Overall, the experiment in this paper is useful and the results are also helpful for better drought monitoring in different regions. However, the structure of this paper is not well constructed and there are too many grammar problems which make me hard to read. There are many points that need clarification and major revision. I am not convinced that this paper is suitable to be published in NHESS in the present form.

The general and specific comments are outlined below.

General Comments:

1.   In this manuscript, the authors mentioned different kinds of drought, "meteorological drought", "atmospheric drought", "crop drought", "soil drought", "drought in grassland", "drought", "high temperatures" (which should be high temperature), "pasture drought" and "soil-pasture drought", however, the authors never define them. Please add the definitions and the possible effects on grassland before use them.

2.   The structure of introduction need to be improved. The current introduction missed the definition of different kinds of droughts like "atmospheric drought", "meteorological drought", "soil drought", "grassland drought". In addition, a detailed introduction of related studies should be added for readers. Finally, the research question(s) is(are) not clear enough.

3.   The study area and experimental design section (2.1) need to be improved as it missed the introduction of the study area shown in Fig. 1.

4.   The discussion section is like results or introduction. For example, the section 4.3, I guess your purpose is to prove the higher accuracy of 10 minutes in this study compared with the previous studies with a time scale of 1 day. It is really not convinced with no comparison conducted, no other supported materials. In addition, why the authors discussed/introduced the soil relative humidity here? If you want to discuss the suitability of the soil relative humidity, please give another discussion topic in another paragraph.

5.   The logic is unclear and the grammar problem is serious. I strongly suggest you (A) engage a native English speaking scientist and/or (B) some professional editing services to improve the English expression of your revised manuscript.

6.   The paper includes many confusing phrases like "gradient processing", "soil-pasture drought" which make this paper hard to read clearly.

Specific Comments:

1.   Lines 48-49: Did you mean the underground water level in the "Three Rivers Sources" and "the area around the lake…" are under 2 m? Please provide enough evidence or reword the sentence.

2.   Lines 70-71: How can the readers understand the "dynamic" of the drought index? Why call it a "dynamic drought index"? Explain it reasonably.

3.   Line 74-75: "Since soil moisture in alpine grassland depends on natural precipitation, soil drought directly affects forage yield." All the layers of soil moisture depends on natural precipitation completely? Even for the layers lower than 20 cm? In addition, what's the relationship between the dependence on natural precipitation of soil moisture and the soil drought directly affects forage yield? Are there any indirect factor? Explain it.

4.   Line 75: where is the previous studies? Provide them.

5.   Line 77: the use of "few studies" in preference to "no study" implies that there has been some and this needs to be cited here.

6.   Line 79: what are "the abovementioned problems" except the static soil moisture problem?

7.   Lines 81-84: The authors should express these objectives in a better way, as they are not clear enough to read. Such as "the rate of change in soil volumetric moisture content based on simulation tests of precipitation changes…", "and combined with the soil moisture data", "to investigate the influences of precipitation and soil moisture on development of drought were". As mentioned above, how do you define the drought in your study, the deficit of precipitation or the deficit of soil moisture or something else? If you define it as the soil moisture deficiency, then how do you investigate the influences of soil moisture (itself)?

8.   Line 99: The rust-proof icon sheet have 20cm below ground, what's the meaning of the 20-30cm layer and 0-30cm layer?

9.   Line 108: Why is the average drought intensity? Are there many drought intensities?

10.   What kind of "reservoir capacity"?

11.   Line 121: "The surplus available water storages were X (x1,x2,……,xn) and Y", What's meaning of the 'Y'? Define it.

12.   Line: 122: What is the "The regression coefficient (a)"? The same with "the empirical regression parameter" in line 114? If yes, delete it here.

13.   Line: 123: The abbreviation D for drought degree is a conflict with the abbreviation of dynamic drought index (D).

14.   Line 147: "the volumetric soil water content gradient"? And what is the difference between "drought" and "drought events"?

15.   Line 159: How should we readers to understand the soil moisture yield? Give enough explanation even with the reference.

16.   Line 160-161: The sentence is confusing.

17.   Line 163: "Daily soil water loss generally fluctuated within 0-0.4 mm", but in Fig3, the Y-axis is "Water loss (%)"? What is the definition of water loss?

18.   Line 390~391: Firstly, what's the meaning of 'x' and 'Y' in the Regression equation？ Secondly, which 'correlation coefficient' is used in Table 2? Pearson, Spearman or Kendall? Thirdly, if the Pearson correlation coefficient is used in Table 2, the two variables are X and Y or ln(X) and Y? If the variables are X and Y, the coefficient shouldn't be 1, if in another situation, the coefficient is -1. Why the correlation coefficient in Table 2 are all 1?

19.   Lines 201-202: "This relationship can be described by the logarithmic linear equation Y=alnX+b", why is the logarithmic linear equation?

20.   Lines 209-210: "Pasture cannot normally survive if the level of D stays at 1 for a long time without decreasing", is there any supporting data?

21.   Lines 230-232: Why is the degree threshold 0.36?

22.   Line 252: Give the evidence for this sentence.

23.   Line 254: expand the research conclusions of other scholars. In addition, other scholars with one citation? Give more accurate citation.

24.   Lines 276, 278: How should the authors understand the drought speed? Define it before using

it.

25. Lines: 280-281: "D can be calculated easily by testing the soil moisture." There are many vague sentences like this, what is "D"? "testing the soil moisture" for what? The water content or something else?

26. Line 290: what is "the soil-pasture drought"?

27. Line 306: what "slope"?

28. Table 2: I cannot imagine the correlation coefficients for all groups in various soil moisture layers are exactly 1 with just 49 samples for each. It is really exact a line? In addition, how could you quantify the correlation coefficient between x and Y with an exponent relation? For example, Y=-1.028ln(x)+3.2624 in group 1 for 1-10 cm soil moisture layer. Did you measure the correlation coefficients between ln(x) and Y?

Technical Corrections:

1. I found so many grammar problems. I can find even more than two typos in one sentence. Such as "…At the same time, the moisture gradient among different groups disappeared gradually.the volumetric soil water content gradient In the early period of drought events…".

Some specific problems in the first several paragraphs (Not limited to these) are given as follows:

Line 52: The space between "region" and "(Xu et al.,2008;…)" is necessary.

Line 53: "2016).Given";

Line 57: "…Myers et 57 al.,2017) .These"; more than these two…

Line 70: "Chen et al.(2007b),Ma et al.(2017)pointed…" missing spaces

Line 80: "was as follows:(1) to quantify"

Punctuation problems:

Line 54: ["warm and dry." This] in where it should be ["warm and dry". This];

Line 67: "Shi et al(2017)" missed ".";

I suggest the author carefully and rigorously modify the grammar problems sentence by sentence, word by word. You will avoid a lot of typos if you can use the proofreading function of Microsoft word properly.

2. Line 11: "but" should be "and"?

3. Lines 15-16: reword the sentence and make it more clearly to authors.

4. Line 36: Give a more representative abbreviation for the "Dynamic drought index", like DDI or DYDI.

5. Line 46: Delete "even in".

6. Lines 47-48: Define "Three 48 Rivers Sources", and what is "the lake"? Did you mean "lake area"? Please check your English expression very carefully.

7. Lines 53~54: "Given prediction of future climatic changes, the climate in the study area may

become 'warm and dry'" Provide some evidence.

8. Line 70: change "change" as "respond".

9. Line 109,142: No reference 'chen et al.,2017b', maybe 'chen et al.2007b'?

10. Line 124: what's the mean of 'n' and 't' in Expression(2)?

11. Line 138: "Results and analysis" or "Results and analyses"?

12. Line 124,191,196: what is the difference between the 'D' in these three expressions?

13. Lines 265-266: reword this sentence for clarity.

14. Line 275: How to prove that D (drought degree, I guess you mean) can accurately reflect the influences of drought history on the current drought degree and the whole drought process?