General Comments:

In this edited manuscript, the authors do an excellent job stating their results and placing them within the current body of knowledge, without over interpreting them. I felt that the authors responded to all valid comments I had previously made and corrected me on comments I had made that were not valid.

I was particularly impressed with their discussion on the microbial respiration rates and appreciate that the authors included data for multiple measurements throughout the thawing process. They also did an excellent job distinguishing between the three transects and the altitudinal effects which were difficult to understand in the previous version. The rewritten discussion was much clearer and easier to digest, and I thought the main points were well supported and well stated. Finally, the authors did a good job at speculating about impacts of climate change within the constraints of their results and the conclusions section did an excellent job summing up the results of this paper.

One issue that needs to be taken care of is the grammar throughout the manuscript. There are too many grammatical errors to count and I've highlighted a few examples below. I suggest it be thoroughly edited by an English speaker.

Specific Comments:

L240: Should reference Fig 2b, c.

L249: Seems strange to start this section off with the interactive effect, when the RDA showed that most of the variation could be constrained to an altitudinal effect, while only 8% was explained by the interaction term (if I'm reading your results correctly).

L252: Doesn't this indicate that ALL the effects (altitude, transect, altitude:transect) were largely driven by the soil variability rather than just the interactive term? I agree that the interaction term is interesting and it is nice you can relate it to Mg++, however, Figure3 shows all 3 transects oriented in the same ordination space from the lower left to the upper right alongside increasing elevation. It seems like the text is focusing so strongly on the interaction, when the two standalone variables have more explanatory power. I do want to note that I think the discussion section does a very nice job interpreting these results.

Table1: Please rename first column to Site Altitude [m a.s.l.]

Figure 2b: Should the Y-axis title be "Potential Respiration"?

Figure 2: This is completely a personal preference on my part, but I like the horizontal ticks you have in part c between the sites. You may want to consider adding the longer ticks in parts (a) and (b). This is not completely necessary though, since you nicely change the color of the bars for each transect.

L798: "Results of RDA", is this supposed to be the figure title? It is not a complete sentence and is strange in the middle of the legend.

Also, check this figure legend in general for grammar errors. "The correlation between the abundance of the main microbial groups (bold italic) and the soil geochemical parameters that were retained by forward selection of all the explanatory variables collected. The altitude of sampling sites was used as a

supplementary variable…. Dotted lines indicate environmental variables retained by the forward selection model."

Figure 4a. Here I recommend adding the larger x-axis tick marks as seen in 4b, since there is no color change distinguishing between the transects.

Grammar examples:

L20: Grammar error, "we did not <u>observe</u>…".

L22: "Mainly due to differences in bacterial PLFA compositions, but also systemic altitudinal shifts in MCS related <u>to</u>…"

L32: "fundamental roles…"

L37: "Offer a great opportunity"

L38: "presence of vegetation, and…"

L65: "…we conducted <u>a</u> study aiming to assess…."

L229: "while mosses covered <u>a</u> very small proportion…"

L242-L245: The grammar issues in this sentence need to be addressed as it is difficult to understand.