Dear Editor Dr Peer Nowack,

Many thanks for your hard editorial work again. We also thank Reviewer 2 for the constructive comments regarding the connection to aspects of previous work. According to the comments from the Editor decision, we have thoroughly addressed Reviewer 2's concerns. In the online re-submission, we have included our point-by-point replies to Reviewer 2's concerns. Please see track changes in the third revised manuscript for our responses.

We are looking forward to a further decision on the revised version.

Best regards,

Jing Wang, Yanju Liu*, Fei Cheng, Chengyu Song, Qiaoping Li, Yihui Ding, and Xiangde Xu

The following are our point-by-point replies to Reviewer 1's concerns.

The authors have positively addressed the comments. I thank the authors to clarify that their EAMBZ domain is different from that of Si et al. 2021. However, I would say that one can still infer the same conclusion about the interdecadal variations in the JJA EAMBZ precipitation from Si et al 2021.

Reply: Many thanks for your constructive comments. We have clearly stated that the EAMBZ domain in the current study is different from that of Si et al. 2021. Therefore, we saw distinctive conclusions about the interdecadal variations in the JJA EAMBZ precipitation, which are different from the work of Si et al 2021.

Please see **Line 267-271** in the third revised version for the related contrastive analysis.

Line 267-271

"Note that to some extent, the observed major interdecadal fluctuation periods of summertime EAMBZ precipitation are dissimilar from those tied to summertime Northeast Asian precipitation revealed by observations (1900–2012) from 11 local meteorological stations (Si et al., 2021), e.g. the above-normal precipitation over EAMBZ (Fig. 1e) vs. the below-normal precipitation over Northeast Asia around 1990 (Si et al., 2021; their Fig. 2a)."

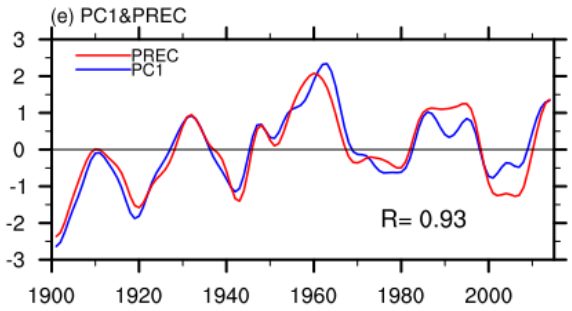

Fig. 1e Normalized time series of the JJA-mean EAMBZ precipitation index (IEAMBZP) (red line) and associated first principal component (PC1) (blue line), with the number denoting the temporal correlation coefficient (TCC) between the corresponding time series. Precipitation data are detrended and 11-year low-pass filtered.

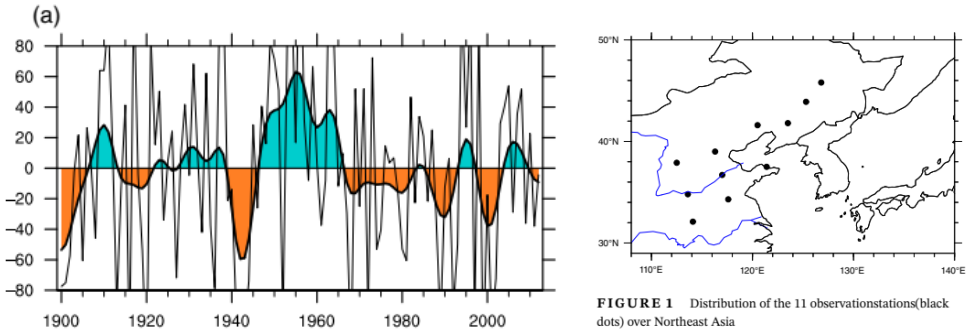

Fig. 2a Time series of summer precipitation (unit: mm) over (a) Northeast Asia from 1900 to 2012, averaged for the 11 stations in Northeast Asia (see the figure to the right). The filling curve is the decadal-filtered values.
(Fig. 2a was copied from **Si et al., 2021**)

Also, to my next question about Zhang et al 2018 which investigated the connection between IOBM and EAMBZ precipitation, the authors responded that Zhang et al 2018 studied combined influence of IOBM, AMO as well as PDO on EAMBZ precipitation while the current study highlights the primary role of IOBM. However, except in L320-324 in this version of the manuscript, I do not find this message in the manuscript. Reading the abstract as well, one will not find this information.

Hence, I would request the authors to rewrite/restructure to highlight these two major points both in the abstract and the manuscript I) a different domain compared to Si et al 2021II) relative to past studies such as Zhang et al. 2018, this study shows the primary role of IOBM. At this stage I would recommend for a major revision.

Reply: Many thanks for your helpful comments. We have restructured the Abstract and the final Section "Conclusions and discussion" to highlight the two issues of the different domain compared to Si et al 2021, as well as the role of IOBM.

Please see **Line 18-19** and **Line 22-23** in the **Abstract** for the third revised version.

Revised Abstract

"Based on long-term observational and reanalysis datasets from 1901 through 2014, this study investigates the characteristics and physical causes of the interdecadal variations in the summer precipitation over the East Asian monsoon boundary zone (EAMBZ), which is a peculiar domain defined from the perspective of the interplay between climatic systems (i.e., mid-latitude westerly and East Asian summer monsoon). Observational evidence reveals that, similarly to previous studies, the EAMBZ precipitation featured prominent interdecadal fluctuations, e.g., with dry summers during the periods preceding 1927, 1939–1945, 1968–1982, and 1998–2010, and wet summers during the periods of 1928–1938, 1946–1967, and 2011 onwards. Further analyses identify that, amongst the major interdecadal oceanic forcings (e.g., Atlantic multidecadal oscillation and Pacific decadal oscillation), the Indian Ocean basin mode (IOBM) is a significant oceanic forcing responsible for the interdecadal variations of the EAMBZ precipitation, playing an independent and critical modulation role. When the cold phase of the IOBM occurs, an anomalous cyclonic circulation is excited around the northeast corner of the tropical Indian Ocean, which further induces a "north-low–south-high" meridional seesaw pattern over the Northeast China–subtropical western Pacific (SWP) sector. Such seesaw pattern is conducive to the enhanced EAMBZ precipitation through linking favorable environments for the transportation of water vapor from the SWP and the convergence over EAMBZ at interdecadal timescales. For this reason, a physical-empirical model for the EAMBZ precipitation is developed in terms of the IOBM cooling. Despite the fact that the extreme summer EAMBZ precipitation cannot be captured by this model, it can still well capture its interdecadal fluctuations and reflect their steady relationship. The key physical pathway connecting the IOBM cooling with the interdecadal variations of the summer EAMBZ precipitation is supported by the numerical results based on the large ensemble experiment and the Indian Ocean pacemaker experiment. Our findings may provide new insights into the understanding of the causes of the interdecadal variations in the summer EAMBZ precipitation, which may favor the long-term policy decision making for the local hydrometeorological planning."

Please also see **Line 439-440** and **Line 457-458** in the **Conclusions and discussion** section in the third revised version.

Line 439-440

"EAMBZ is a peculiar domain defined from the perspective of the interplay between climatic systems (i.e., mid-latitude westerly and EASM). …"

Line 457-458

"We further identify that, amongst the major interdecadal oceanic forcings (e.g., Atlantic multidecadal oscillation and Pacific decadal oscillation), …"

Reference:

Si, D., Jiang, D., Hu, A. and Lang, X., 2021: Variations in northeast Asian summer precipitation driven by the Atlantic multidecadal oscillation DOI: 10.1002/joc.6912.

Zhang, Z., Sun, X. and Yang, X.-Q., 2018: Understanding the interdecadal variability of East Asian summer monsoon Understanding the Interdecadal Variability of East Asian Summer Monsoon Precipitation: Joint Influence of Three Oceanic Signals DOI: 10.1175/JCLI-D-17-0657.1.