

## ***Interactive comment on “Seasonality and spatial variability of dynamic precipitation controls on the Tibetan Plateau” by Julia Curio and Dieter Scherer***

### **Anonymous Referee #2**

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This manuscript analyzed the seasonality and spatial variability of dynamic precipitation controls on the Tibetan Plateau using HAR dataset. It stresses the high impact of the mid-latitude westerlies on precipitation distribution on the TP and its surrounding year-round. I can feel the strong eagerness of authors on concluding the westerly is the controller of the precipitation over the TP. However, manuscript is supportive enough. I have great concerns before the conclusions could be drawn. Substantial revisions are necessary before the manuscript is publishable.

All of this work is based on the single approach – correlation and single data set – HAR. Large uncertainties in conclusions occur due to the approach adapted and data set used. Multiple approaches or datasets are necessary to swipe away these uncertainties.

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More validation and evaluation on HAR are of fundamental necessity before it could be used on analyzing. The whole basement of this study is the precipitation classification by Maussion et al. (2014). However, the precipitation classification Maussion et al (2014) did is for only the glacier accumulation regimes locating at high altitudes above about 5000m shown in their Fig. 14, rather than for the whole Tibetan. Is it representative for the precipitation over the whole TP? If so, please show the evidences. If not, suggest changing the title to “. . .on the glacier accumulation regimes over the Tibetan Plateau”

P2L47, it reads “on average, more than 60% of moisture needed for precipitation falling on the inner TP are provided by the TP itself (Curio et al. 2015)”. In authors’ previous paper published in 2015. That suggests that convections over the TP dominate precipitation in the TP rather than the moisture transportation from outside. In this manuscript, the westerly are argued to be the dominant controller in precipitation. These two conclusions are conflict to each other. Which one is the leading controller of the precipitation in the TP, in authors’ ultimate view? What is the linkage of the convections and the westerly? Considerate analysis and evaluation are strongly suggested before the conclusion is drawn.

Over ocean or area with low elevations, 300 hPa is high enough to stand for the height that the westerly locates. However, the TP possesses an elevation above 4000m on average. 300 hPa is too low for the westerly over there. Authors cite Schiemann et al. (2009) as the reason of this selection. We can read the cited reference is about the precipitation climate of Central Asia. The TP possesses distinguish climate from the Central Asia not only in its unique height, but also the distance from the ocean. They are not comparable. Authors should refer to works in the TP rather than other where. Numerous studies claim that the westerly reaches as high as 100 hPa over the TP. For instance, 200 hPa (in the global climate model domain, Gao et al., J. Climate 2014) or 100 hPa (in regional climate model domain, Gao et al., J. Climate 2015) are the height where the westerly hang over the Tibetan; whereas, the 600 hPa (in the

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global climate model domain) or 500hPa (in regional climate model domain) is the near surface. The 300 hPa is a middle layer between the upper and near surface layers. It is reasonable using the vertical wind speed at 300 hPa for the vertical motions. However, the horizontal wind speed at 300 hPa used to represent the westerly jet over the Tibetan is questionable.

It is claimed that “Six controllers are selected”. However, five are analyzed in 3.2.1a, 3.2.1b, 3.2.2, 3.2.3 and 3.2.4. Do I missing something? Before the controller is concluded, I prefer to call them elements rather than controller. In addition, background of these elements is missing. Why these elements are chosen? What is their relevance with precipitation? For instance, the horizontal wind speed at model level 10 (WS10) is used. What is the height of model level 10? What it stands for? Is the PBLH relevant to PBL parameterization schemes used in simulation?

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