

Interactive comment on “The SPARC water vapour assessment II: Comparison of stratospheric and lower mesospheric water vapour time series observed from satellites” by Farahnaz Khosrawi et al.

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General comments

This is a useful summary paper, which, for the most part, presents a large and complex body of information in a digestible manner. Most of the items that make it difficult for the reader are related to the large number of datasets from a single instrument (MIPAS). If it were possible to do anything to separate the inter-MIPAS comparisons from the

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(more important) comparisons between different instruments, then I would like to see this done. But I recognise that this might be too large a change to be made.

Like referee 1, I am conscious that this paper does not provide any kind of guidance to the reader as to which data sets are the most useful. I imagine that this is deliberate and is done to avoid annoying any of the data providers. I nevertheless feel that some sort of opinion as to which datasets are the most useful for which purposes would not be out of place.

Specific comments

- Page 4 line 10: The authors note that the data from UARS MLS are not considered. I do not think these data would add much as there are less than 18 months worth. But the authors have included the ILAS-II and SMILES data, which cover even shorter time periods, so I think they should explain why they are including ILAS-II and SMILES, but not including UARS MLS. (**Disclaimer:** I am responsible for the UARS MLS water vapour data.)
- Figure 1: The labelling of the colour bar is rather cluttered; it might be preferable to label only 2,3,4,5,6,7, and 8 ppmv.
- Page 8 line 14: I would remove the words “(contour time series)” as the data are presented as an image — no contours have been drawn.
- Page 8 line 27: Again (and in several subsequent places, including in the supplement), remove the word “contour” as figures 1, 5, and S1-S3 contain no contours.
- Figure 2-4: I do rather wish that the various teams involved with MIPAS would agree on one best product. Half of the products shown in these figures are from this one instrument. I understand that the instrument has various operating

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modes which are not directly comparable, so a single product may not be practical. But 13 different products are very confusing for the reader and the data user. It might have been preferable to first form some sort of combined or approved MIPAS dataset (or, at most, one for each operating mode) to be compared to other instruments. I do not imagine that the authors will want to re-design the entire paper along these lines. But for the purposes of these figures it might be better to show only one MIPAS dataset (and possibly, only one ACE-FTS data set — why do we need V2.2 if V3.5 is supposed to be an improvement?).

- Page 10-12: Many of the features of the data described here are rather hard to see in figures 2-4, on account of the large number of lines. I am not sure what to suggest (other than not showing all the MIPAS data!).
- Figure 5: The black dots are very difficult to see, especially against the darker end of the colour scale. Potential solutions include joining the dots with a line and/or using a colour (red?) which does not form part of the colour scale.
- Page 14 lines 1-15: One of the most striking features of the figure is the change in 2012 caused by the end of the Envisat mission and hence of the myriad MIPAS datasets. It strikes me that the use of the max-min difference to quantify spread means that this plot mostly tells you about where the noisiest dataset is at its noisiest. I have to question whether this is the most useful measure of either atmospheric variability or overall data quality.
- Figures 7-9: These figures are an interesting way of showing a large amount of summary information in a clear way, and in a small space. Something that caused me a bit of confusion was the way that the numbers in the upper triangle do not always align with those in the lower triangle. This is because different levels have different datasets available. It might be worth inserting blank rows into one or other triangle in each pane so that the two triangles have the same numbering scheme.

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- Figures 11-13: In addition to the suggestion I make regarding figures 7-9, figures 11-13 have text on them which is VERY small. It is commonly recommended that text on a figure should be no smaller than the figure caption text in the final typeset version of the article. There is clearly a bit of leeway on this recommendation, but the text on this figure is so tiny that it is very annoying for the reader, especially for middle-aged readers who are still cross that they need reading glasses. I am not sure what to suggest here, because simply making the text bigger will not work: in some cases it is already impinging on the diagonal lines.
- Page 21: dedication. I too have good memories of working briefly with Jo Urban, and was saddened to hear of his passing at such a young age.

Technical corrections

- Page 2 line 1: “allowed considering the time period” reads rather oddly. Maybe write “allowed us to consider the time period” or “allowed the consideration of the time period”.
- Page 3 line 17: “One drop (also known as the millennium drop) . . .” The “also” does not read right as you have not first given another name by which the drop is known. Maybe write “One drop (sometimes known as the millennium drop) . . .”.
- Page 11 Line 25: remove comma after “Both”
- Page 14 line 30: replace “than” with “as”

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