

#### Reply to Anonymous referee #4

The manuscript presents tree ring width records from three sites near and outside the edge of the modern East Asian Summer Monsoon (EASM) region, where are considered to be affected by the interaction between the EASM and the westerlies. The authors found that both the EASM and the westerlies play a significant role in shaping climate changes the Helan Mountains, Changling Mountain in the southern part of the Alxa Plateau is mainly influenced by the EASM, and Dongdashan Mountain is mainly influenced by the westerlies. However, it is still unclear how does the large-scale ocean-atmosphere changes influence the interaction between the westerlies and the EASM, therefore resulting in the hydroclimate changes in these three study sites.

Reply: Generally, the intensity of ENSO (El Niño-Southern Oscillation) was inversely correlated with the intensity of the EASM. There was a negative correlation between PDO (Pacific Decadal Oscillation) and dry-wet variation in the region west of 100°E. When the NAO (North Atlantic oscillation) is in positive phase (negative phase), it indicates that the mid-latitude westerly winds are in strong (declining) phase, which is conducive to (unfavorable) precipitation formation.

#### Main comments:

1. Lines 601-604, all of the above-mentioned large-scale climate and ocean-atmosphere changes affect the EASM and westerly circulation through different pathways, which in turn have various effects on the northwestern edge zone of the EASM and the zone of interaction between the two major atmospheric circulations. It's too coarse to say "all of the above-mentioned...", "various effects on...". I would suggest the authors extend this part by comparing the tree ring width index with ENSO/PDO and NAO indices, in order to illustrate how the large-scale ocean-atmosphere changes effect the interaction between the EASM and the westerly.

Reply: We have added the general related information in Line 602-606. "*Generally, the intensity of ENSO (El Niño-Southern Oscillation) was inversely correlated with the intensity of the EASM. There was a negative correlation between PDO (Pacific Decadal Oscillation) and dry-wet variation in the region west of 100°E. When the NAO (North Atlantic oscillation) is in positive phase (negative phase), it indicates that the mid-latitude westerly winds are in strong (declining) phase, which is conducive to (unfavorable) precipitation formation.*"

As demonstrated in the text, the impact of westerly and EASM on the study area is the subject of this paper. Studies of the Tibetan Plateau monsoon and large-scale ocean-atmosphere changes (ENSO/PDO and NAO) impacts on the westerly winds and monsoon circulation add to the complexity of regional climate change in terms of the driving mechanisms. With regard to this matter, our team must also conduct further research in this area.

2. Figure 7 has been removed, and the current Figure 8 should be changed to Figure 7. I suggest to add one more figure to discuss how the large-scale ocean-atmosphere changes (ENSO/PDO and NAO) effect the interaction between the EASM and the westerly. It is recommended to integrate Figures 1 and 2 into one figure.

Reply: In accordance with the proposed modification, Figures 1 and 2 have been consolidated into a single figure. Furthermore, the figure serial numbers have been revised.

3. In the 2.1 study site section, please point out the interval distance between the three tree ring sampling sites

Reply: We have added the following sentence in section 2.1: “*The distances between the CL and HL, CL and DS, and DS and HL sampling sites are approximately 250 km, 310 km, and 450 km, respectively.*”

4. Some sentences should be carefully checked and polished. For example, in lines 595-600, “large-scale climate and ocean-atmosphere changes”, a better statement should be “large-scale ocean-atmosphere changes”.

Reply: We have revised it accordingly.

#### **Reply to Anonymous referee #5**

The authors have followed most of the recommendations and the manuscript has been significantly improved. Below I list a few minor comments while reading the revised version of the manuscript. I suggest that this manuscript can be accepted after minor revision.

1. Line 49, influenced by the westerlies and the the East Asian summer monsoon (EASM).

Reply: We have revised it accordingly.

2. Line 119-121, this sentence should be reorganized.

Reply: We revised it to “*Qinghai spruce (Picea crassifolia) is a common tree species in the Helan, Changling and Dongdashaan mountain areas around the Alxa Plateau. Using dendrochronological methods, we analyzed the climate response characteristics of spruce radial growth on the above three mountains.*”

3. Line 152-153, As a result, vegetation cover in this region is characterized by pronounced interannual variability.

Reply: We have revised it accordingly.

4. Line 543, The southward movement of the cold air is also correspondingly weakened.

Reply: We have revised it accordingly.

5. Line 555, please change “wrote” into “stressed” or “indicated”

Reply: We have revised it to “*indicated*”.

6. Line 556-558, When the westerlies become stronger (weaker), the high precipitation zone moves northwestward (southeastward)

Reply: We have revised it accordingly.