RC1:

General comments:

The manuscript submitted by Mathys et al. describes a new method to extrapolate the quantification of ice contents in permafrost areas based on another paper submitted. By the combination of multiple observations, modelling tools, remote sensing data, they evaluated the ice contents in study sites in the Central Andes. This quantification is helpful for the scientific community to better understand hydrological processes occurring in permafrost-affected catchments.

I think the paper is suitable for publication in The Cryosphere with the condition that the paper explaining the methodology is published as this manuscript fully depends on Hiblich et al. paper. Moreover, I do have some specific comments that may improve the quality of the manuscript.

Specific comments:

Figure 2: It is hard to link the figure with what is described in the text. I would recommend adding some information on the figure to help the reader follow the different steps.

We will adapt the figure and the caption to make this clearer and provide more information to the reader.

L143-145: I suggest to split the sentence into two separate sentences.

We agree and will change the sentence accordingly.

In this way, I found multiple long sentences in the manuscript and splitting them would help the reader.

Thank you very much for this observation. We will revise the manuscript and shorten long sentences in order to improve the readability.

L223-225: “Figure 3, 1a,b” and “Figure 3, 2a,b” are hard to understand. Please clarify.

This was an error in the preprint, thanks for spotting it. We changed the text to “Figure 3; a,b” and “Figure 3; c,d”. This now also corresponds to the figure labels.

Figure 5: I do not see where the text refer to Figure 5. If it is not cited, it should be moved to the Appendix section or removed. Moreover, the figures and the tables within Figure 5 are hard to read.

Figure 5 is referred to on L209 in the original manuscript. We therefore keep the Figure in the main part of the text but will move the figure closer to the citation and improve the explicit referencing between text and figures.

L253-255: This should go in the Discussion section.

We would prefer to keep the sentence here, as it is needed to justify our decision of the choice of study areas and their probable permafrost distribution in the following sentences (l255ff: “As a consequence of these clear differences between the two sites, the entire area of Site D was considered for the following steps of the methodology, whereas only rock glaciers and talus slopes were considered at Site A.”)

L312-313: Parentheses are doubled. Please correct.

Agreed and changed accordingly.

L332-335: I would suggest to move this sentence to the discussion section.

We agree and will move the sentence to the Discussion section.

L335-338: These results are already mentioned in the previous paragraph.

We agree and have deleted the repeating sentences.

Figure 7: It is not clear that “rock glacier dominated catchment” cover the four groups above.

We agree and this will be changed to make it clearer to the reader.

Figure 8: The large uncertainties in the calculations of ice content revealed by this figure are not enough discussed in the discussion section. I would recommend to add information regarding this uncertainty so the reader can understand how the method presented in this paper improves the quantification of ice contents in permafrost areas.

The uncertainties (bars) shown in Figure 8 origin mainly from the uncertainties regarding the spatial extension of the subsurface ice occurrences and their maximal/minimal values, which are the focus of our geophysical approach (this manuscript, but also the companion paper Hilbich et al., part I). These are explained in lines 406-411 of the original manuscript. By displaying the uncertainties like this, we want to be as clear as possible regarding the chosen geophysical approach. In a purely applied study one would of course narrow down the uncertainty range by choosing a best guess scenario and depth/ice content ranges, which correspond to realistic uncertainties and not to the maximal uncertainties shown in Figure 8. We agree that this has not yet been expressed well enough in the original manuscript and we will therefore discuss the uncertainties in more detail in the discussion section of the revised version.