

Comment on **essd-2022-200**

Anonymous Referee #1

Referee comment on "A dataset of standard precipitation index reconstructed from multi-proxies over Asia for the past 300 years" by Yang Liu et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2022-200-RC1>, 2022

The manuscript titled "A dataset of standard precipitation index reconstructed from multiproxies over Asia for the past 300 years" by Liu et al presents a great effort of extending the spatial and temporal reconstruction of the hydroclimate variation in Asia, which would serve as a valuable component to the PAGES 2K family. I therefore recommend the publication of this work, after the authors addressing the following comments and questions:

Major comments

- The study area covers a larger region than what has been discussed in the introduction. Please provide a brief rationale of why choosing the study area, especially the Russian territory in Europe, and add in the introduction, the research progress has been made in the areas not covered in the four gridded datasets.
- One novelty of this reconstruction is the new approach of the grid-location-dependent division (GLDD), but the description and validation of the method, in my opinion, is not sufficient. For example, if GLDD is original to this study, then it deserves a separate subsection and should be developed from a theoretical framework; or if it is a new application of an existing method, then the original reference(s) should be given.
- A work-flow-chart illustrating the steps taken to reconstruct the index will be very helpful, as multi-proxy datasets have been applied during the procedure, and different data sites have been involved and some eliminated at various stages.
- Along with comment (3), it would be nice to show in Figure 1 where the "135 ring-width chronologies" are and what time frame they cover. It would also be helpful to make a table listing the number of proxies (sites) used for construction of Nov-Oct SPI2 Version A and B, and wet season Version A and B, respectively, at different time intervals.
- The merge of DW65 into DW120 (Line 132-139) needs to be illustrated more clearly. For example, how were the 2045 records of DW65 added? Is there a calibration or verification performed on both datasets? How were the 2045 added records fit to the isolines? Please also provide the rationale for including the 4 ice cores and 1 stalagmite

record, and the important data information.

- The "Results and Discussion" section could be enriched by illustrating some examples of its usability. For example, the new reconstruction could benefit the study of Asian monsoon responses to ENSO and volcanic eruptions (Liu et al., 2022). Or it could be utilized to study the interannual to centennial spatiotemporal variability in hydroclimate reconstruction in Asia (therefore also echoing one of the motivations of this study suggested in Line 22-24).
- It is also important to discuss the uncertainties or limitations of this study, in terms of the methodology or the changing of reconstruction quality along time or in some regions. For example, it would be nice to hear the authors' opinion on how the GLDD method compares to the ones already used in PAGES 2K (Christiansen & Ljungqvist 2017).

Miner comments:

- Line 20-22, please add a couple of the most up-to-date studies, such as Wei et al (2020) on the topic.
- Line 53-54, please provide the references of the "many new proxies achieved in recent years" if they are from published sources.
- Line 55, please add "over the past 300 years" following "reconstruction effort on seasonal to annual precipitation variability", as a way to address the opening question (Line 22-24) of lacking interannual to centennial spatiotemporal variability.
- The subsection 2.2 on instrumental needs more details, for example, why does a separate GPCP precipitation data is used to identify the wet seasons of different regions in Asia? Some information about the different rainfall regimes and their driving mechanism will be helpful.
- I believe there are some typos in some of the years mentioned in Line 173-178. For example, it should be "4 candidate proxies for 1700-1739 (Fig.4c)" instead of 1939. Please double check and correct all relevant typos.

References:

Christiansen, B., and F. C. Ljungqvist (2017), Challenges and perspectives for large-scale temperature reconstructions of the past two millennia, *Rev. Geophys.*, 55, 40–96, doi:10.1002/2016RG000521.

Liu et al. (2022) Tropical volcanism enhanced the East Asian summer monsoon during the last millennium. *Nature Communications*. <https://doi.org/10.1038/s41467-022-31108-7>

Wei, K. et al (2020). Reflections on the Catastrophic 2020 Yangtze River Basin Flooding in Southern China. *The Innovation* 1, doi:10.1016/j.xinn.2020.100038.