

# Interactive comment on "Multi-proxy reconstructions of May–September precipitation field in China over the past 500 years"

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- In blue: referees' comments
- In black: our answers
- In black italic: what we will propose to add in the text

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## General comments:

The PAGES Data Stewardship Integrative Activity seeks to advance best practices for sharing data generated and assembled as part of all PAGES-related activities. As part of this activity, a team of reviewers has been constituted for the "Climate of the Past 2000 years" Special Issue. The data team is reviewing the data handling within each of the CP-Discussion papers in relation to the CP data policy and current best practices. The team has identified essential and recommended additions for each paper, with the goal of achieving a high and consistent level of data stewardship across the 2k Special Issue. We recognize that an additional effort will likely be required to meet the high level of data stewardship envisaged, and we appreciate dedication and contribution of the authors. This includes the use of Data Citations (see example in

supplement). We ask authors to respond to our comments as part of the regular open interactive discussion. If you have any questions about PAGES Data Stewardship principles, please contact any of us directly.

Best wishes for the success of your paper,

2k Special Issue Data Review Team (Darrell Kaufman, Nerilie Abram, Belen Martrat, Raphael Neukom, Scott St. George) and ex-officio team members (Marie-France Loutre, Lucien von Gunten)

## Major comments:

### Item 1: Essential additions for this paper:

(1) Add a "data availability" section that describes where the data can be accessed, including a Data Citation for the precipitation reconstruction generated in this study (#6 below).

**Response:** We will add 'data availability' section in the revised manuscript. Our reconstructed precipitation field will be archived on the NOAA website, as done for our previous studies (e.g., Shi et al., 2012a; Shi et al., 2012b; Shi et al., 2013; Shi et al., 2014; Shi et al., 2015). A data citation will be added for all the records. It's a good opportunity to check all datasets again, especially for the proxy records. We found that 31 tree-ring records in the original Table S1 from different sources are duplicated and should be removed. e.g. No. 299 and No. 482 are the same tree-ring width chronology in Zhangxian, China. Moreover, a Dryness/Wetness record in Tainan was not included in any grid reconstruction and can also be deleted. Herein, 476 proxy records are already available in the public repository, including 241 tree-ring width chronologies in International Tree Ring Data Bank (ITRDB) (<https://www.ncdc.noaa.gov/data-access/paleoclimatology-data/datasets/tree-ring>), 78 tree-ring width chronologies in the supplement of the book (Li et al., 2000), 38 tree-ring chronologies in the PAGES2k\_dataset v2.0 (<https://figshare.com/s/d327a0367bb908a4c4f2>), 12 tree-ring width chronologies and 107 Dryness/Wetness records at the webpages of the Chinese Meteorological Data Service Center (CMDC) ([http://data.cma.cn/data/detail/dataCode/HPXY\\_HDOC\\_CHN\\_DAW.html](http://data.cma.cn/data/detail/dataCode/HPXY_HDOC_CHN_DAW.html), and [http://data.cma.cn/data/cdcdetail/dataCode/HPXY\\_TRRI\\_CHN.html](http://data.cma.cn/data/cdcdetail/dataCode/HPXY_TRRI_CHN.html)). Following the PAGES Data Stewardship Integrative Activity, only these 476 proxies that are already archived in public repository will be used to reconstruct the precipitation field in the revised version of this study. All figures will be updated with this dataset. We compared the revised figures with the previous versions, and confirmed that the revision has no substantial impact on our main conclusions.

We have the data analysis to confirm the quality of our reconstruction is similar with only the archived data sets. According to data availability, we divided into three proxy subsets: 1) version A: 476 proxies are already archived in published repository. 2) version B: 38 tree-ring chronologies are included in addition to 476 proxies in

version A. The 38 proxies were shared from Asia2K phase one. We will contact with the leader of Asia2K phase one and hope that the 38 tree-ring chronologies can be archived in published repository soon; 3) version C: 53 tree-ring chronologies and an instrumental record are added in addition for 514 proxies in version B. We do not expect that those 54 records will be publicly available soon. The figures below show differences between the 3 subsets.

### Data coverage

In Figure 1, the coverages of three subsets are different. For instance, in version C, there is a tree-ring chronology in Northeastern China and a long instrumental precipitation record in South Korea, which are useful to improve the accuracy of reconstruction in Northeastern China.

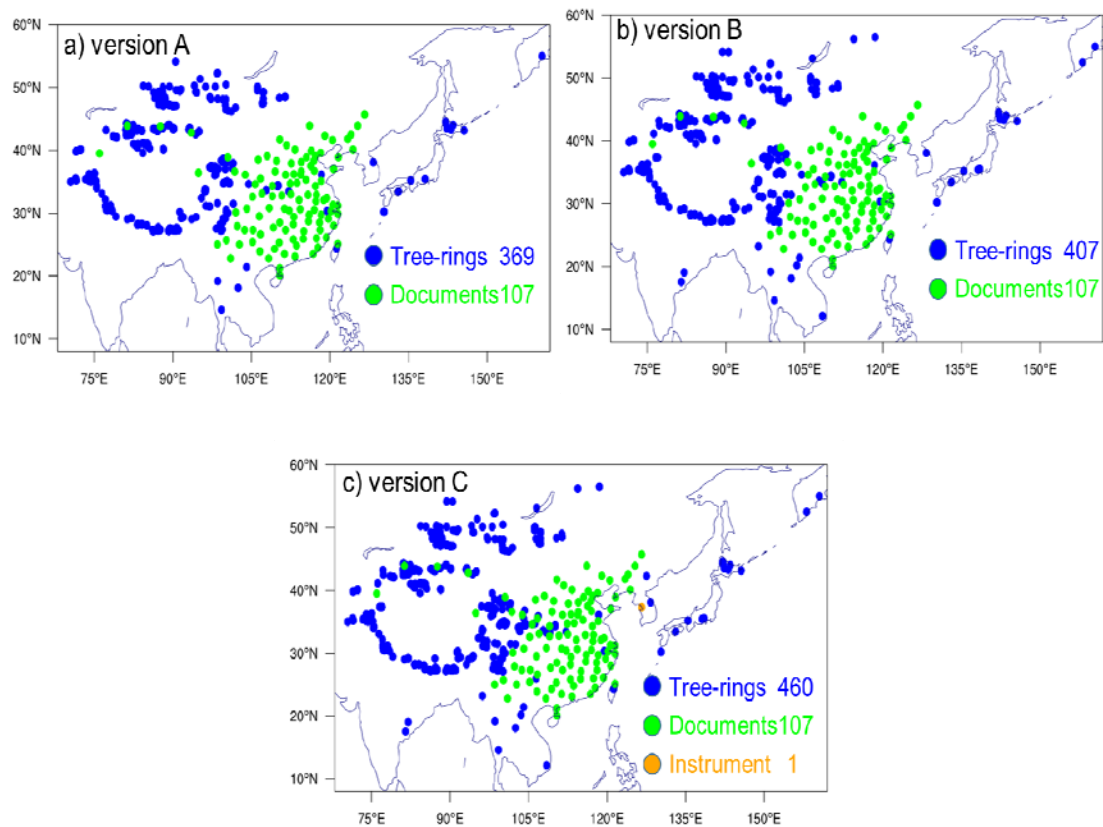
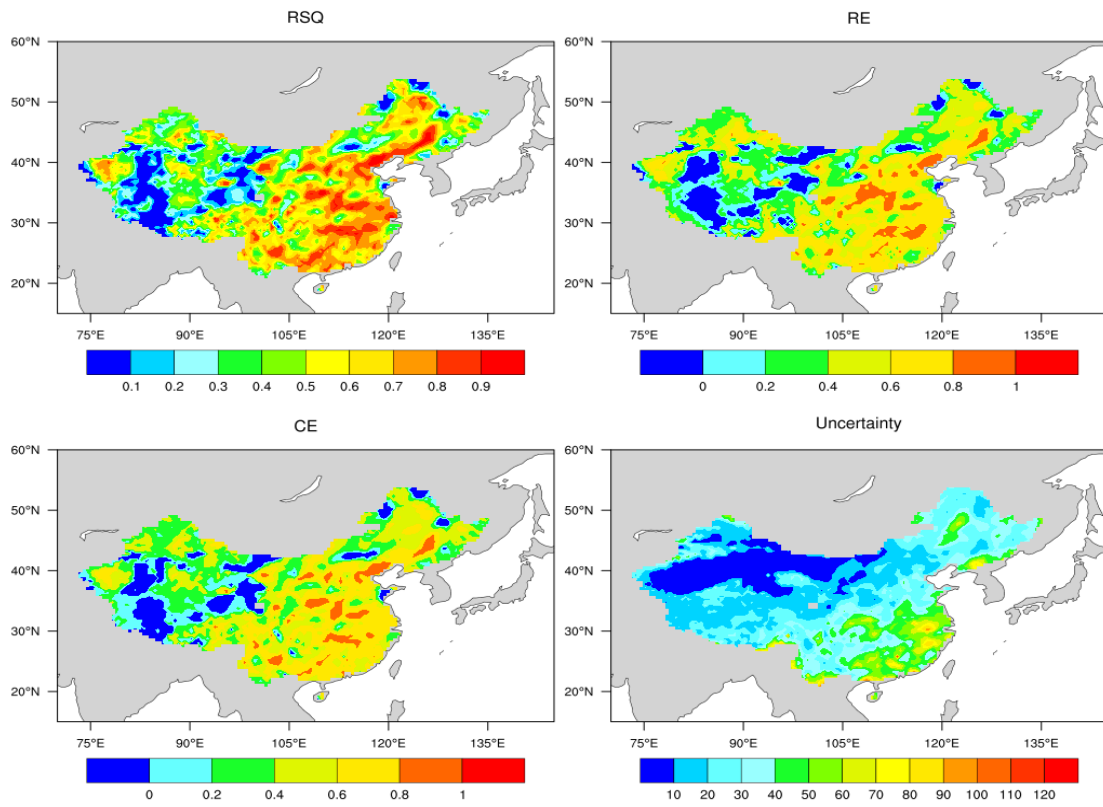


Figure 1 Map showing the locations of 476 proxy records (a), 514 proxy records (b), and 568 proxy records (c).

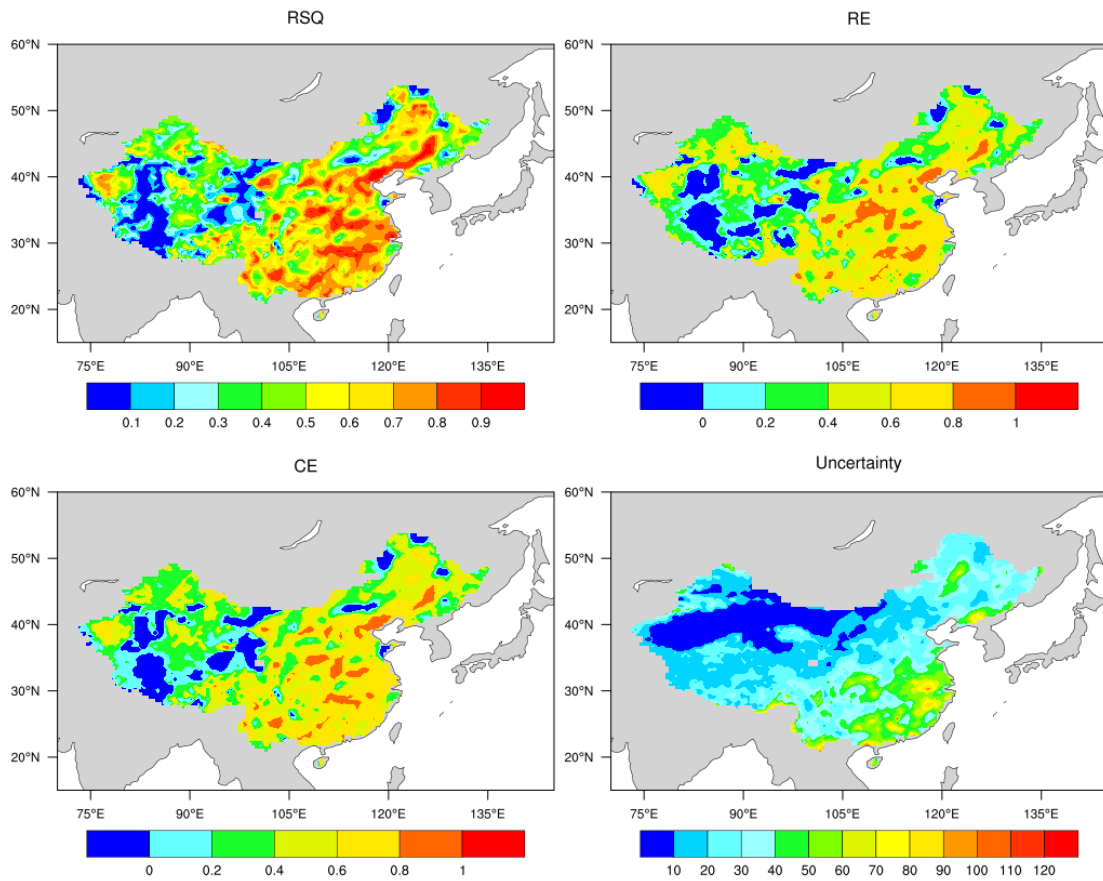
### Skill scores of three reconstructions using the 3 data subsets

Figure 2 shows that the  $r^2$ , RE and CE values of three reconstruction are very similar. But the four grids ([34.25°N, 100.25°E], [34.25°N, 100.75°E], [41.25°N, 128.25°E], and [49.25°N, 129.25°E]) in version A and the two grids ([34.25°N, 100.25°E] and [34.25°N, 100.75°E]) in version B were not reconstructed because there are no enough proxies.

a) Version A:



b) Version B:



c) Version C

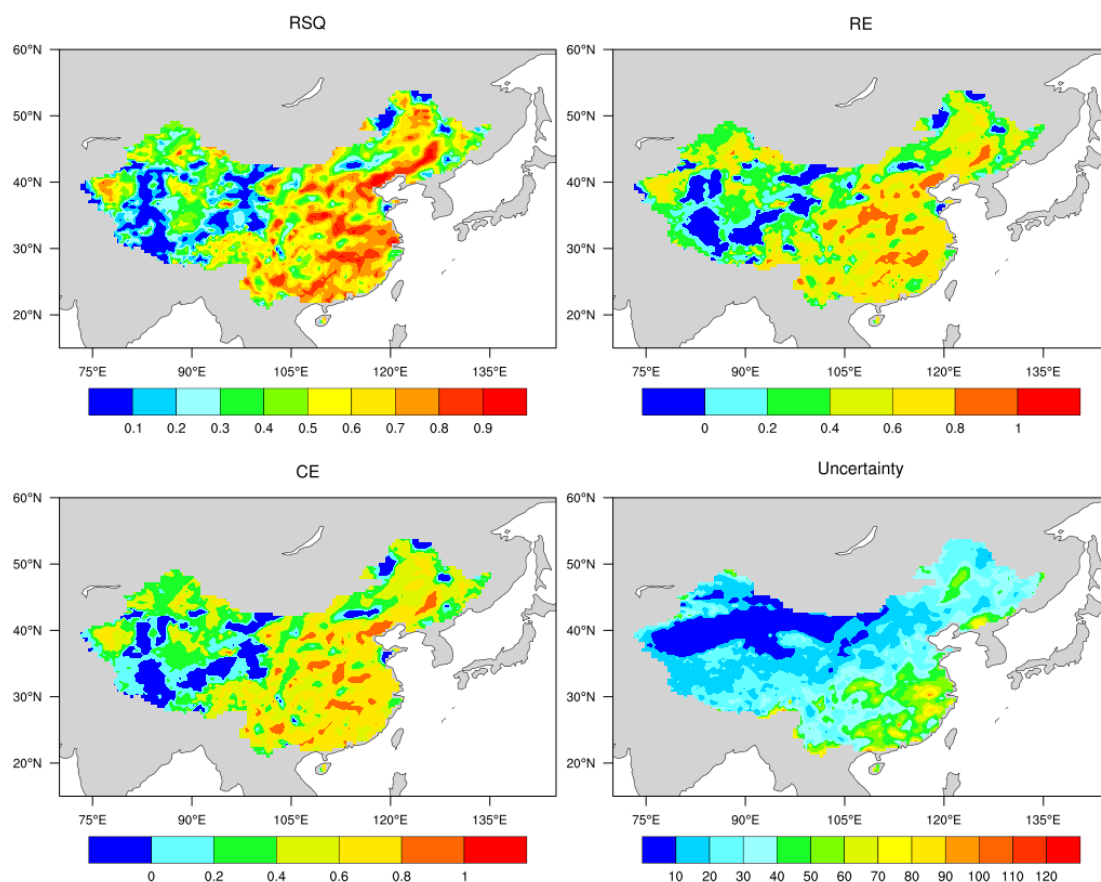


Figure 2 Skills of the reconstructed MJJAS mean precipitation anomalies in China for three versions (the 1961–1990 verification period and the 1991–2000 calibration period). The  $r^2$  is the square of the Pearson product–moment correlation coefficient, the RE and CE are the reduction of error and the coefficient of efficiency, the uncertainty is characterized from the standard deviation of the residual between the reconstructed and instrumental precipitation data during the verification period.

**Conclusion:** The skill scores of three reconstructions are very similar. This indicates that the selection of subsets does not affect the data analysis and the main conclusion in this manuscript. But it still affects the several grid reconstructions. e.g. the four grids in version A were not reconstructed because of the insufficient proxy records. Following the rule of the PAGES2k special issue, we will show the results with version A in the revised manuscript.

**Item 2:** (2) Add Data Citations (in addition to publication citations) for all 492 proxy datasets listed in Table S1.

**Response:** Following the data review team’s suggestion, we will add the data citations in Table S1 in the revised manuscript.

**Item 3:** (3) For those data not already in a public repository, including the 108-time

series of wet/dry records, submit essential metadata along with the time series and include the Data Citation in Table S1.

**Response:** Following the team's suggestion, we will submit essential metadata which includes the Data Citation in Table S1, but the time series will not be included in Table S1. Because the Dryness/Wetness dataset is already achieved in Chinese Meteorological Data Service Center (CMDSC) in a public repository. It is easy to get the time series through a simple registration on the website ([http://data.cma.cn/data/detail/dataCode/HPXY\\_HDOC\\_CHN\\_DAW.html](http://data.cma.cn/data/detail/dataCode/HPXY_HDOC_CHN_DAW.html)).

**Item 4:** (4) For those records with previous PAGES 2k IDs, please include cross references to those IDs. These can be found in Table 1 of PAGES2k Consortium (in press). It will be of interest to know how many of the tree rings were used to reconstruct temperature.

**Response:** Following the team's suggestion, we have checked all Asian tree-ring chronologies in PAGES2k Consortium dataset v2.0 (PAGES2k\_v2.0.0). There are 229 Asian tree-ring chronologies in the PAGES2k\_v2.0.0 dataset, and 172 of them are used in this study. Cross references will be made in Table S1.

**Item 5:** (5) If this study relied on the PAGES2k temperature data base for metadata, quality control or other aspects, then please cite that compilation (PAGES2k Consortium, in press).

**Response:** Following the team's suggestion, we will cite the compilation (PAGES2k Consortium, in press) for 172 tree-ring chronologies in this study. Herein, 134 of 172 tree-ring chronologies have already been archived on NOAA website.

**Item 6:** (6) Submit the primary outcome of the data analyses to a public repository and include the Data Citation. This includes (a) the detrended and infilled version of all tree-ring chronologies, (b) the resulting precipitation time series reconstruction with and without 9-year smoothing, (c) the IMFs of the reconstruction time series at multiple temporal scales (Figs 5 and S1), and (d) the reconstructed precipitation value for each grid point at a reasonable time resolution, possibly decadal.

**Response:** Following the PAGES Data Stewardship Integrative Activity, we only use 476 proxy records which are already archived in the public repository. We will submit the metadata with the data citation in Table S1. The output of the data analyses will be submitted to NOAA website and a data citation will be added. (a) All 369 tree-ring chronologies are already archived in the public repository. We will include the original data URL to show where the data are archived by the original author. (b) The gridded precipitation data including the regional mean curve (in Figs 4 and 6) and its IMFs (in Figs 5 and S1) will be submitted at an annual time resolution to allow analyzing extreme events.

**Item 7:** Recommended elements are:

(1) Archive the instrumental precipitation target time series (Fig 4a and 4b, black

lines)

**Response:** The two instrumental precipitation datasets are both archived by the Chinese Meteorological Data Service Center (CMDSC). Herein, the China's Ground Precipitation Dataset V2.0 can be obtained from the website ([http://data.cma.cn/data/detail/dataCode/SURF\\_CLI\\_CHN\\_PRE\\_MON\\_GRID\\_0.5.html](http://data.cma.cn/data/detail/dataCode/SURF_CLI_CHN_PRE_MON_GRID_0.5.html)) and The Homogenized Monthly Precipitation Dataset in China can be downloaded from the website ([http://data.cma.cn/data/detail/dataCode/SEVP\\_CLI\\_CHN\\_PRE\\_MON\\_GRID.html](http://data.cma.cn/data/detail/dataCode/SEVP_CLI_CHN_PRE_MON_GRID.html)).

**Item 8:** (2) Archive the precipitation anomalies for the six climate modes (Fig 9, blue lines)

**Response:** We will archive the precipitation anomalies for the five climate models in Fig 9 on NOAA website, the last one is the reconstructed result, not the simulation.

**Item 9:** (3) Archive the code used to generate the reconstruction

**Response:** We will archive the code for the OIE method on GitHub website after this work published.

## References

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