Earth Syst. Sci. Data Discuss., 7, C1–C5, 2014
www.earth-syst-sci-data-discuss.net/7/C1/2014/

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7, C1–C5, 2014

Interactive Comment

Interactive comment on "A global climatology of total columnar water vapour from SSM/I and MERIS" *by* R. Lindstrot et al.

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Received and published: 10 February 2014

Review of "A global climatology of total columnar water vapour from SSM/I and MERIS" by Lindstrot et al.

A new global climatology of total column water vapour (TCWV) has been constructed based upon SSM/I microwave retrievals and MERIS near infrared channels. The two satellite instruments are highly complimentary although are subject to contrasting characteristics meaning that MERIS land and SSM/I ocean estimates will generate effectively separate land/ocean datasets. This approach has nevertheless worked well in the past, for example for the GPCP precipitation dataset, and the authors go to some lengths to evaluate the quality and characteristics of the new dataset. My assessment

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is that the work warrants publication subject to the minor recommendations and suggestions below.

1) Is this product superior to combining microwave TCWV over ice-free oceans with reanalysis data over land (e.g. Allan et al. 2013 Surv. Geophys. doi:10.1007/s10712-012-9213-z)? If the authors can provide evidence for this then it may help in demonstrating its usefulness.

2) While microwave TCWV datasets have a mature methodology, to my mind this is not yet the case for MERIS TCWV data. Will preferential sampling of clear-sky scenes lead to underestimated monthly mean water vapour since clear events which can be quite rare in some regions, are generally less moist than cloudy scenes (e.g. Cess and Potter 1987 Tellus doi:10.1111/j.1600-0870.1987.tb00321.x; Allan et al. 2003 QJRMS doi:10.1256/qj.02.217). See also comment (10).

3) Abstract - "global time series" are mentioned yet the paper does not present them. This would be a stringent test for homogeneity.

4) p.60, L17 - "uncertainties are not changed" - this is not clear to me. Does it mean that uncertainties are the same in both datasets or the same as their parent products?

5) p.61, L18 - TCWV and low level moisture are also strongly linked with intense rainfall and the hydrological cycle (e.g. Held and Soden, 2006 J Clim doi:10.1175/JCLI3990.1; Allan et al. 2013 Surv. Geophysics).

6) p.61, L23 - TCWV is not a key variable in the water vapour feedback since changes in water vapour in the middle and upper troposphere are more important than changes at the lowest levels which influence TCWV most strongly (e.g. Soden et al. 2002; Allan et al. 2003 doi:10.1007/s10712-012-9213-z).

7) p.63, L12 - the NVAP product suffered from inhomogeneities; how does the new GVaP product compare with the up-to-date NVAP global time series? This may be work for future studies.

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8) p.65, L10 - how is the altitude of the freezing level parametrized? This may be affected by a warming atmosphere and influence the retrieval.

9) p.15, L15 - how does the present method compare with the method applied to the widely used Wentz et al. products? Are there big differences?

10) p.66, L2 - are daytime clear-sky conditions representative since there could be more water vapour during the day than at night yet less water vapour in clear-sky regions than cloudy. To what extent are these biases significant and do they compensate each other?

11) p.66, L18 - if the cloud data used for screening suffers from inhomogeneity this could affect the TCWV time series through changes in systematic biases and scene identification.

12) p.67, L15 - "modelled" based upon what input data?

13) p.69, L7 - daily or monthly climatological averages?

14) p.69, L23 - F13 has quite stable ECT but F14 drifts by a few hours. Presumably the diurnal cycle of TCWV is not large enough for this to introduce significant errors?

15) p.71, L13 - does masking out precipitation regions bias TCWV low or is this effect small?

16) p.71, L19 - can the smooth transition of water vapour between land and ocean be evaluated using high resolution reanalyses?

17) p.73, L16 - is there any evidence of a trend or jumps in the record?

18) Figure 6 - it is difficult to see the ocean points. I suggest making the symbols bigger as there are less ocean points. These points appear to be biased high; is there any reason for this? This seems to be the opposite bias found for the MERIS-SSM/I comparisons in Fig. 8.

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19) p.74 - this is a very nice comparison of MERIS and SSM/I over sunglint regions

20) p.74, L9 - is the wind speed from SSM/I?

21) Figure 8 - is cloud also screened from SSM/I in this case?

Corrections

p.61, L5 - Trenberth et al., 2009

p.63, L5 "it is indicate to use" –> "our aim is to use"

p.72, L8 - "Exemplarily" –> "As an example," (also Fig. 1). Exemplary implies "very good" which it may well be but "Example" is probably more appropriate!

p.72, L24 - remove "overall" which is not necessary

p.73, L4 - "In case" –> "In the case"

p.75, L4 - "a not properly working" –> "an inadequate"

References

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Interactive comment on Earth Syst. Sci. Data Discuss., 7, 59, 2014.