Spring-water temperature suggests widespread occurrence of Alpine permafrost in pseudo-relict rock glaciers

Your manuscript presents the results from spring-water temperature of several rock glaciers, investigating in conjunction with topographic and geomorphological factors, spread in an area of 795 km^2. The underlying method is based on measuring spring-water temperature to distinguish between intact and relict rock glaciers. Only two specific cases are investigated with electrical resistivity tomography (ERT) to investigate the permafrost presence in the ground. Although the area investigated is commendable, the study presents methodological, conceptual, and formatting failures that make this work unsuitable for publication in its current shape.

GENERAL COMMENTS:

Background:

There is a lack of context with the previous work by Seppi et al. (2012), who pioneered the rock glaciers classification in the area investigated in this research work. In general, a detailed discussion between Seppi et al. (2012) and your contribution would allow placing your findings in the context of current research. Finally, there are very relevant limitations in this work in the points chosen for the spring-water temperature measurements which make some data used in the analyses not exactly reliable.

Methodology:

- The ERT surveys are performed only in two rock glaciers. Considering the aim of this work, this is not enough. There is too assumption about the spring-water temperature and the location of some of the measuring points which need to be verified not only on two rock glaciers. This is not enough to explain the difference in temperature in your dataset and cannot be used to discriminate intact rock glaciers from relict ones.
- There is a missing information about the runoff estimation. Did the runoff estimation do by visual inspection (as said in the line 171) or did you measure it properly?

Results:

- The subchapter “Ice storage in the rock glaciers and glaciers of Val di Sole” is placed in the wrong position. If the authors explain the methodology to estimate the ice volume and consequently the hydrological response, you should put these details in a proper subchapter in the methodology and add this notion in the introduction as well.

Discussion:

- Some information (see previous comment about the subchapter 5.5) are presented for the first time in this section. It is well explained, and the analysis are done in a proper way, but the position is wrong and completely unlinked with the text. The authors never mentioned previously this analysis, so its introduction is completely not in the correct place and never explained before along the text.

Limitations:

- As mentioned by the authors, there are several relevant limitations in this work.
    1. Location of the points where the spring-water temperature are performed.

If the point is located not in correspondence of the rock glacier but a few meters downstream, how this measure can be considered a real temperature value of the water coming out of the rock glacier? Between the rock glacier and the measuring point, the water is subject to alteration process that can alter its property and thus may represent an unrealistic spring-water temperature data. Therefore, this value should not be used to distinguish between intact and relict rock glaciers. By doing so, part of your dataset is based on unreliable data, if this situation arises. How many springs investigated fail in this case?

2. As you said, some springs were only monitored once. It seems a bit small to me to be used within a dataset where the ultimate goal is to use the spring-water temperature information to discriminate relict rock glaciers. I appreciate the explanation for their validation, but I do not think your conclusion to include this data in the dataset is robust enough.
3. This work seems based on outdate rock glacier classification which distinguish between intact (active and inactive), and relict rock glaciers. The update classification of rock glaciers distinguishes them between active, transitional, and relict. Could the authors explain why this latter classification is not taken into consideration?

DETAILS:

Line 60: check grammar

Line 86: ….and particularly on relict rock glaciers

Line 96: add reference

Line 107: what is the time interval considered for the precipitation parameter?

Lines 112-115: Add a short explanation of Seppi's method to classify rock glaciers and how they pointed out the number of rock glaciers in every single category.

Line 120: …mean annual precipitation of 1233 mm (Carturan et al., 2016)

Lines 129-130: rewrite the sentence. It is not clear.

Lines 130-132: These two sentences are not placed in a correct position since they provide results. Please, consider to move these lines in the appropriate section.

Line 133: What "considering accessibility" means?

Line 159: Why some springs were collected once per year? What is the reasoning behind the authors' choice to carry out only one measurement per year (albeit repeated between 2018 and 2020) and to consequently be able to consider this value sufficiently truthful?

Line 161: This classification between intact and relict rock glaciers is based on the outdate classification. As the authors may know, there is an update rock glaciers classification made by RGIK2023.

Line 171: How did the authors estimate runoff "visually"? It is a very subjective value and depends heavily on the operator in charge of the measurement.

Line 174: Do you mean outlier values?

Line 175: How did you exactly estimate runoff? You previously said, "runoff was visually estimated".

Line 177: See comment above. At least, insert a value for this "higher".

Line 219: I consider that one measure is not enough. Can the authors explain why they consider this measurement to be sufficient? Since your work is focused on distinguishing between intact and relict rock glaciers based on spring-water temperature, I don't think one measurement is sufficient enough.

Line 243: Insert the length of each survey.

Line 258: This seems more a result than a method. Consider moving in the appropriate section.

Lines 265-270: This part does not seem a result. It should be better to move it in the method section.

Line 386: Please consider indicating this information in Figure 1.

Lines 397-398: This is not something surprise. It has been already reported in some previously studies. Please add more recent references.

Section 5.5: Why this part is inserted in the discussion section? The explanation about the volumes should be moved in the methodological part.

Figure 2: Insert north arrow and scale bar.

Figure 3: Insert (a), (b), (c), and (d) and adjust the caption accordingly.