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Interactive comment on "Uncertainty sources in simulated ecosystem indicators of the 21st century climate change" *by* Jarmo Mäkelä et al.

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The article by Makela et al. applies two ecosystem models to two boreal pine sites in Finland using 3 RCP scenarios from 5 CMIP5 climate models to determine uncertainties in carbon and water variables due to parameters, climate models, RCP scenarios, and management options (which are only covered in one of the ecosystem models). This is an interesting uncertainty analysis, though the breadth of the work is limited as it only covers two sites within a single biome, rather than more broadly defining uncertainty based on a wider-range of sites or biomes or through extrapolation. While the authors have made clear why their choice of particular climate models, it is not clear how these two ecosystem models fit into the broader range of such models. The significance of this study is also not great without further justification. Are these sites

representative of other boreal forested site? Do results for pines also apply to spruce or larch forests? Are the same climatic trends also occurring at most other boreal forested sites? Does one set of model results for two sites really make the case that management is more important than the other factors? The paper can be improved if this approach and results can be put into the broader context.

1. Line 104 (Section 2.3): Please provide more description of the "100 vectors". I count around 20 parameters from Table 1 in the 2019 paper – are these the parameters that are being varied? There needs to be a more thorough discussion of how the parameter uncertainty is determined. 2. Section 3.1 – define DEL (delayed management scenario) 3. Line 162: Should be Figure 3, not 2 4. Figure 4: I assume the respiration is ecosystem respiration, and not heterotrophic or autotrophic, so please specify. 5. Figure 5: How are the Cfluxes determined – are these the mean or net difference (NEE) of the GPP and ecosystem respiration? Similarly, in Figure 9, how are the Wfluxes determined? 6. Figure 8: Need y axis labels and title and x axis title 7. Lines 201-203 (Section 3.4): What is meant by different model parameterizations here – this should not be confused with parameters as used throughout the paper, as isn't the meaning here different functional relationships in the different models? 8. Figure 10: There is a reference to drought frequency from this figure, so a better (or additional) figure would be one that showed the frequency distribution of droughts between the different models. 9. Line 204: What is A1? 10. Figure 13: This figure is really just comparing the two models (JSBACH and PREBAS). There are references in the discussion to this figure about pathways (lines 259-260) and high variation (lines 260-261), but I don't see that from this figure. Also how is linearly lengthening of VAP shown in Figure 6? 11. Lines 251-252: How do you know how much CO2 has contributed to GPP? That would have to come from modeling or a FACE experiment. 12. Lines 304-306 don't make much sense to me, as the amount of drought days is increasing in Figure 10. 13. Conclusions: I like general points that management is most important to carbon, that effects of RCP are more important with time, and that NEE is complex due to offsetting effects of GPP and respiration. But the last paragraph is a weak ending

– can use a better closing paragraph to highlight the importance of the study, how it informs the broader modeling community, and where to go from here.

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