Interactive comment on "Improving the representation of high-latitude vegetation in Dynamic Global Vegetation Models" *by* Peter Horvath et al.

Anonymous Referee #2

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General Comments

This study evaluates estimates of PFT distributions from a DGVM in comparison to those of remote sensing and empirical models, and against a field-based dataset, for 20 plots of high-latitude vegetation types across Norway. The topic investigated, approach taken, and results reported will be of interest to the modeling community.

The paper could benefit from more or better explanation of the methods, especially the CLM simulations. For example, it is unclear whether or not this is intended to be any kind of 'temporally-explicit' analysis; this seems a sort of model estimation of some 'average' PFT distribution from the spin-up results that was compared to field plots and

remote sensing data, both of which presumably represent a specific point in time (that is not specified in either case in the methods here).

To properly interpret the results, the sensitivity tests need more explanation and clarification to justify and understand what was done here in this study (vs. previous work).

The "RS method" as one of the three methods compared here seems kind of out of place in this analysis since it is not a method for predicting future PFT distributions as with the DGVM and DM methods. What is the reasoning / purpose behind including RS in this comparison? Or could / should it be used in this study more as a 'reference' data set, like the AR data?

Specific Comments

25-26. please consider this statement carefully; numerous authors could claim that this is untrue

34. can these three thresholds be named here, or at least hint at what they are (e.g. "... based on ...)?

115-116. this is not quite clear and perhaps needs to be specified or qualified; i.e. don't many "countries" have national-scale inventory programs?

126-131. Selecting only 20 plots seems limited, even if deemed acceptable for bioclimatic variation. There needs to be better explanation / justification for this choice, how "acceptable" was determined, and whether a kriging of temperature and precipitation really captures "bioclimatic" variation across the country.

150. curious decision to give a new acronym to CLM. why not just refer to it as "CLM"? and actually, you do, somewhat, as it seems to switch back-and-forth between "DGVM" and "CLM4.5" for the rest of the manuscript. I see the idea to associate the results from CLM as representative of the "DGVM" approach, but when describing or referring to the specifics of CLM then just call it "CLM" (or "CLM4.5")

154. it may be useful here to point out what these simple assumptions are, and how different (or not) they are from those for which the DM method is based on.

171. was soil C initialized somehow, or was it a separate (longer) spin-up? are these mostly undisturbed sites or was that taken into consideration for the vegetation spin-up at each site? was the CORDEX climate used for the spin-up? average or de-trended?

174. what year / era does this RS map represent? Table 2. I don't think all of this detail is necessary in the main text.

278, 279 & 305 are confusing uses of sub-headings

287. swe_10 and tmin_5 make sense as described but can "precipitation seasonality" be explained? "bioclim_15" is not as obvious as the other two parameters

293-299. there just seems like so much of the justification and explanation of decisions and approaches for the sensitivity test are glossed over here. For example, why are these particular parameters chosen, how was bioclim calculated, is the stepwise order important, what does it mean "three PFTs at the same time", how were the thresholds determined, etc etc. Perhaps a little more explanation than just "see Horvath et al 2019" (line 286) would be helpful.

414-415. this seems like a bit of a leap without a more direct connection to the results of this study.

468. but in line 312 it was stated that two of those three "had little effect"

498-499. when are high-quality RS products ever not available anymore in this day-and-age?

503. Just to be clear, it seems that these parameters were identified in a previous study, not this one, correct? And actually in this study only one of them (bioclim_15) was found to be useful, no? This same claim is made in the abstract, as well, and should be used with care.

C3

Technical Corrections

- please review the grammar, wording and sentence structure throughout

42. please re-word and fix the grammar of this sentence one way or the other

55. remove "the" before DGVMs

60. latitudes

150. replace "further" with "hereafter"

170. "recalculated"

Table 2. "AR" is missing from the caption

292. change "NEB" to "NET", I think

341. "spectre" should be "spectrum"?

412. "overprediction of Boreal NET"?