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Biogeosciences Discussions

Interactive comment on "Impacts of droughts and extreme temperature events on gross primary production and ecosystem respiration: a systematic assessment across ecosystems and climate zones" *by* Jannis von Buttlar et al.

Anonymous Referee #2

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General Comments

The manuscript is a relevant and very well written investigation of the role of extreme climatic events (temperature and precipitation) in determining GPP, Reco, and NEP across ecosystem types, based on global data from FLUXNET. Particularly valuable is the exploration of a simple standardized approach to identifying extreme events, which may result in inclusion of extreme events that might not be identified based on a priori identification of events. There are also potential pitfalls in this approach, which I believe the authors address reasonably well. In particular, the authors note that reliance on

percentiles may result in false positives for shorter time series and for sites with low climatic variability. The results are generally consistent with previous research, which is promising indication that the approach is valid. In any case, the automated approach will ...

Specific comments

Section 1.2 Provides thorough and very specific background on the response of photosynthesis to temperature and water stress (line 25 p. 3 to line 6 p. 4), but less detailed background on microbial responses to the same stressors (lines 7-14 p. 4). It would be great to balance this by providing a bit more background on microbial ecology, and perhaps streamline the background on photosynthetic responses.

Section 2.2 (line 5) is there a citation that could be added to justify the use of midday NEE as approximation for GPP and nighttime NEE for R_eco?

Section 2.3 (line 4 p.8) What is the relevance of noting that most sites have Rˆ2 < 0.9? Is this a source of concern, or is the exclusion of sites with Rˆ2 < 0.6 sufficient? Clarification would be useful.

Section 2.3 (line 10 p. 8) If i understand this description correctly, the authors are stating that their approach assumes that the water storage capacity is assumed the same everywhere. In absence of good site-specific information, this approach may be reasonable, but it would also be useful to provide some commentary on how the results might be affected by this assumption. For example, what would the sensitivity of the results be to assuming a slightly lower or higher water storage capacity?

Section 2.4 (p. 9 lines 2-3) Why is seasonal variation in sensitivity to water availability not expected? My intuition is that there could be quite a bit of sensitivity in ecosystems where phenology is driven by precipitation rather than temperature. Can the authors provide more explanation?

Section 3.3 p. 13 line 23 – This is a small thing, but having the longer term reversal

in the trend for R_eco described as "somewhat surprising" makes me wonder what evidence there is that we might expect any other trend. A little context on why the authors find it surprising would be helpful, or alternatively, I'd suggest just deleting the phrase "and somewhat surprisingly,".

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