Reply to the comment of Dr. Q. Zhang:

We pay our highest tributes to his valuable comment. We would like to mention that we noticed previous studies on ENSO-climate teleconnections and reviewed the progress in their theory and frontier research issue in the introduction part of our manuscript. The following are the detailed explanations for our scientific focus, methodology, and main findings.

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'I read with great interest this paper, but found it boring and meaningless. Actually, there are numerous researches addressing precipitation changes and relevant connections to ENSO, and other global climatic signals. However, I cannot find anything new or novel from this paper in terms of methods, idea and even results and conclusions.'

As an influential ocean-atmosphere phenomenon, ENSO has been reported to exert enormous changes on climate and hydrology over the world, especially around the Pacific Rim (e.g. Gershunov and Barnett, 1998; Gong and Wang, 1999; Yeh et.al, 2009). In China, ENSO dominates parts of the abnormal signals in monsoon systems. Various studies have extensively documented the teleconnections between ENSO and precipitation anomalies in different spatio-temporal scales (e.g. Lin and Yu, 1993; Huang and Wu, 1989; Zhou and Wu, 2010). However, most studies have focused on changes in annual or seasonal precipitation amount related to ENSO rather than changes in individual precipitation events, although possible shifts in characteristics of precipitation events, e.g. frequency and intensity, have been highlighted in studies of climate change around China (Zhai et al., 2005). The anomalies in precipitation amount derive from anomalies in its frequency, intensity or the joint distribution, but precipitation events and their extremes are direct indicators more relevant to hydrology than annual and monthly amounts. What's more, precipitation extremes, such as consecutive wet days and dry spells, which directly relate to droughts and floods, have rarely been addressed in previous studies of ENSO over China.

Thus, we use a comprehensive set of precipitation indices in this study to reach our main objectives: (1) describe ENSO-induced precipitation anomalies between developing and decaying stages; (2) compare the anomalies of precipitation frequency and intensity with those of annual amount; and (3) propose possible changes in precipitation extremes responsible for these anomalies.

In the goal-oriented analysis, this study highlights the new type of El Niño events, Central Pacific El Niño, and differences between developing and decaying stages.

Our innovation is to integrate potential anomalies in characteristics of precipitation events with those in precipitation amount to inform climate and hydrology policy. We respect his opinion about our research innovation, but we think our study have proposed very interesting research gaps where a sufficient attention was paied in previous studies. We hope he was willing to reread our manuscript and rethink the scientific problems we put forward.

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'Besides, the authors of this paper presented statistical results only but no causes and physical mechanisms were discussed with enough evidences. Therefore, I cannot take this study as a real study. It is nothing but a simple statistical analyses. In general, this paper lacks novelty in methods, idea and even conclusions. No new findings can be found. What's more, it is a kind of repeated work, in this sense, I do think it is boring to read such a repeated work.'

In the methodology, we adopt a commonly used way to obtain the anomalies of signals and test the anomalies by the nonparametric Mann–Whitney U (Teegavarapu et al., 2013). Although there is very limited creativity in our methodology, it is worth mentioning that meteorological stations from National Meteorological Centre in China have undergone rigorous selection process into our dataset to omit possible non-climatic noises (Qian and Lin, 2005; Qu et.al.2016). This process is not an easy task, includes extreme value and consistency check, spatial outliers test, and homogeneity test, but can significantly improve the quality of long-term climatic data. We think these methods are sufficient to discover the ENSO-induced changes in our objectives.

Many interesting findings are discovered in the anomalies of precipitation events. For example, Eastern Pacific (EP) El Niño caused less precipitation in developing years and more precipitation in decaying years, but a clear pattern was only found in decaying Central Pacific (CP) El Niño (line 114-line 132). This can be further explained in detail (line 151-line 172). Anomalies of the amount in EP roughly paralleled anomalies in frequency and intensity, but the anomalies were altered in CP. In CP decaying years, negative anomalies in frequency (Southern China) and positive anomalies in intensity (Northern China) resulted in the total pattern, that means the anomalies of the amount in different regions were dominant by different contexts of precipitation events. In CP developing

years, however, clear anomalies in characteristics of precipitation events didn't induce obvious anomalies in the amount across China. Our study provides in-depth explanation in the ENSO-induced precipitation anomalies which is little mentioned in previous studies. More findings can be derived from such comparisons above.

Moreover, this study explains what precipitation extremes ENSO events have triggered and what linkages are there with the anomalies of the amount. For example, in EP and CP decaying years and in LN developing years, the number of very wet days (R95p), the maximum rainfall in one day (Rx1d), and the number of consecutive wet days (CWD) all increased, which supplemented the linkages between anomalies of the amount and those of frequency and intensity. In addition, risk of floodings and droughts may be directly revealed by anomalies of precipitation extremes, such as probable droughts in EP developing years while probable floodings in EP decaying years.

The regional distributions of the anomalies in the contexts of precipitation events are very complex, and thus the anomalies of precipitation amount should be treated with care to further inform climate and hydrology policy, such as adaptation efforts ahead of extreme events. Regionally, we found that the continental climate zone of China is more sensitive to ENSO than other regions based on the region's high incidence and magnitude of anomalies in precipitation events. Possible driving mechanisms behind the spatial differences may be related to the anomalous Western North Pacific anti-cyclone and variability of East Asian summer monsoon, which is further analysed in our discussion and conclusion. In summary, our study puts forward an outline to explain the anomalies of precipitation in detail and provides a means of climate prediction on a daily time scale. We think lots of further researches are needed to advance our understanding after this study.

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'I cannot suggest acceptance because of its lowest quality and presentation quality.'

Finally, we respect all his opinions, but we hope he was willing to reconsider our innovation in ideas and findings and accept our manuscript for this publication.

We express sincere thanks to him for his efforts again!