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Interactive comment on "Using ground-penetrating radar, topography and classification of vegetation to model the sediment and active layer thickness in a periglacial lake catchment, Western Greenland" *by* Johannes Petrone et al.

Johannes Petrone et al.

johannes.petrone@skb.se

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Comment: Fig. 4A-C and Fig. 4D-F are probably profiles 1 and 2 in Fig 3B. I presume the profile are the roughly E-W transecting profiles in the map Fig. 3B!? I would also recommend that the Fig. 4 figures should have a consistent order with GPR-profile, Probe and the model of different layers, now they are mixed between profile 1 and profile 2. Fig. 4 B and Fig. 4F why are there a difference between the profiles in the figures and what is the difference between the probe data and the modelled active layer

depth from the GPR profiles? Can you please elaborate around this problem and write it out a bit more clearly.

Response: We realize that we should be clearer regarding the whole of Figure 4 and have addressed this partly in Author Comment 1 in the second response. To summarize: Yes, the transects are illustrated in E-W direction. The main difference between Figure 4B and Figure 4E (originally 4F) is that raw data is presented in Figure 4B to extract information which can then be applied to other transects (Figure 4E).

GPR travel time to PF boundary vs Active Layer depth at probe locations vs vegetation (Figure 4B) resulted in general wave velocities for each vegetation classification. These can be found in Table 2. We tested the velocity values using a separate transect (Figure 4E) where we used the velocities from Table 2 to model Active Layer depth from the GPR measurements. The modelled values matched the probe depths to an acceptable correlation and these wave velocities were then applied to all GPR measurements.

Changes in manuscript: The order of Figure 4A-C and 4D-F is updated so that they appear in consistent order as suggested. Both the figure caption text and the main text describing the methods have been rewritten slightly to make it clearer the connection between probe depth, GPR travel time, wave velocity, vegetation class and modelled active layer depth.

Comment: "Fig. 7 Upper part is the model of the active layer thickness in the catchment area while the lower is a schematic model, could you indicate in the upper figure where the schematic model in the lower figure is located? The text is referring to Fig. 7A and 7B but this is not indicated in the figures or the figure caption below, please adjust caption accordingly to the text."

Response: The schematic figure represents a general valley area of the catchment, ranging from the catchment boundary towards the lake.

Changes in manuscript: Black dashed lines have been added in Figure 7A to illustrate valleys found within the catchment and the figure caption has been updated to explain this.

Comment: “In the Fig 8 it is missing A, B and C, please add that to the figure. Please also add A, B and C to the caption and please refer to these different sections in the text clearer. Especially section 3.2 and lines 15-20 of the discussion part would be more understandable if the reference to Fig. 8 updated accordingly to the suggestions above. The text in the discussion is unclear concerning the soil temperature measurements and especially where this measurement is performed. Can this be indicated? Where approximately is this Fig 8 for the model taken, can it be indicated on any of the maps in the earlier figures?”

Response: A wrong version of Figure 8 has been uploaded to the manuscript. The wrong figure shows soil temperatures only for the active periods of 2011, 2012 and 2013 and not for the whole period of 2011-2015 as indicated in the text. We apologies for the inconvenience, but updating the figure to the one showing soil temperatures for the period 2011-2015 should solve the questions raised. The text in the manuscript is correct given that the figure is updated.

The location of the soil measurements is marked in Figure 3B and in Line 24 P 10 it is written that the temperature station is placed in the vegetation group heath.

Changes in manuscript: Updated to correct figure showing the whole period of 2011-2015. See attached figure.

Interactive comment on Earth Syst. Sci. Data Discuss., doi:10.5194/essd-2016-19, 2016.

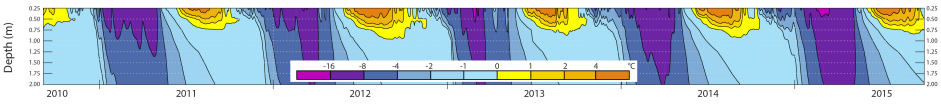

Fig. 1. Correct figure 8.