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Biogeosciences Discussions
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Interactive comment on "Contrasting responses of terrestrial ecosystem production to hot temperature extreme regimes between grassland and forest" *by* Y. Zhang et al.

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We appreciate the valuable comments on our manuscript. We have attempted to address all the concerns of the reviewer and editor and list our responses in the reply below. In our reply, we have repeated each comment, followed by our response. All referenced changes have been implemented in the revised manuscript.

Referee Comment, Anonymous referee COMMENT:

COMMENTS: Using the integral of EVI (iEVI) as a surrogate of NPP, the authors explore the NPP response to inter-annual variations of maximum temperature (Tmax) finding a contrast response of forest and grassland sites to Tmax. The methodology

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Interactive Discussion

Discussion Paper

is valid and the results contribute to our ongoing understanding to the asymmetric ecosystem responses to climate variations.

RESPONSE: Thank you for your positive comments.

COMMENTS: My primary concern on the methodology is that the iEVI approach is not as accurate as the authors claimed. For example, if you only look at the temporal correlation between iEVI and NPP, rather than the spatio-temporal correlation, will you still get high R2 like 0.90? The possibly lower R2 does not suggest the approach is invalid but suggest that the uncertainties in this approach are larger than the authors indicated. This should be clearly stated in order not to mislead readers.

RESPONSE: This is a good comment. We agree that the temporal correlation between iEVI and ANPP (interannual site-level variability) is not as strong as the spatio-temporal correlation. However, as shown in Fig.1 with field measurements from two sites in Table 1 (Central Plain and Jornada), the temporal relationships are still very strong (around R2=0.70, P<0.01) at the site scale and hence iEVI can pick up temporal variation of ANPP. On the other hand, it should be pointed out that we did not use this relationship to estimate ANPP for our sites from iEVI. Here, we presented this relationship to just demonstrate that iEVI could give a good estimate of the production like many other studies did. We argued that ' iEVI can be used to accurately quantify the dynamics of ANPP with confident and provide consistent sensitivity across biomes ranging from arid grassland to forest'.

Minor comments:

COMMENTS: Since the results were fully based on the 12 sites, it is still of fairly good risk that the phenomenon found may not represent the general behavior of forests and grasslands. It may help should the authors acknowledge such risks in the conclusion.

RESPONSE: We agree with this comment. We will mention such risk in the discussions about this limitation and point out the more future work to test our results.

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COMMENTS: The section 3.2 mixed the discussions of spatial and temporal correlations, which is a bit difficult to follow. I think it will be good if they could be separated in two paragraphs.

RESPONSE: We will make this change.

COMMENTS: Page 6003 “Fig. 1” should be “Fig. 2”

RESPONSE: We will correct this.

COMMENTS: Errorbars in Fig. 5 seems missing

RESPONSE: We will add the error bars in Fig. 5.

Editor’s comment:

COMMENTS: The manuscript appears to be a reasonable approach to evaluating the effect of heat waves on net primary production as estimated from satellite remote sensing. It will be of interest to the BG readership, but requires major revisions before it is suitable for final publication.

RESPONSE: We appreciate the positive feedback and the suggested considerations. We will adequately address the comments by the reviewer and editor as shown in the response and the revised manuscript.

COMMENTS: Unfortunately, there are numerous grammatical errors that should be corrected to make the text more readable.

RESPONSE: We will make the grammatical corrections through the manuscript.

COMMENTS: All the concerns of the reviewer should be addressed, especially a more careful evaluation and explanation of the differences between the spatial and temporal trends, prior to resubmission. The generalizations of the specific results from this study should be applied to other ecosystems more cautiously.

RESPONSE: We will address the concerns of the reviewer, and give a more explana-

tion of the differences between the spatial and temporal trends as shown in the above response to the reviewer and the comment below. Meanwhile, we will mention the limitations of the study in the discussion.

COMMENTS: Additionally, please provide more details on the data that were used in Equation 1. How many data points were used (sites and years)? (Please provide the number that was used for the statistics). How would Eq 1 change if site or year was held constant?

RESPONSE: As shown in Table 2, we totally used 53 site-years data from 9 sites for Eq.1. As shown in the response to the reviewer above (Fig.1), the temporal relationships are still quite strong (around R2=0.70, P<0.01) at the site scale. If for a given year (e.g., 2001 in Table 2), we found that the spatial relationship is also strong and the resulted equation between ANPP and iEVI is similar to Eq.1 (Fig.2). We will integrate Fig.1 and 2 into the new Figure 1 in the manuscript. We will clarify this in the revised manuscript.

COMMENTS: The reviewer also asked for clarification about the accuracy of Eq. 1 when applied to spatial or temporal correlation. This analysis would help inform the discussion of temporal versus spatial patterns observed in the data. Also, on Line 107, what is meant by a "pixel-based quality assurance (QA) control"? Please provide a citation.

RESPONSE: Please see the above response to reviewer for the accuracy of Eq.1 when applied to temporal correlation. For the "pixel-based quality assurance (QA) control", we used the quality flag in the MODIS EVI (MOD13Q1) product to remove low-quality, cloud- and aerosol-contaminated pixels and observations made at large sensor zenith angles (>30°). A citation will be provided in the revised manuscript.

Interactive comment on Biogeosciences Discuss., 11, 5997, 2014.

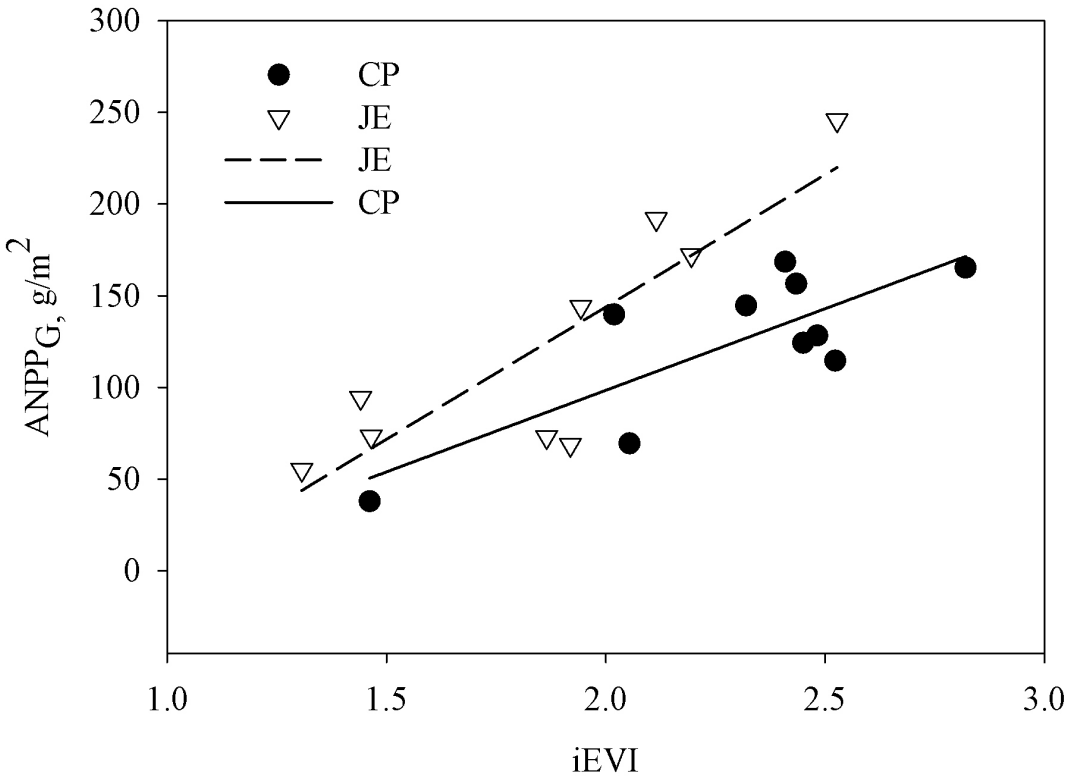

Fig. 1. The relationship between annual ANPPG (ground measurements) and the corresponding iEVI derived from MODIS data during 2000-2009 period for CP and JE selected sites (R2=0.63 and 0.74, P<0.01)

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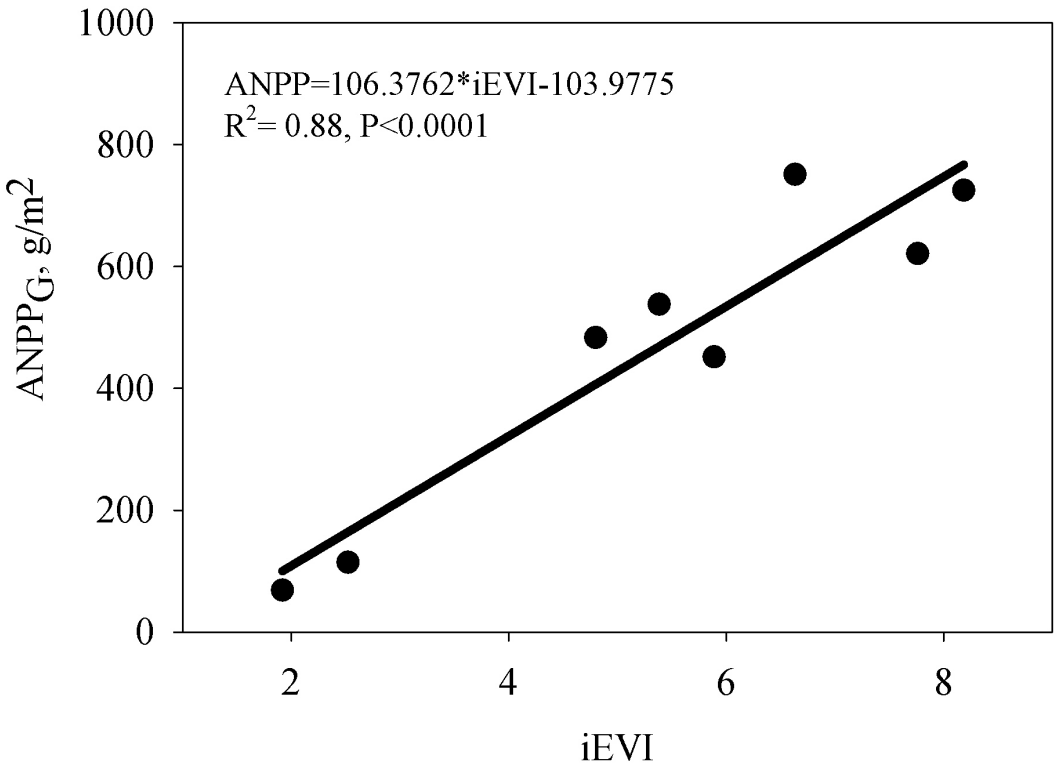

Fig. 2. The relationship between annual ANPPG (ground measurements) and the corresponding iEVI derived from MODIS data in 2001 across sites (R2= 0.88, P<0.0001).

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