

***Interactive comment on* “Research on Occurrence and Development of Pasture Drought Events in Alpine Grassland using the Drought Threshold” by Tiaofeng Zhang et al.**

Anonymous Referee #3

Received and published: 17 January 2019

Based on experiment data, in this paper, the authors aim to identify drought occurrence, development and intensity in pasture and alpine areas, Qinghai China. Tens of thousands drought indicators have been developed in previous studies, such as the most widely used PDSI, SPI and SPEI, etc. Yet, few of them are focused on pasture and alpine areas, Qinghai China, which maybe the authors' motivations. The authors may want to well introduce their experiment design, how to quality control observational data, and how occurrence, duration and intensity of the so-called soil drought impact pasture and alpine growth and yield. Unfortunately, the related works are not well done in this study. In current version, there are many uncertainties to define soil-drought. Specifically, the exponent “a” is very sensitive and flexible, and thus it is very hard to

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be identified and applied in larger areas. In this case, readers are not able to build their confidences in this paper. I would like to suggest the authors to inter-compare currently widely used drought indicators such as: PDSI (Dai, 2013), SPEI (Vicente-Serrano et al., 2010), VHI (Kogan, 1997), and current CMA operational drought monitoring product using the observational data. Dai A, Increasing drought under global warming in observations and models, *Nature Climate Change*, 2013(3): 52-58 Kogan F., 1997, Global drought watch from space. *Bull. Am. Meteorol. Soc.*, 78:621–636 Vicente-Serrano S M., S Beguería, and J I. López-Moreno. 2010, A Multiscalar Drought Index Sensitive to Global Warming: The Standardized Precipitation Evapotranspiration Index. *Journal of Climate*, 23: 1696-1718 Minors: 1. The authors may want to read the manuscript couple more times to fix the grammar and typo issues. 2. Soil drought: generally, this is called agricultural drought, due to soil moisture deficits may lead to a reduction in crop yields, plant biomass and ecologic productivity (Wilhite and Glantz 1985; Yin et al., 2018). Wilhite, D. A., and M. H. Glantz, 1985: Understanding the drought phenomenon: The role of definitions. *Water Int.*, 10: 111–120. Yin, J., Zhan, X., Hain, C. R., Liu, J., & Anderson, M. C. (2018). A method for objectively integrating soil moisture satellite observations and model simulations toward a blended drought index. *Water Resources Research*, 54. <https://doi.org/10.1029/2017WR021959>

3. Line 18-19: have demonstrated »» demonstrate; Line 20: 0-20 cm layer »> 0-20 cm soil layer. 4. Please remove the first and fifth highlights. 5. Line 54: be become»» become 6. Line 55: high temperatures»»»> extreme temperature 7. Line 59, Meteorological drought »» Agricultural drought 8. Line 62-85, there are many drought indices introduced in previous studies, why only the couple indicators that are not the most popular ones are listed here? And the authors' motivations are not clearly described here. 9. Section 2.1, experiment details are missed. 10. Equ (1): so $f(\text{soil moisture changes}) = e^{1+a}$? Is there any physical explanation? 11. Line 134: lower than 20»» lower than 20%? 12. Section 3.2: so the technique is developed here ? Otherwise, please add the related references. 13. Discussion parts are not new. Basically, all the discussions have been investigated in previous studies. 14. A table focused on

Groups' (Group 1-5) descriptions is missed. 15. Figure 2, the unit should be m^3/m^3 for volumetric soil moisture.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2018-305>, 2018.

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