**Climate
of the Past**
Discussions

Interactive comment on "Response of *Pinus sylvestris* var. *mongolica* to water change and the reconstruction of drought history for the past 260 years in northeast China" *by* Liangjun Zhu et al.

General comments:

By compositing tree-ring width records from four sites in NE China, the authors have reconstructed a regional PDSI history of past 260 years, and find an increasing PDSI (decreasing drought stress) trend with a warming climate. The historical extreme dry/wet years were identified and discussed. This reconstruction was validated by other drought related reconstructions. The potential impacts of large-scale climate variability, such as AMO, PDO, ENSO etc were tested by correlation analysis.

The long-term regional moisture history is valuable for understanding the response of moisture variability to a warming climate. However, high quality PDSI reconstruction

is still lacking in NE China. The PDSI reconstruction present in this study is based on sufficient tree-ring with data which are produced by standard dendrochronology procedure. The reconstruction results could provide an important insight into the driving mechanisms of PDSI variability of past centuries.

The language of this manuscript needs to be largely improved by native speakers or by professional editing service. I suggest this MS being accepted by CP if the coauthors can address all reviews' concerns and taking into account of comments in CPD (if they are reasonable)

Specific comments:

Lines 9-10: "our reconstruction is accurate and representative, and recorded the same dry years/periods" Does it mean your reconstruction is more accurate and representative than previous ones? If yes, this statement is supported by a more coherence of your reconstruction (than precious ones) with historical and documents and fire history? Line 27 preserved should be replaced by recorded? Line 33 producing should be leading to? Line 40-41 should be improved as: 81 million people and more than 720,000 farmland hectares were suffered from water shortage Line 42-45 River can not on fire, I think you are referring to the Daxing'anling forest fire in May 1987 of Heilongjiang Province, please improve this part correspondingly Line 46-48 This part could be improved as: In order to better character current and project future drought conditions, an improved understanding of past drought variabilities and potential forcing mechanisms is required. However, the short meteorological records of Daxing'an Mountains since the 1950s has limited the understanding of drought history at long-time spectrum. Line 48 remove Therefore Line 48 provide should be serve as Line 52 could improve as: monsoon Asia using 327 tree-ring width chronologies Line 53 could improve as: some disagreements between the MADA results and tree-ring-based local drought reconstructions or instrumental drought data, especially in eastern Asia, which might due to an insufficient tree-ring network used by MADA (Li et al. 2015; Liu et al. 2016). Line 66 farther should be further? Line 67 should be clarified Line 70

high-latitude forested portion should be high-latitude forests Line 73 remove extreme Line 111 should be improved as: Pearson correlation analysis was conducted to esitamate climate–tree growth relationships Line 112 should be improved as: The gridded climate dataset is much longer and has higher homogeneity and coherency than station data. Line 115-116 remove ", a most commonly used drought index," Line 146 you should specify here which "large-scale climate" indexes are tested Line 162 is it ok to substitute "PDSI data among the annual, seasonal or individual month scales" with all seasonal PDSI compositions? Line 166-167 is it ok to replace "The regression model between the tree-ring indices (predictors) and annual PDSI (predicted) for the calibration period was as follows" with The linear model for PDSI reconstruction is? Line 171 please replace "actual" and "estimated" with instrumental and reconstructed throughout this manuscript Line 173-174 is figure 6a a correlation between one PDSI index with another PDSI index? I think figure 6a and 6b could be replace a spatial correlation map between PDSI reconstruction and dai-PDSI. Line175 please specify which two calibration periods. Line175-178 please move this section after "is the tree-ring index at year t." of line 169, and add a sentence at the end of this paragraph, such as: suggesting this linear model is robust for PDSI reconstruction. Line 170-174 should be another paragraph after "suggesting this linear model is robust for PDSI reconstruction" Line 179 please replace "Drought-wet variations" with historical PDSI variability Line 188 replace greatest with greater Line 191 and 193 Table 5 only show the individual dry/wet years, consecutive dry/wet periods was absent in Table 5, is that right? Line 196 replace "the dry and wet variations" with historical PDSI variability Line 202-203 replace "main climate limitation for its radial growth" main climate factor limiting its radial growth Line 218-219 this section is not clear so far. Is it possible that the positive correlation of tree growth and winter temperature could arise from less frost damage if the winter temperature is higher? Is Scots pine in your study an evergreen tree species? If yes, the positive correlation of tree growth and winter temperature could also because higher winter photosynthetic rates and more photosynthetic products stored if temperature is high in winter, these photosynthetic products will be used

for tree growth in summer of next year (storage effect). The positive correlation with spring temperature could due to earlier and larger snow melting which supplies the spring soil water, and eventually stimulated tree growth? Anyway this section should be improved accordingly. Line 225-226 is the "local historical record" and "historical documents" have been specified in the Data and Methods part? Since I can't find them before section 4.2. Line 234 Are PDSI reconstructions in Mengkeshan and Pangu from your data, or previous studies of other people? If they are from previous studies outside your sampling region, is it possible to do the same SEA analysis with your own data of this study? Line 243-253 I agree with you that Cook's MADA reconstruction is inaccurate and sometime useless in regions with no or a few tree-ring data, such as your study region.