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Interactive comment on "Impacts of land-use change and elevated CO$_2$ on the interannual variations and seasonal cycles of gross primary productivity in China" *by* Binghao Jia et al.

Anonymous Referee #1

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Binghao Jia et al. investigates the effect of CO2, climate and land use change on the inter-annual variation and seasonal cycle of gross primary production (GPP) in China using 12 terrestrial biosphere models and observation driven data. Their main finding, in general, is that climate was the dominant control factor during 1981-2010 for the trends, inter-annual variations, and seasonality of China's GPP. A rise in CO2 increased GPP in China with increased inter-annual variability especially in the places where vegetation is dense.

→ I like the way authors choose to analyze the GPP data and perform the statistical tests from 12 models along with an observation-based estimate.

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Discussion paper

→ The nonparametric method is used to test statistical significance.

→ Figures are carefully chosen to communicate the essential results.

→ References are appropriately cited

I find the paper is well written and the presentation is excellent. I thus recommend this paper for publication once the following minor issues are addressed.

1) I am a bit surprised that China Land Use/Cover Dataset in Fig.7 shows a decrease in cropland areas at end of the period (1982-2010) and also many satellite-based studies (you have also listed many peer-reviewed) over China shows large afforestation but Terrestrial biosphere models show an increase in cropland areas?? Then how come observation-based estimate of GPP you have shown agrees very well with the model simulated GPP? Could you please clarify this more clearly in the text?

2) I suggest moving supplementary Figure S1 to main Figure 2. This is an important figure and also you are discussing this right at the start of the results section and I think this should be moved. There is an inset figure in each panel of this figure? What is it? You don't discuss. Explain what is it otherwise remove! Also, in the caption please be clear that the results shown in Fig.S1 (also many other figure captions) are the average of 28 years or what?

3) Page 5, two lines above the line 25: I suspect that Fig.2a instead of Fig.1a. Also, the GPP range you mentioned 4.9 to 9.2 PgC/yr, but I see Fig.2a maximum value in the boxplot is more than 10PgC/yr.

4) In general, throughout the text, it would be convenient for the readers if you mention also the abbreviation for the regions (R1, R2, etc..). For eg. at Page 5, two lines below line 25: southeastern China (1.3 PgC/yr, R7) and (1.5 PgC/yr, R9)? I suppose 1.5 PgC/yr corresponds to R9.

5) Why MTE abbreviation for the machine learning algorithm?? not sure how you have chosen MTE?

6) In Figures 3 & 7 legends should be at the top left/right panel (eg. Fig.3a or 3b), to avoid wondering which color is what for a while. Readers usually start looking at the first panel of the figure before going to the bottom panels.

7) At page 7, near line 10: why some discrepancies between SG3 and MTE over northeast China, southeastern China and east parts of southwestern China? Worth explaining there!

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