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Interactive comment on "The impact of spatiotemporal variability in atmospheric CO_2 concentration on global terrestrial carbon fluxes" *by* Eunjee Lee et al.

Anonymous Referee #2

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The authors have produced a generally clear and well written paper that describes a set of model simulations that are designed to investigate the importance of spatio-temporal resolution of CO2 forcing for global terrestrial carbon cycle models. They find that increased CO2 forcing resolution has little impact on global aggregate GPP and NBP, but may be important in some regions and seasons.

Overall the paper represents a valuable contribution to the field. However I do have some concerns, or some suggestions that could increase clarity. My main concern is the design of the experiments; where variability in space or time is reduced, from 3hourly spatially varying CO2 to 390ppm CO2 that do not vary in time or space. In this

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Discussion paper

line of variability reduction, the middle step includes removing interannual variability (trend + annual anomalies around the trend). I think the paper could be more clear if it ends with what models are commonly forced with, global, annual CO2 concentrations that changes between years. Subsequent reductions in variability could be reported also, but those are less interesting.

Page 7, line 23: it is not clear if global averages of CO2 are preserved or not through the reductions. Interpolation of monthly means may change the sum of daily values (or 3 hourly). A clarification on this would be good.

Minor comments:

Page 1, line 30, and continuing on page 2: sentence is unclear.

Page 5, line 24 and throughout the paper: NBP is usually positive for a sink.

Page 6, line 31: recycled instead of multiple loops? e.g. "with recycled 1981-2015 MERRA-2 forcing data"

Page 7, line 3: omit "simply"

Page 7 line 20: "every land surface element" is not clear

Page 8, line 17-18: Why not use the same mask for both datasets? Regridding may be needed.

Page 9, first paragraph: Why zonal GPP evaluation and seasonal NBP evaluation?

Page 9, last row, "this turns out" could perhaps be expressed better.

Page 10, line 12 " by the way, is perhaps not a surprise" could also be expressed better.

General; synoptic and daily are both used for the same reduction of variability, I recommend using one of to be consist

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