The kernels are certainly not shaped like Johann Carl Friedrich Gauss himself.)