

Interactive comment on “Contrasting effects of CO₂ fertilisation, land-use change and warming on seasonal amplitude of northern hemisphere CO₂ exchange” by A. Bastos et al.

Anonymous Referee #2

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The increase of the seasonal-cycle amplitude (SCA) of CO₂ has been long researched. This study utilized the inversions and LSM simulations to research the main drivers of the enhanced SCA, and pointed out that the effects of CO₂ fertilization and warming on SCA have the contrasting effects. However, I have a big concern that whether the GLM can give us the reliable result. It can be a good prediction model but not for causal analysis, especially the predictors here you used (eg. Temperature and CO₂) have the high correlations. So (a) I think you should show a figure that makes a direct comparison between the statistical decomposition (CO₂, T_{gs}, ..) and factorial simulations (S1,S2-S2, S3-S2) upon TRENDY S3 NBP, not in the form of your Figure S6 (slope). (b) In your Figure S6b, we can focus on the green bar which represents the

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climate effect only. But after your MLRM fit, we can find that the WH and CO₂ also have the significant effect. (c) We can see the climate effect is positive in model experiments in Figure 2c, but temperature effect is negative in statistical analysis in Figure 3a. So what's the matter? These phenomena show that the explanations should be cautious.

Details: (1) Abstract Line 4: 'from and 11 state-of-the-art' remove the and (2) In introduction, the last two paragraphs can be place into Section Data (3) Page 7 line 4 'The coefficients from the GLM fit for each datasets are shown in Figure S' maybe Figure S5; The last sentence in next paragraph should be 'Figure S6' (4) Page 7, line 14. 'strong decreasing trends for mid-latitudes'-only CAMS shows (5) Page 9, line 12-13 'In boreal North America, LSMs estimate SCAnbp trends very close to CarboScope estimates, mainly attributed to climate' not only to climate, CO₂ effect even stronger. (6) Page 11, line 23 '(i) indirect negative effects of T on decomposition during the “release period” why negative effects? It seems a positive effect, because warmer temperature can result in more release of C by respiration, which can enlarge the SCA.

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