

**Manuscript Number: nhess-2018-305**

**Reviewer #2:** This paper discusses the important issues of alpine grasslands including the soil moisture, drought duration and intensity based on daily 10-minute interval data. Researchers had a nice experimental setup. The results should be published but the quality of the paper at this point do not satisfy the publication quality. I suggest publishing after careful revision. Need to revise the language and grammar in order to make the paper clear. I am sure, authors had clear story to tell and supported by the experimental results, but for the scientific paper it has to be clearly written and explained thoroughly.

**Response to comments:** *We appreciate the comment from the reviewer that the topic is certainly worthy of publication, and we very much appreciate the suggestions made by the reviewer to strengthen the manuscript. we have thoroughly revised the manuscript in accordance with your advice, including the experimental design, logic and structure, and grammar. Nonetheless, we have significantly altered the text to make the uncertainties more apparent, as the reviewer suggests. The reviewer is thanked for this comment, which has resulted in a stronger manuscript.*

**\* Specific comments:**

**Comment 1:** Lines 59-61: Define the Meteorological drought and crop drought before you discuss this. There are many more different kind of droughts in this paper that do not have proper definitions. Please define them all.

**Response to comment 1:** *The reviewer is correct that the original manuscript needed to go into additional detail on these aspects of the droughts definitions. We have added a new paragraph at the **very front of the introduction section** in the revised manuscript that goes into more detail as to the droughts definitions. The reviewer is thanked for noting that the original manuscript should have filled in details, which has now been done in **Line39-48**.*

**Comment 2:** Lines 62-66: The sentence is not clear. Please revise it.

**Comment 3:** Line 64: "... difference, With the advantages, " Is it comma or period after the word "difference"? If it is comma do not need to start with capital letter "W".

**Comment 3:** Lines 70-73: Did not understand the sentence: "Chen et al.(2007b),Ma et al.(2017)pointed out that a dynamic drought index (soil drought degree) centered on the soil volumetric moisture content can effectively characterize the dynamic development and long-term accumulation characteristics of droughts" Also use space after comma, periods and parenthesis (before the word "pointed").

**Comment 4:** Lines 74-78: First, define the Atmospheric and soil droughts respectively. Also describe these few studies: "few studies concerning the soil drought threshold of pasture".

**Comment 5:** Line 79: What are the problems?

**Response to comment 2-5:** *The reviewer is thanked for noting our poor language usage. The language suggested by the reviewer has been adopted verbatim in the revised manuscript. we also rewrote those parts of the introduction in the revised manuscript where return rates were mentioned.*

**Comment 6:** Lines 167-168: What is “constant evaporation and secondary evaporation”?

**Response to comment 6:** *The reviewer correctly notes that our terminology is not precise here. This sentence has been rewritten in the revised manuscript to clarify our intent. In addition, we have rewritten the section in **Line167-176**.*

**Comment 7:** 3.1.2 Could simply name this “Soil moisture balance” Corresponding figure should have cited in here.

**Response to comment 7:** *The sentences was simplified in **Line 159**. The reviewer is thanked for drawing our attention to the importance to simplify .*

**Comment 8:** Lines 209-210: “Pasture cannot normally survive if the level of D stays at 1 for a long time without decreasing.” What do you want to say without decreasing? Long time is how long? What do you mean by normally survive?

**Comment 9:** Lines 210-211: “On the contrary” to what? I did not understand what you were comparing. On the contrary of what you expected or on the contrary of D?

**Comment 10:** Lines 224-225: What is the “root layer”? Clarify which specific soil layers you are talking about by root layer.

**Response to comment 8-10:** *The reviewer is thanked for noting that the reader could get confused in this paragraph. The text in this paragraph in the revised manuscript further clarifies that the soil drought degree comparisons to the soil drought intensity are for the past and not future. There is reinterpretation in **Line 199-205**.*

**Comment 11:** Lines: 295-296: “Soil moisture in the 0-30 cm layer declined continuously in all groups after gradient processing of precipitation.” What do you mean by “gradient processing of precipitation”?

**Response to comment 11:** *The reviewer correctly notes that our terminology is not precise here. This sentence has been rewritten in the revised manuscript to clarify our intent. And the conclusion section was rewritten. **See in Line292-297**.*

**Comment 12:** Figure 3. There are 5 different layers of soil water content: 0-10, 0-20, 0-30 cm and 10-20 and 20-30 cm:

Would soil water content of 0-20 cm represent the sum or average of 0-10 cm and 10-20 cm?

Would soil water content of 0-30 cm represent the sum or average of 0-10 cm and 10-20 cm and 20-30 cm? Please clarify.

**Response to comment 12:** *The reviewer once again points out our use of imprecise language. This has been clarified in the revised manuscript to note that there represent average. The reviewer is thanked for calling our attention to it.*

**Comment 13:** Table. 2: Why the correlation coefficients are all 1? Did you round decimal numbers? Please use at least two digits after decimal points.

**Response to comment 13:** *We have added two Figure in the revised manuscript, following the reviewer’s suggestion verbatim. Figure 7 and 8 have been created and inserted in the revised manuscript that summarizes these computations. In the discussion section of the revised manuscript we have discussed the correlation coefficients. We also mentioned some potential future work that could follow on to these results, including the observational factors.*

**Comment 14:** Table. 4: Please explain, how did you define drought degree thresholds

**Response to comment 14:** *The reviewer is correct that the original manuscript needed to go into additional detail on these aspects of the methodology. A new **Table 4** and **Figure 4** have been created and inserted in the revised manuscript that summarizes these computations. We have added a new paragraph at the results section in the revised manuscript in Line **Line232-244** that goes into more detail as to how these thresholds are estimated from the soil relative humidity. The reviewer is thanked for noting that the original manuscript should have filled in some of these steps, which has now been done in the revised manuscript.*

**\* Technical comments:**

**Comment 1:** Check very carefully the use of periods and commas: If you use a comma, do not start with capital letter, get a space after comma and period etc.

**Response to comment 1:** *We like the reviewer's suggested language and have adopted it verbatim in the revised manuscript. We have had the entire manuscript professionally edited by International Science Editing (a language editing company).*

\*In summary, the yellow part of the paper is the rewritten sections. There were significant changes made to the manuscript as regards multiple strike years. The reviewer is thanked for mentioning this suggestion, which has definitely strengthened the manuscript.

**Thank you for your valuable comments.**

**Tiao feng Zhang**