

The Cryosphere Discuss., referee comment RC1  
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## Comment on tc-2021-234

Jacopo Boaga (Referee)

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Referee comment on "Spectral Induced Polarization imaging to investigate an ice-rich mountain permafrost site in Switzerland" by Theresa Maierhofer et al., The Cryosphere Discuss., <https://doi.org/10.5194/tc-2021-234-RC1>, 2021

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Authors present an interesting application of SIP on a permafrost site. The study is exhaustive and well presented, results are supported by the data presented and the work is of interest for TC readers. I have no doubt the paper deserves publication after some minor corrections on text and graphics.

- Line 73 and 76 seems describe the same concept, maybe the lab tests can be presented in one sentence.
- line 140  $\rho$  is the here the real component ( $\Omega$  m) ?
- Ln 176 Maybe the relaxation frequency of ice should be here better introduced
- chap. 3.2 The SIP setup description should include essential information as the electrode spacing, the arrays lengths, to etc. to be specified line by line
- chap.3.2.2 . August or September 2019 ? (see line 218). I think part of this paragraph is setup (3.2) rather than mapping. You assert resistance contact was in the range 5-60 k $\Omega$  , a very low values in such a debris condition (if compared to the literature ones, in the common order of hundreds). Did you help the contact some way ? and if yes, how do you increase the contact locally? This is of extreme importance in SIP results obtained below, and of huge interest for the TC community.
- Ln 258 is it always 5 m the spacing ? did you collect dip dip data also with 10 m spacing?
- Ln 302-304. This last sentence about robust inversion is not clear, is it real necessary?
- Fig.2, I suggest to label the figures (a,b,c,d) to help reader's comprehension. Modify the text and caption accordingly.
- Ln 402. Sentence is not clear, I think the concept is  $p_a$  has no frequency dependence but it is still able to discern frozen parts.
- Ln 546-549, Sentence about Duvillard work is not clear.

Fig.8 the c) panels must be differentiated, cause they are not clear in the caption. Please label the different depths in the figure.

-Ln 584-87 As I understood you performed lab test on Lapires sample rocks. This is part of the research (and then Method) and should no be presented here in the discussion section.

-Ln 601 Since the spacing was 5 m, why you average pixel of 1 m width. Maybe keeping the same spacing address more your survey lateral resolution.

Ln 614 How Coperey work differs from Limbrock one? This is of interest in the discussion of your results.

Fig. 9 I suggest label the panel. Looking the figure, the frequency dependence of AL and permafrost seems to have the same behaviour. This should be more emphasised in yours discussion.

Thank you for the very interesting reading