



Interactive comment on “Recent above-ground biomass changes in central Chukotka (Russian Far East) using field sampling and Landsat satellite data” by Iuliia Shevtsova et al.

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We thank the anonymous referee #2 for the revision and valuable suggestions on the improvement of our manuscript.

Referees comment: “The authors have stated at Page 2, line 40-50 that ‘a loss of specific species from one PFT can be replaced by taxa from another PFT in response to climate change even though total AGB production remains similar’. Accordingly, at Page 3, line 65-70, I suggest the authors should also add some literatures which found that different PFT may also have similar NDVI values and caused bias estimation of

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biomass based on remote sensing data.”

Authors’ response: Thank you for the suggestion. Although, there is not many publications, featuring the described effect, we added more information to make a point you were suggesting to include (lines 72-75):

“However, NDVI can be affected by water content and tall vegetation shadows, what can influence the spectral signal of vegetated land (Pattison et al, 2015) and decouple it from the biomass relationship. Such decoupling, or similar biomass ranges make distinguishing between different plant functional types (PFT) or communities difficult. Furthermore, NDVI may not capture differences in understory of moderately closed forests (Loranty et al, 2018) because the remote sensing signal comes from the top of canopy. “

Referees comment: “Page 4, line 90-95. I don’t quite understand why plot numbers for different habitats are not equal. Please explain.”

Authors’ response: Before the expedition to the previously not described in terms of vegetation central Chukotka we planned to cover different habitats based on NDVI. On the other hand, afterwards we based our vegetation classification on taxonomical composition, rather than NDVI, what mainly made the disproportions in the sampling different habitats. However, the different number of habitats is in line with the concept of stratified random sampling, assuming higher number of plots to place the well-presented typical habitats and less in the not typical. We added a clarification to the lines 98-100: “Numbers of plots per habitat are different, but align with the concept of stratified random sampling with assuming a higher number of plots to place the well-presented typical habitats and less in the not typical.”

Referees comment: “Page 4, line 95-100 is a 50 x 50 cm area large enough for tree samplings, at least in this region? How to avoid arbitrary sampling in a plot with 15 m radius?”

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Authors' response: The trees were not sampled on the 50 x 50cm area, this area was used only to sample ground layer vegetation. The trees were sampled on the plot with 15-m radius. We added a clarification (line 106): "Trees and tall shrubs were sampled directly from 15 m radius plot."

Referees comment: "Page4, line 105-110. I am a little bit confused that sampling plots in different survey years are not in the same location? If this is the case, how to study the changes in AGB if plots located differently? The authors should provide information or cite papers to suggest to what extent these results are convincing base on such kind of data series?"

Authors' response: Speaking of AGB changes we only compared changes inferred from Landsat satellite data. We used field AGB estimations of 2018 to establish a connection between the field and remote sensing data. We have not compared field-based AGB changes in different years. For the clarification, we have added a sentence (lines 114-115): "In 2016, we investigated only projective cover, whereas in 2018 both projective cover and AGB were estimated."

Referees comment: "Page 6, line 140-145. It would be better if the authors provided more information about remote sensing images used in this study even though you have cited a paper here, especially for the year of 2018."

Authors' response: We used the remote sensing data from 2000/2001/2002 and 2016/2017. For clarification we added the description of remote sensing data used in the study in Appendix B (lines 647-659):

"For each time stamp (2000/2001/2002 and 2016/2017) we used available Landsat acquisitions: peak-summer and snow-covered (table B1, Shevtsova et al, 2020a). We used peak-summer acquisitions to derive two Landsat spectral Indices (Normalised Difference Vegetation Index (NDVI), Normalised Difference Water Index (NDWI)) and snow-covered acquisition for derivation of Normalised Difference Snow Index (NDSI). Before indices calculation the Landsat data was topographically corrected. The sub-

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sets that we used for land-cover classification were cloud free and cloud-shadow free. Additionally, we masked all water bodies. Latdsat-8 data were transformed to Landsat-7-like (see section 1.2 Landsat data, pre-processing and spectral indices processing).

Table B1. Dates and short description of Landsat data used for retrieving spectral indices and further land-cover classification.

Referees comment: "Page 9, line 225-230. Maybe I missed some important information, but I did not find season information from the context. I assumed that the authors aware that when studying biomass changes, same season should be the prerequisite."

Authors' response: In the line 96 we stated that "during the expedition "Chukotka 2018" in July 2018..." the survey in the field was done in July. Concerning Landsat data we used the peak-vegetation season (15 July-15 August). That information was added to the Appendix B (table B1).

Please also note the supplement to this comment:

<https://bg.copernicus.org/preprints/bg-2020-416/bg-2020-416-AC2-supplement.pdf>

Interactive comment on Biogeosciences Discuss., <https://doi.org/10.5194/bg-2020-416>, 2020.

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