Biogeosciences Discussions

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Comment on bg-2021-133

Dan Metcalfe (Referee)

Referee comment on "Representativeness assessment of the pan-Arctic eddy covariance site network and optimized future enhancements" by Martijn M. T. A. Pallandt et al., Biogeosciences Discuss., https://doi.org/10.5194/bg-2021-133-RC1, 2021

General Comments:

This paper synthesizes available eddy covariance data in the Arctic and attempts to identify areas which are well and not well represented by the current distribution of eddy covariance stations. The topic is interesting and important, the paper is generally well written, and the analysis appears sound though the spatial representativeness assessment lies well outside my own competence. A major source of impact and novelty in the present paper is the method used to identify specific new locations/upgrades to existing locations which would result in the greatest relative increase in biome representativeness. This advance is particularly valuable since it could greatly improve the effectiveness of strategic research planning for future flux sampling efforts. I have only fairly minor suggestions for improvements (see below).

Specific Comment:

All figures: It is difficult to distinguish the ”no data” and poorly represented areas with the current color scheme. Also, it may be a good idea to explicitly exclude areas with permanent ice (ie: much of Greenland), unless you think these areas should be represented with EC data?

Lines 136-139) I miss a bit more detailed discussion and justification in the intro, results and discussion of the broader implications/considerations of the 18 variables chosen to represent environmental variability. How/why were these particular variables chosen? Are there any other significant variables that could have been interesting to include? How might the variables selected in turn impact your estimates of spatial variability in representativeness? For example, are there some important variables which remain poorly represented even in Alaska/Fennoscandia? How were the variables combined together to create a single metric of environmental variability? Many of the 18 variables seem likely

they would be strongly autocorrelated with each other, so any procedure that treats all individual variables as “equal” in weight to each other may be flawed…

Lines 509-501) Its probably true that more EC sites within an ecosystem would create greater certainty for that ecosystem but the key question is would this result in a greater % improvement in overall biome representativeness compared to installing an EC site following your optimized site selection protocol? I assume not, but your approach should be able to resolve this.