

## ***Interactive comment on* “Can the *Pinus sylvestris* var. *mongolica* sand-fixing forest develop sustainably in a semi-arid region?” by Yiben Cheng et al.**

**Yiben Cheng et al.**

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We thank the reviewer for the constructive comments. The manuscript has been significantly improved by addressing the comments. The following are our point-to-point responses to their comments.

1. The Title: “Can the *Pinus sylvestris* var. *mongolica* sand-fixing forest develop sustainably in a semi-arid region”. The topic was “too large”, and, the paper seemed like to study the soil moisture dynamics and recharge source, not relevant the subject. I really think that the study is interesting, but the title might reflect better the performed research. Reply: Implemented. The title of the paper has been changed to “On the

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soil moisture dynamics of sand-fixing *Pinus sylvestris* var. *mongolica* forest in a semi-arid region”. We think this title is a better representation of the study. 2. It was not appropriate to rely on three years (2016-2018) of soil moisture measurements to determine whether the sand-fixing tree species survives. First, the experiment time was too short, and the artificial trees with life cycles over decades. The adaptability of long-lived woody species cannot be based solely on water, temperature, light, soil texture, etc. Reply: Implemented. The point raised in this comment is elaborated in the discussion section as follows. “One should be cautious that the three years (2016-2018) soil moisture measurements presented in this study may not always be reliable for performing long term (such as decades long) prediction of whether the studied species can develop sustainably over decades as some artificial trees may have life cycles over decades long. Therefore, continuous (preferably decades long) measurements are necessary in the future. Another notable point is that the adaptability of long-lived woody species may not be based solely on water, temperature, light, and soil texture. Despite of such limitations, we think this three-year investigation offers an important step for understanding the soil moisture dynamics of sand-fixing *Pinus sylvestris* var. *mongolica* forest in a semi-arid region. Furthermore, these three years happen to encompass rather dramatically different weather patterns in the region (wet versus dry years), thus offer additional insights on the function of the *Pinus sylvestris* var. *mongolica* forest under highly variable external forces.” And this research. See page14, line 321-332.

3. Logically describe the work you do in the Introduction. For example, the description of the semi-arid regions and the drought situation in China should be merged into other paragraphs without the need for separate sections; and these statements were not relevant to the subject of this study. Reply: Implemented. The introduction has been reorganized. The description of the semi-arid regions and the drought situation in China has been substantially shortened as suggested. 4. The Result and Discussion should be separated. I saw more results but no discussion. Reply: Implemented. The Results and Discussion have been separated. See page 13-14.

5. For the Summary and Conclusions, it reads too much like the Abstract and simply restates the main results, instead of leaving the reader with a “take-home message” and “fruit for thought”. Reply: Implemented. The Summary and Conclusions have been revised to convey the “take-home message” and “fruit for thought”. See page 14-15.

Special comments. 1. Need to mark the line number. Reply: Only line numbers of every 5 lines are added according to the requirements of HESS. 2. The main part of the Abstract focused on describing the research background (almost 1/3). I would expect some results and discussion or implications of the main findings. Reply: The implemented. The research background has been shortened in the abstract. See page 1. 3. L30. What do you mean the current precipitation conditions? Was it the annual precipitation (2016, 2017, and 2018) mentioned later? If so, what was the relationship between the evaporation and precipitation? Reply: Implemented. The current precipitation conditions refer to the three-year (2016-2018, dry- and wet- year) precipitation conditions. We have revised the text for clarification. See page 1, line 26-27. 4. In the Keyword, I would recommend adding soil moisture and DSR, which were the two main monitoring indicators of this study. Reply: Implemented. See page 1, line 30. 5. L95. Replace with “over  $3 \times 10^5$  hm<sup>2</sup>” Reply: Implemented. 6. L155. “In another word” is not common and can be replaced with “In other word”. Reply: Implemented. 7. L170. The recharge depth of spring snow melting in Abstract was 160 cm (L25), why was here it 140 cm? Another problem was that I did not see the recharge depth in 2017 and 2018, and only in 2016. Can I think that the recharge depth in the Abstract was the 2016? Reply: Implemented. The issue has been clarified. See page 6, line 170, line 198, line 214. 8. L 175. Why was there no change in precipitation in Figure 3? Reply: Implemented. The precipitation information is added in Figure 3. 9. L265. Move to the Methods. 10. In the Conclusions (No. 3), what was the start of the year? 2016? why was there a negative value (-16 mm)? Reply: Implemented. The starting year is 2016. The soil moisture storage change is the soil moisture storage at the end of the year minus the soil moisture storage at the

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beginning of last year. The negative value means that the soil moisture reserve has decreased by 16 mm during the year.

Please also note the supplement to this comment:

<https://www.hydrol-earth-syst-sci-discuss.net/hess-2019-110/hess-2019-110-AC3-supplement.pdf>

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