

Interactive comment on “The impact of spatiotemporal variability in atmospheric CO₂ 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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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