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Hydrology and Earth System Sciences
Discussions

Interactive comment on "A new uncertainty estimation technique for multiple datasets and its application to various precipitation products" *by* Xudong Zhou et al.

Anonymous Referee #2

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The manuscript entitled "A new uncertainty estimation technique for multiple datasets and its application to various precipitation products" introduced the variance partitioning method into uncertainty quantification of ensemble precipitation datasets, which considers both temporal and spatial uncertainties, and thus established a more comprehensive uncertainty metric as compared with the classic metrics. The deviation of the mathematical framework is rigorous and complete, while lots of work, including various precipitation products in multiple regions, was conducted in the validation of the new metric. On the other hand, some theoretical questions are needed to be explained clear and the English writing of this manuscript needs improvement. The detailed problems are listed as follows: (1) According to the definition of the new uncertainty

metric, it's one of components partitioned from the SST over time, space and ensembles. Thus, the new uncertainty Ve interacted with other components (Vt and Vs), as the authors discussed in Section 6.1. Given an ensemble of precipitation, if we replace one year's data to make the inter-annual variation larger, then the Ve obtained will correspondingly decrease. However, this decrease of Ve resulted from regular temporal variation instead of variability of ensemble precipitation datasets. In summary, how to separate the influence of normal spatio-temporal variation from the ensemble variability representing the new uncertainty estimation? In addition, is the classical N.t.std or N.s.std affected by the same temporal or spatial variation? (2) Following Comment (1), the authors should clearly define the reasonable variation resulted from temporal dynamic or spatial heterogeneity and variability associated with uncertainty investigated in the present study of biased ensemble precipitation datasets. Also, as the interaction between the spatio-temporal variation and ensemble data variability exists, is it part of the uncertainty Ve? (3) The authors said the new uncertainty metric Ve contained both temporal and spatial uncertainties at the same time, while the classical metrics (N.t.std or N.s.std) contained only one source of uncertainties. Why the comparison of Ve with classical metrics was conducted by using each of classical metrics rather than the sum of N.t.std and N.s.std? (4) Many literatures in the field of hydro-meteorology have studied on the variance decomposition method in multi-source uncertainty investigation. What's the difference between the new uncertainty estimation partitioned from grand variance and previous studies should be highlighted in Abstract and Introduction. (5) There exist many grammar mistakes in the manuscript. For example, "an new uncertainty ..." in Abstract should be "a new uncertainty ...", the expression of "which has been included the model variation" in Abstract is wrong, "of" was omitted after "because" in Line 30 on Page 2. In addition, please check Line 16 on Page 5 and Line 8 on Page 25. (6) Despite the grammar mistakes, multiple improper or incomplete English expressions also tended to hinder the readability of the paper. For example, the mean precipitation value in Line 26 on Page 10 may be not only derived from "The long-term annual mean precipitation" but also from the lumping of spatial grids? To make review-

ers and readers fully understand this study, the English should be improved considerably throughout the manuscript. (7) The gauge precipitation provided by CMA was taken as the benchmark. Although the CMA data was excluded from gauge-based group, other gauge-based products also contained part of the gauge data from CMA. This is expected to clearly state. Were the gauge-based data downloaded in grid or gauge format? Are all the precipitation data in daily time scale? (8) Why is there no content in the section of 2.4? (9) In Figure 6, since the curves plotted represented the uncertainty, what does the band of $\pm$standard deviation around the curves mean, the uncertainty of uncertainty? Please explain. (10) In Figure 12, the quantile of the box is increasing from bottom to top for normal boxplots, while there is inverse order of quantiles here. Please check it.

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