

Interactive comment on “The 2018 northern European hydrological drought and its drivers in a historical perspective” by Sigrid J. Bakke et al.

Anonymous Referee #2

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Summary

This paper studies the May-August 2018 European drought from an atmospheric perspective, and meteorological and hydrological drought analyses. The authors found that record-breaking temperatures in May and July 2018 were observed in northern Europe regions accompanying meteorological drought denoted by SPEI-3 from May to July 2018. However, the hydrological drought shown by streamflow and groundwater drought started to develop in June and July, respectively. The author also found that local terrestrial processes including aquifer properties are important in controlling the hydrological drought response to meteorological conditions.

Assessment

C1

This paper analyzes the 2018 northern European drought from different perspectives. The manuscript is interesting and well written. I have only a few minor comments below and most of them are for clarification. I believe this work is well suited for HESS.

Line by line comments

L refers to line and P refers to page.

P4L24: Do the temperature data here refer to 2 m temperature?

P4L31-32: I am wondering why do the authors use 2 different spatial scales for analyses in section 3.1 and 3.2 (0.25°), and 3.3 (0.1°)?. Why do not simply use a spatial resolution of 0.1° ?

P8L15: The authors may write: three-month.

P8L27-29: Here, I am also wondering why do the authors use SPI-3 (SPEI-3) distributions derived from the data year 1971 to 2000 to calculate SPI-3 (SPEI-3) in the year 2018? Why do not use the distribution derived from 1971 to present data? By only using data from 1971 to 2000 (20 years ago), the drought 2018 might be too extreme because the authors excluded extreme drought years e.g. 2003, 2006-2008, and 2015. This has implications in the distributions that the authors used. Moreover, the average temperature >20 years ago was lower than the average temperature in the past 20 years (2000-2020). In Europe, we also use drought years 1976 and 2003 as a benchmark for extreme drought years. 2018 was comparable to those years in terms of drought severity. This question applies to other reference data (e.g. section 3.1, from 1981 to 2000).

P9L4-6: I am wondering why do the authors use absolute values to determine the SPI classes? Figure 6 also shows the SPI/SPEI index values from -3 to +3.

P10L3: The authors may write as Figure 3a-d.

P10L11: The authors may write as Figure 3e-h.

C2

P12L30: Please write the Figure number after the sentence thus the reader can follow the description easily. Here is Figure 9a.

P12L33: The authors may write Figure 9b after the sentence.

P13L2: The authors may write Figure 9c after the sentence.

P14L20: Typo “than 3 std, respectively 2 std”

P24: Table 1: The author may write last accessed before the date. E.g. (last accessed 24.03.20).

P25: Back to my question about the reference data, here in Table 2, the authors indicate that they have temperature, precipitation, Geopotential height at 500MB data up to the year 2018.

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