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Biogeosciences Discussions

Interactive comment on "Can C-Band SAR be used to estimate soil organic carbon storage in tundra?" *by* Annett Bartsch et al.

Anonymous Referee #2

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General comments

The authors present a study that demonstrates the potential use of C-band SAR to determine SOC content in Northern treeless arctic regions. The inferred surface roughness from the SAR data provides an observable metric that may be correlated to measured SOC values from pedon and upscaling land cover based studies. In general the method provides reliable results and at a higher spatial resolution thant the existing NCSCD dataset. The work is innovative and appears to have great promise at better resolving SOC content across permafrost areas.

Weaknesses: Where does it go from here? Do the authors believe that it can produce a reliable panarctic map or given the limitations with carbon rich soils do they believe the method should be reserved for areas with traditional landcover-based assessments? If

so, will they produce this map? Will it be available?

Specific comments:

Abstract – last sentence: This sentence is not particularly clear. In general a brief explanation/discussion on why unfrozen period and SOC should be closely related would be very helpful. This relationship is presented in results but early in the paper it would helpful to have more detailed context on the why this is important.

Figure 2: The differences in the scattering between the 3 examples is not very clear, is it the number, the length of arrows or both, for example what is uniquely different in the scattering between the first and last examples.

Page7, line 14, 'the used orthorectification' is awkward and unclear wording.

Page 7, line 18-19. It is unclear why the minimum value is better than using a mean or median value.

Figure 7: it would be helpful to have the legend on this figure rather than having to refer back to Fig 4.

Page 18, line 33, 'as partially possible for shallow river sections' unclear.

Page 18, line 34, what resolution is meant by 'very high spatial resolution'? Current Hydro1k has rivers at 1km pixels, would 500m be enough to eliminate the mixed pixel impact on of a river on the GM measurements? Figure 14: Label Right hand Y axis, I think it is samples, but the legend has samples/10,000 which would seem to imply the plot is showing a maximum number of samples of 6 x 10ˆ9, which is confusing.

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