

# ***Interactive comment on “Ambiguous agricultural drought: characterising soil moisture and vegetation droughts in Europe from earth observation” by Theresa C. van Hateren et al.***

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First of all, we wish to thank the reviewer for reading our manuscript and for providing their insightful and detailed comments on our paper. In this document, we will address the comments of the reviewer. The major comments addressed are the use of agricultural droughts, the use of remotely sensed soil moisture data, novelty of the manuscript, consistency of concepts, critical soil moisture, results and discussion, periods, and the figures, each discussed in its own Section below.

1. The use of the term agricultural drought

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The reviewer rightfully notes that it has become more common in recent decades to use the term "soil moisture drought" (SMD) instead of "agricultural drought" (AD). Indeed, the terms are often used correctly. Nonetheless, we found that using the term AD for denoting SMD is still rather common [e.g. Sridhar et al., 2008, Hao and AghaKouchak, 2013, Chakrabarti et al., 2014, Martínez-Fernández et al., 2015, 2016]. For that reason, we suggest to move away completely from the term agricultural drought towards soil moisture drought and vegetation drought, to avoid any ambiguity in drought research.

The reviewer also mentions that the term AD is commonly defined in relation to agricultural productivity and crop yield, rather than vegetation growth in general, as we wrote. We will adapt our phrasing in a newer version of the manuscript.

The next point the reviewer makes is that they miss a discrimination between crop, vegetation, and land cover types. In a new version of the manuscript, we will comment on the use of NDVI across Europe. We will additionally add figures in the appendix or supplementary material, including an analysis of skill scores split up by land cover, i.e. grassland/agricultural areas and forest (as shown in Figs. 1 and 2). We will also comment on the choice of the fixed growing season.

We agree that including such statements will improve the manuscript and help place the study in a broader scientific context.

## 2. The use of remotely sensed soil moisture data

The reviewer comments on the use of remotely sensed soil moisture data, which mainly give a view on the surface soil moisture, rather than the root zone soil moisture. We are indeed aware of this, but should be more elaborate on the disadvantages of this choice, and add an hypothesis on how our conclusions might have differed if large scale root zone soil moisture observations were available and used in this study. We will make the suggested changes in a newer version of our manuscript.

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### 3. Novelty

Here, the reviewer makes a comment related to the one in Section 1, stating that it is already common to make a distinction between SMD and vegetation anomalies. In a newer version, we will more strongly address this and acknowledge cases where the distinction is made correctly. We will also expand our review on previous findings related to the asynchrony of soil moisture and vegetation in the introduction, as suggested by the reviewer.

### 4. Concepts consistency

The reviewer is absolutely right in pointing out that we should be consistent in our phrasing of important terms in our manuscript. We will choose one phrase per concept to be used consistently, and explain related terms and concepts in a newer version of the manuscript.

### 5. Critical soil moisture

Here, the reviewer gives a suggestion on how to improve our introduction and discussion by making use of the concept of critical soil moisture. We think that this is an excellent suggestion and will therefore incorporate this in a newer version of the manuscript.

### 6. Results and Discussion

The reviewer notes that there is no clear distinction between the results and the discussion. They suggest that we move the discussion away from the results section and into the discussion section. We agree that an improper distinction between these two sections may be confusing and we will therefore make sure to limit the discussion to the Discussion section in a newer version of the manuscript. Including subsections might help structure the discussion further and we will explore this suggestion when rewriting the Results and Discussion sections.

### 7. Period

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The reviewer notes that the used periods are lacking in the manuscript, and more specifically in the Data section, in the anomaly and drought calculations and selection and in the figure captions in the Results chapter. We will include the used periods in the sections, as suggested by the reviewer.

## 8. Figures

We thank the reviewer for their positive feedback of the visualisation in the Figures. In a newer version of the manuscript we will explain all abbreviations and concepts in figure captions, and make sure that the names in the figures correspond with the names in the captions, as suggested by the reviewer.

## 9. Minor comments

We will address the Minor Comments of the reviewer by making the suggested changes in the manuscript.

## References

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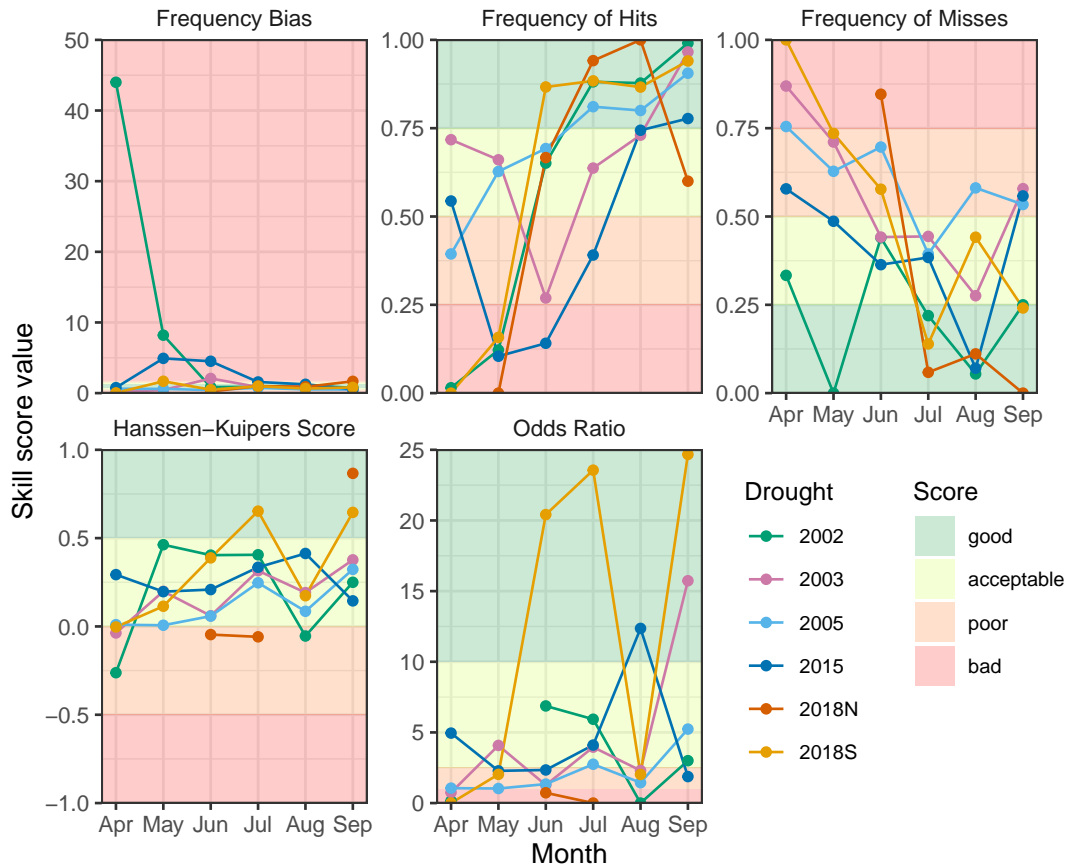
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Interactive comment on *Hydrol. Earth Syst. Sci. Discuss.*, <https://doi.org/10.5194/hess-2020-583>, 2020.

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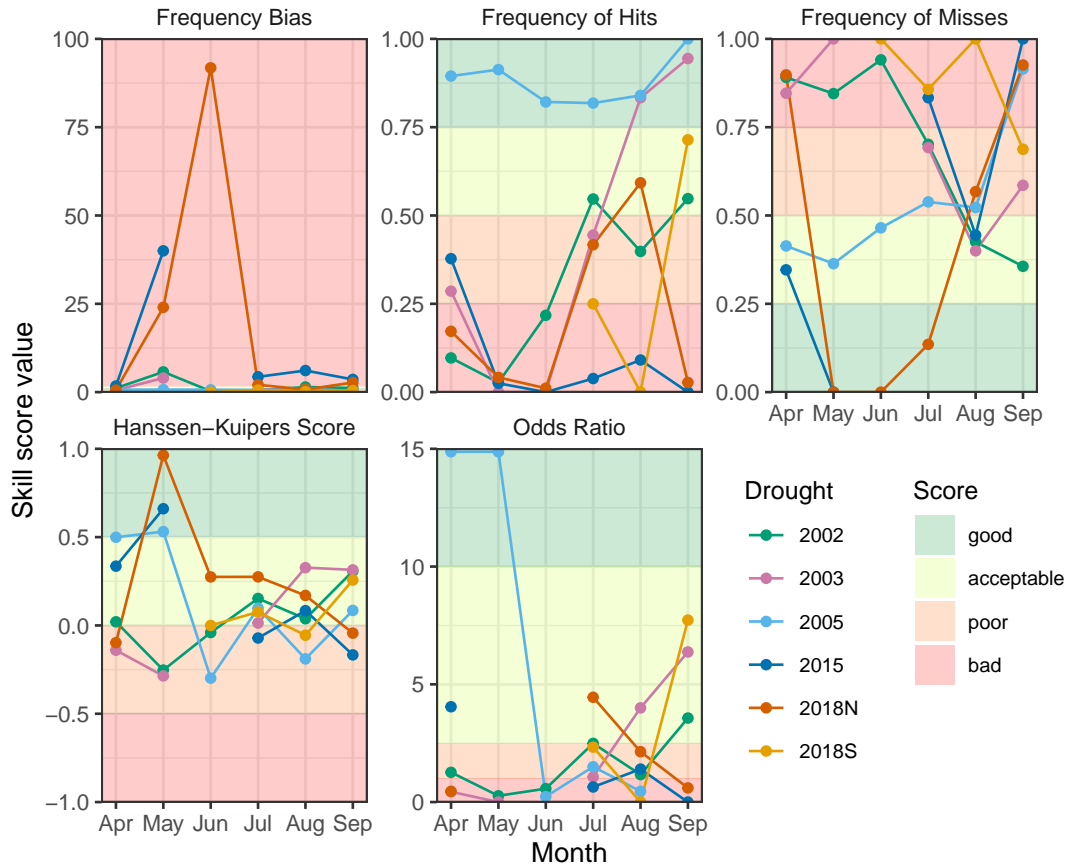


**Fig. 1.** Skill scores over grassland pixels, as defined in the supplementary material. An 80% threshold was used.

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**Fig. 2.** Skill scores over forested pixels, as defined in the supplementary material. An 80% threshold was used.

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