

## ***Interactive comment on “Controls on the development and persistence of soil moisture drought across Southwestern Germany” by Erik Tijdeman and Lucas Menzel***

**Eric Hunt (Referee)**

ehunt@aer.com

Received and published: 30 August 2020

Thank you for giving me the opportunity to review this paper. Overall, this paper represented results from a well-research project, is well-written, and will make a very nice addition to the literature once it is revised. The figures are of excellent quality.

The only major issue is the authors terminology of defining drought for soil moisture in absolute terms as opposed to as an anomaly. While opting to look at soil moisture as a % of available water content (putting a current observation in the context of field capacity and wilting point) is highly appropriate, many members of the drought community would take significant issue with saying anything under 30% AWC is drought, if

C1

that occurs more than 20% of the time for a given location and time period. However, what the authors are conveying in the paper is soil moisture stress, or perhaps more correctly- low enough soil moisture to cause significant water stress for vegetation, in the context of drought and flash drought formation. Therefore, I recommend the authors consider changing the term "SM drought" to "SM stress". This would in no way reduce the importance of the article or the effectiveness of the message. Clearly in years like 2003, 2015, 2018, and 1991, SM drought was appropriate but in other years it may not be, especially for grid points where that is a common occurrence.

Another thing for the authors to consider is to look at the development time and see what percent of cases were more flash drought oriented (e.g., 25-40 days from start to ) vs. a more traditional drought that develops more slowly. That could then be tied to the temperature and precipitation anomalies, in addition to what is already shown in Figure 7.

Finally, please make it more clear in the methods that Socc is only for a particular year and grid point combination. This is implied in the article but more explicitly stating it will help the readers.

Specific comments are as follows: Line 39: List some examples of drought indices and their references L52-54: There are indices (e.g., ESI) that account for both ET and potential ET. L65: As in future climate scenarios or forecasting of soil moisture at S2S? L71-72: Consider re-writing sentence on drought. L82: Below normal precipitation? L131: What does TRAIN stand for? L156: Please clarify the length of spin-up time for the model? Was it truly 1 year (1988) or all 31 years and only 1989-2018 considered in the analysis? If the former, you will need to provide justification for doing so. L177: Elaborate further on why you chose to use FC as opposed to an AWC of say above 0.70.