Biogeosciences Discuss.,
https://doi.org/10.5194/bg-2019-286-AC1, 2019

Biogeosciences Discussions
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EGU

Interactive comment on "Quantifying impacts of the drought 2018 on European ecosystems in comparison to 2003" *by* Allan Buras et al.

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Received and published: 30 September 2019

Thank you very much for your constructive review, which highlights important aspects and potential ambiguities and will help us to considerably improve our manuscript.

While we agree with most of your critiques, we would like to emphasize that we do not ignore the differences of the two drought events: Fig. 6 was particularly designed to highlight that the peak of the drought-response in different land-cover types was delayed in 2003. As shown in Fig. 6 the lowest value of mean NDVI-quantiles of coniferous and mixed forests was lower in 2018 compared to 2003, while broadleaved forests displayed more similar NDVI-quantiles. Regarding arable land and pastures the lowest values occurred later in time and were lower in 2003. We refer to these results in

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lines 247-250 in the initial submission. Moreover, section 4.2.2 of the initial submission discusses possible effects related to the differing location, i.e. the drought 2018 hit potentially less adapted ecosystems at higher latitudes which may have caused the observed stronger ecosystem response in 2018.

We agree, that these points need more emphasis and we will do so in the revision of our manuscript by:

1) Visualizing the temporal development of climatic conditions in a similar manner as for NDVI in Fig 6 in the main text and adding an animated gif to the supplementary which depicts the spatiotemporal development of climatic water balance anomalies (i.e. an animated version of Fig. 3 from January to October) to quantify the preceding initial conditions of the two events (moist winter and early spring in 2018 thus beneficial conditions at the onset of 2018 vs. dry late winter in 2003 thus less beneficial initial conditions in 2003) and the development in course of the drought events,

2) Providing yet another supplementary gif which will visualize the temporal development of NDVI quantiles using maps and histograms (animated version of Fig. 4 throughout the growing season) from beginning of May until end of October to allow for assessing the temporal development of the two drought events,

3) Comparing and modelling the climatic features and ecosystem response representative of the peak of drought in each year (i.e. July/DOY 209 in 2018 vs. Aug/DOY 241 in 2003) instead of for July/DOY 209 only and revise the underlying analyses of Figs. 4, 5, and 7 accordingly,

4) Emphasizing the spatiotemporal effects in the discussion, in section 4.2.2.

As can be seen in the figures attached to this reply, these additional analyses confirm our initial conclusion since:

I) The area featuring extreme drought (lower than 2 negative standard deviations) was larger in 2018 compared to 2003 (1.4 times larger, i.e. 1.35 million km^2 in 2018 vs.

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950,000 km^2 in 2003).

II) The drought response of the considered ecosystems affected a larger area in 2018 compared to 2003 (again 1.4 times larger, i.e. 820,000 km^2 featuring the lowest quantile in 2018 and 570,000 km^2 in 2003).

III) The drought response was stronger in 2018 compared to 2003 as expressed by significantly steeper regression slopes, the differences between 2003 and 2018 now even became stronger.

Please also find a detailed point by point reply to the comments raised by referee #1 in the supplementary pdf.

Please also note the supplement to this comment:
https://www.biogeosciences-discuss.net/bg-2019-286/bg-2019-286-AC1-supplement.pdf

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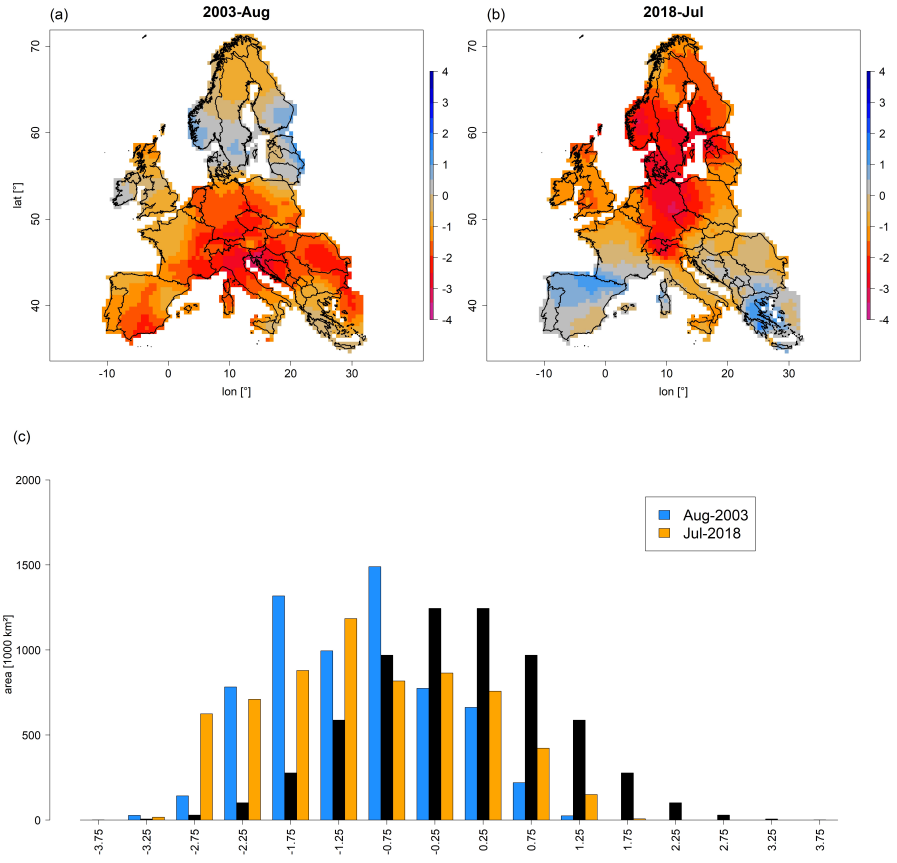

Fig. 1.

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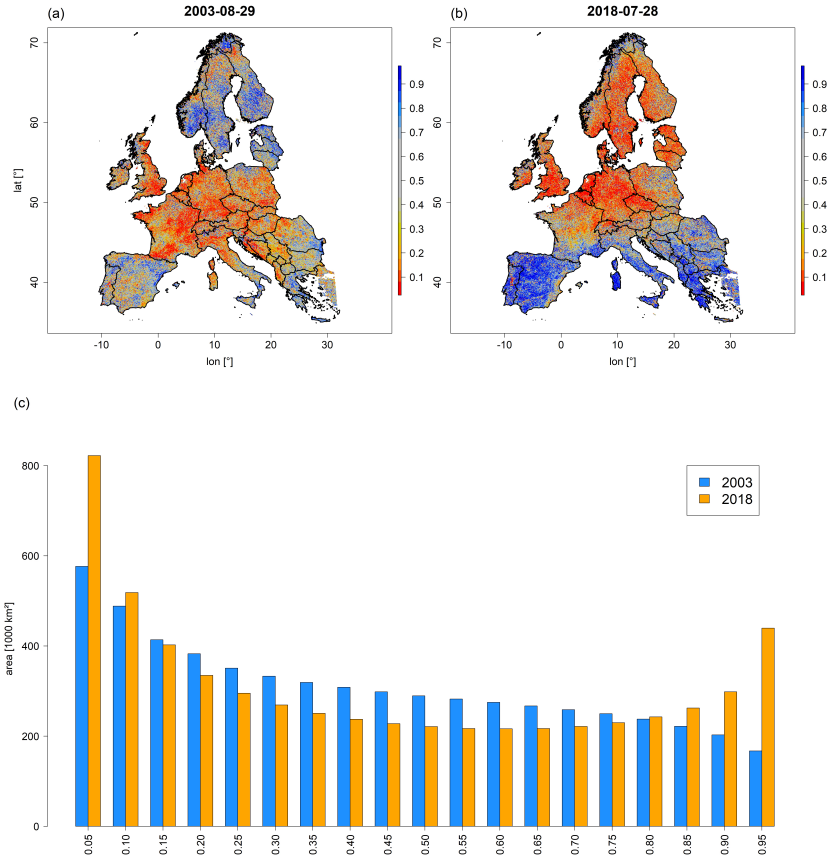

Fig. 2.

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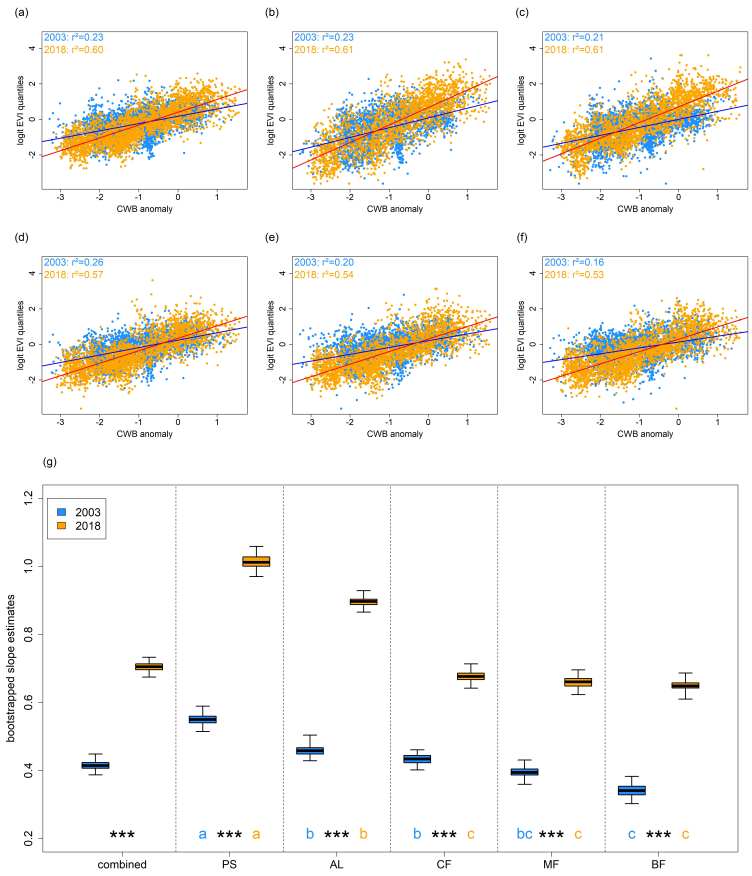

Fig. 3.

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