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Interactive comment on "Quantifying Soil Carbon Accumulation in Alaskan Terrestrial Ecosystems during the Last 15,000 Years" *by* Sirui Wang et al.

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In their manuscript, the authors present a model study of soil carbon accumulation in Alaska over the last 15000 years with a special focus on peat carbon accumulation.

Overall, the manuscript is quite interesting and suitable for publication in biogeosciences. However, a number of minor issues remain before it is ready for publication.

1. Figure 2 shows the vegetation distribution used to drive the model for 5 time slices. However, results are presented in Figs. 7 and 9 for 6 time slices. This is confusing for the reader. At the very least it needs to be clearly marked in the figure caption. The symbols used in Fig. 2 to show peat basal dates are also very difficult to make out. Maybe it is possible for the authors to make this Figure clearer.

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2. Figure 7: Figure caption is unclear. How can you show cumulative SOC density? This would imply only the very last time in the time interval is shown. I assume you actually mean the mean SOC density.

3. Figure 12: Caption also unclear. I assume the late 20th century distribution is shown? Figure caption shows 15ka to 2000AD, implying a mean value over this time frame.

4. Since a large part of the results hinges on the modelled changes in peatland area, it is essential that a description of how area changes are determined is provided. Currently it is only stated that area is prescribed from Matthews & Fung, implying no change is possible.

5. Page 4, lines 94-95: the Spahni et al. Model has actually been evaluated with respect to the variables listed – see Wania et al. Publications on the LPJ-Why model on which Spahni is based.

6. Page 5, line 97: Why do you cite Kleinen et al. 2010? They do not use a process-based peatland model, but rather prescribed peat accumulation. I assume you actually meant to cite Kleinen et al. 2012?

7. Page 7 and 8, lines 159-166: The aboveground vegetation in your calibration site is significantly different from the Mer Bleu site you use for belowground calibration. In addition the climatic situation at the two sites is significantly different. Therefore is seems quite a stretch to argue that belowground processes are basically the same. Please provide more justification for this assumption.

8. Page 8, line 173: Please correct date for late Holocene time frame

9. Page 9, lines 194-195: The Shuttle Radar Topography Mission (SRTM) only covered latitudes 56S-60N. Therefore there is NO SRTM data for Alaska. You obviously used some other source for topography data – please provide correct reference.

10. Page 9, lines 197-203: Downscaling / bias correction is unclear. From the text one

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gets the impression, that ECBILT fields and CRU data may be significantly different for 20th century. However, my reading of the original publications is that bias correction minimised that difference. Please clarify this – it would strongly strengthen the text.

11. Page 12, line 256: References to Figures 2 and 3 mixed up, please correct.

12. Page 13, lines 279-289: Study sites unclear. Please provide table of site locations.

13. Page 14, lines 314-316 and table 4: table 4 only lists uncertainty ranges for peatland vegetation. How were uncertainty ranges for upland vegetation derived? Certainly not from the ranges in table 4. Please clarify.

14. Page 15, lines 333-334 – see comment #13.

15. Page 15, line 339 – page 16, line 349: how were peatland area changes determined? Completely unclear (see comment #4)

16. Thankfully, the authors have used a spellchecker, so there are very few typos. However, there are numerous places in the text, where grammar needs checking: Temporal forms are not always consistent, and some sentences are missing single words or larger parts. Therefore CAREFUL COPY-EDITING is highly important.

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