

Overall comments

Thanks for the revision. The authors involved many details on the data accuracy and uncertainty, as well as the methodology. I still have one question on the data quality. Although the authors proposed some strategies to improve the data quality, such as using the cloud amount-based inhomogeneity detection plus two homogenizations to minimize data uncertainties. There are still some defects in the harmonized datasets. For example, although the improved SunDu-derived R_s within 1985-1990 were explained by the increasing cloud-free days, the discrepancies between observed and enlarged after the homogenization. Some approaches are suggested to minimize these data discrepancies.

Response: Thanks for the reviewer again for the detailed comments. In this study, we used the variation in cloud cover and atmospheric transmission under cloud-free conditions for 1985-1990 to address the reliability of the homogenized SunDu-derived R_s . Although there are some discrepancies between observed and SunDu-derived R_s after homogenization, their trend for 1981-1995 are nearly the same as shown in Table 1. Minor modifications were also made based on the specific comments.

Specific comments

L179-187, Are the PMT and PMF tests two components of the RHtest approach. I get lost here according to the writing.

Response: We modified this sentence in Lines 179-181 in the revised paper: RHtest provides two algorithms, the penalized maximal T (PMT) test (Wang et al., 2007) and the penalized maximal F (PMF) test (Wang, 2008b), to detect changepoints.

L218-221, rewrite this sentence.

Response: We rewrote this sentence in Lines 221-223: As RHtest can detect the changepoints in the raw data series when the metadata are unavailable while Katsuyama (1987) can't, and RHtest was therefore selected in this study.