Biogeosciences Discuss.,
https://doi.org/10.5194/bg-2017-189-RC3, 2017

Biogeosciences Discussions
Open Access

Interactive comment on "Impacts of temperature extremes on European vegetation during the growing season" *by* Lukas Baumbach et al.

Anonymous Referee #3

Received and published: 1 August 2017

The paper addresses the important issue of plant responses to very hot or very cold periods. As the investigated region is rather large, the use of remote sensing data is the only feasible option, and the choices made here are among the most standard ones. Still, alternative to NDVI are debated, e.g. NPP (which would be, of course, model results rather than directly based on optical imagery) might reflect the vegetation productiviity better. The authors do not discuss why they are using daylight temperature anomalies (LSTAD) rather than simply average air temperatures. It is not sure whether this would make much of a difference, but did the authors even try? Temporal resolution is an important issue as well. While the advantage of using 16-days aggregatets is probably that lag effects are of minor importance (and, thus, not considered at all by the authors), an obvious disadvantage is that the concept of an "event" is blurred

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Discussion paper

- with respect to meteorological phenomena, this time scale is so much longer than the synoptic scale that virtually no meteorologist would consider the averaged values as "events". The spatial resolution is high, but probably still too course to conclude reliably on topographical or land cover covariate effects - and the authors do not find any clear results for them, accordingly. The concept of an "extreme" event usually refers (in POT approaches) to quantiles (much) higher than P90 or lower than P10. The wording should be rephrased to "high temperatures", "low NDVI" and so on, not even "very high" etc. An obvious extension of the approach would be to investigate the impact of changing the percentile thresholds on the spatial patterns obtained - are the conclusions basically the same when trying P80/P20 or P95/P05 ? You cannot go much further than P95 since the number of events present in the time series gets too low. It is also a weak point that by construction every pixel contains the very same amount of "extreme" events. That the heatwave of 2003 did affect only some parts of Europe vanishes from the analysis thereby, and, as the authors rightly point out, for rather stable regions w.r.t. temperature fluctuations and NDVI (think of evergreen forests for example) there is nothing particular or unusual with the values exceeding P90. The distinction of the phenophases is a clear plus for the analysis and, although not unexpected, reveals that the coincidence of the four different combinations of low and high values for LSTAD and NDVI differs very much between the phases. Still, to use the same calendar dates to differentiate the phases is very simplistic and could be improved a lot, given the accumulated knowledge about regional budburst and senescence timings for the different part of Europe. Still, the results quantify nicely the intuitive expectation and demonstrate clearly the non-linearity of the relationship. ECA is in this case without doubt superior to conventional correlation analysis. Another obvious and probably very necessary extension is the consideration of moisture effects, e.g. simply using precipitation time series. This is discussed towards the end of the paper. The presentation is rather clear and of appropriate length. Some of the objections the reviewer has are also considered by the authors, making their contribution rather balanced, no overstating of their results. The suggestions made in this review accumulate to not more than a minor revision.

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