

Comment on **essd-2022-57**

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Referee comment on "Tropospheric water vapor: a comprehensive high-resolution data collection for the transnational Upper Rhine Graben region " by Benjamin Fersch et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2022-57-RC2>, 2022

The authors introduce the process of how to get tropospheric IWV products based on occultation and satellite remote sensing synthetic aperture radar data, using data fusion and data assimilation methods in WRF, and describes the preliminarily evaluations of the quality in this paper.

Major comments.

1. In the introduction, it should be included the previous research on using similar methods and data to get the product. It is suggested to add.
2. At present, the contents before page 7 are far more than expectation. Many of them have nothing to do with the research itself, but are related to the fundamental data and methods. It is suggested that only the contents closely related to the study are kept. The structure of the paper needs to be greatly adjusted. The second section and the first section should be merged, and there is no need for subtitles. The second section is not an introduction to the data and research methods used in this paper, but is more like the expression in the master's or doctoral thesis technical document. It is not suitable in the scientific research paper. Pages 2 to 7 is suggested to be shortened to 3 pages at most. It is assumed that the reader is engaged in parts of research in this field. The third section should not be a description of the data set, but an introduction to the specific input data used in my research and the methods. You can also introduce the horizontal spacing and vertical resolution of observation points actually used in the research. It seems that the focus of input data and output products of this study is not prominent. The IWV product is in the form of grid data, right?

3. The difficulty of this study is the treatment in the case of clear/cloudy circumstances, or precipitation, when the variation of water vapor in the lower atmosphere is more complex.

4. What are the thresholds of spatial and temporal matching during evaluation or colocation? The distance in space, and the time difference.

The evaluation results are insufficient. What is the variation of time series? What is the seasonal change from 2015 to 2019? And what is the difference with those in ERA5? In ERA5, GNSS bending angles and water vapor information from radiosonde in different height of the atmospheric are assimilated. InSAR data are not assimilated. Is IWV integration of GNSS assimilated? From the results, it is found that local water vapor field is more reasonable after assimilation of new observations like InSAR.

Minor comments.

1. The temporal and spatial range of the product should be stated in the abstract and summary. In the conclusion, we should summarize the above and data quality of this product, briefly explain the input data and methods.

2. Abstract. Among should be changed, like one of. Guess should be changed, like estimated or other word. Add the physical quantity IWV in the abstract, which is very important. Add the time period from 2015 to 2019 (or others?), and the quantitative results like 0.98.

3. L82. Delete the citation of the extreme weather events.

4. L267 and 338, etc., no details like these are required.

5. Figure 1 can be deleted. Please consider whether to delete section 3.5.

6. Figure 2 and Figure 4 (not 4S? Put Section 3.3 instead of section 3.5) should be placed in earlier pages.

7. L345. There is a logic problem. Generally, the citations should not be this section itself. It is section 3.

8. Figure 5. What are the first seven in the y vertical axis?

9. Figure 6. In the caption and text, = is inappropriate. The relationship between GSI and GNSS should be expressed in many words to prevent ambiguity. GSI is not referred to the NCEP assimilation system (Gridpoint Statistical Interpolation)?

10. Figure 10. More scales should be added in y axis. The longitude and latitude of Figures 4 and 11 are irregular, while those in Figure 2 are standard.