EGUsphere, referee comment RC1
https://doi.org/10.5194/egusphere-2022-813-RC1, 2022

Comment on egusphere-2022-813

Anonymous Referee #1

Referee comment on "The extremely hot and dry 2018 summer in central and northern Europe from a multi-faceted weather and climate perspective" by Efi Rousi et al., EGUsphere, https://doi.org/10.5194/egusphere-2022-813-RC1, 2022

The purpose of this article is to present the multi-aspect study led by the ClimXtreme research network of a dry and hot compound event: the European summer of 2018, with a special focus on Germany. The authors succeed in showing the importance of such a multi-faceted analysis in understanding the drivers and dynamics of such dry and hot compound events. The science presented here is sound, and the article is well written.

However, I believe that the authors should have presented another case study (even if more local). Indeed, this is a long and dense article, as the authors look at different aspects of this compound event, for a case study that has already been intensively documented on different aspects by various publications: exceptionality (e.g. NOAA Global climate report and Met Office report for summer 2018), predictability and drivers (e.g. Dunstone et al. 2019; McCarthy et al., 2019), drought (e.g. Toreti et al. 2019; Peters et al. 2020), dynamics (e.g. Kornhuber et al. 2019; Drouard et al. 2019; Sousa et al. 2019; Li et al., 2020; Spensberger et al. 2020), attribution (e.g. World Weather Attribution Project, 2018; Vogel et al., 2019, Hari et al., 2020). In addition, it has already been regarded as a compound event by previous studies (e.g. Bastos et al., 2021). As the authors point out along the text, most of the findings shown by the authors were already evidenced in previous scientific papers. I understand the argument of the authors on the exceptionality of such a large-scale, persistent, and intense compound event, but I find the paper very long and dense and to me it does not show any substantial new insight on this widely documented compound event. The authors should reduce the length of the paper or better justify the necessity of such a study for the 2018 compound dry and hot event and its added value.

Additional specific comments:

- The data sub-section is very dense and long. Maybe it would benefit of an italic title for each paragraph to quickly find the piece of information needed.

- Lines 190-197: the computation of the 90th percentile differs for the two heatwave indices?
- Sub-section 2.2.2: I am not sure that three drought indicators are necessary as the purpose of the study is not to compare drought indices or to deeply evaluate the 2018 drought. Mentioning and showing only the SPEI is sufficient to evidence the occurrence and intensity of the drought, as the SPEI is a widely used drought index that considers both precipitation and evapo-transpiration. The SPI is not shown in the main body and does not bring any additional information. And the results shown with the climate network approach could be shown in another way with the SPEI. Showing only one drought indicator would contribute to lighten the text.
- Lines 230-232: The way the blocking index is computed is not clear. Is it a "hybrid" index that looks for an inversion of the Z500 meridional gradient and a strong Z500 anomaly? Are there any spatial and temporal constraints?
- Line 259: are the soil moisture LPJmL simulations absolutely necessary for the paper? It would also contribute to reduce the length of the paper.
- Figures 1d and 1e: you could plot the SPEI value only when it is below the drought threshold.
- Lines 364-365: could you show the thermopluviogram for the Scandinavian region as well?
- Figure 4: Could you show the NAO index for this season as you do for the blocking index?
- Lines 487-490: You should also cite Dunstone et al. 2019: they studied the predictability of this summer season and evidenced the role of this tripole.
- Lines 490-496: The lack of precipitation is also shown in Toreti et al. 2019.
- Lines 504-506: Add a citation.
- Sub-section 3.4: you should cite Vogel et al. 2019 in this sub-section
- Lines 655-656: Cite Dunstone et al. 2019.

Technical corrections:

- Line 468: the closing parenthesis is missing.
- Figure A2, line 702: should be "(b)" instead of "(c)".

Reference:

Dunstone, N., Smith, D., Hardiman, S., Eade, R., Gordon, M., Hermanson, L., Kay, G. and Scaife, A., 2019. Skilful realâ□□time seasonal forecasts of the dry Northern European summer 2018. Geophysical Research Letters, 46(21), pp.12368-12376.