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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Contrasting effects of CO_2 fertilisation, land-use change and warming on seasonal amplitude of northern hemisphere CO_2 exchange" *by* A. Bastos et al.

Anonymous Referee #1

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This paper investigated the relative importance of individual contributors to trends and drivers of the seasonal-cycle amplitude (SCA) in northern high latitudes using two atmospheric inversions and land-surface models. They found the most likely explanation of the trend of SCA at high latitudes is the CO2 fertilization of photosynthesis, rather than LULCC. Although I see the value of publishing, I am concerned about the definition of SCA and reliability of results.

The SCA of atmospheric CO2 should be the difference between the peak and trough values of the cumulative CO2 in a year. But the definition of SCA in this manuscript is the difference between peak uptake and trough of NBP. The sum of NBP during the

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growing season is related to the SCA of atmospheric CO2 while the difference between peak uptake and trough of NBP may be not.

It will be clearer if the Result and discussion can be separated into two part alone. The key finding is CO2 fertilization drive the SCA trend, but more discussion and speculation focused on warming.

Page 2 Line 8, how many are the relative effects of CO2 fertilization and warming on SCA, respectively? Page 5 line 8 and line 28 typos Page 5, why did you use ESA-CCI Land-Cover data set for the analysis of satellite-based vegetation data sets? what are the problems if LUH2 was used for the analysis of satellite-based vegetation data sets? Page7 line4, figure S was missed The size of Fig1.a is too small to see them clearly. Also for figure 4. Page 7 line 15, how did you know the breakpoint in the north of 40°N? Page 8, The patterns of SCANBP trends from the LSM were not consistent with that of CAMS at the pixel scale. The attribution analysis based on LSMs is not very convincing. Page 9 line 29-34, these sentences should be moved into Method.

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