We appreciate the opportunity to revise this manuscript in response to the thoughtful suggestions of the two reviewers. Here we present our responses to these suggestions.

Referee #1 felt that it was a disadvantage that we did not sample the early phase of snowmelt, but as we noted in our response document, the study area is inaccessible during winter due to deep snowpack. We added mention of this reality to the text (Lines 131-132)

Referee #2's overarching general comment is that our sampling strategy for snow may not adequately capture the isotopic and chemical variability in the seasonal snowpack. As noted in our response document, we certainly wish we could have collected more snow and from earlier in the season. However, such an expanded sampling campaign was simply not possible. Thus, we are left with the samples we have and need to rely upon them, with their imperfections, as the sole source of information about the composition of the snow contributing meltwater to this system in 2021. In our revised text we acknowledge that previous work has clearly established how isotope values in snow can vary spatially and change with time. However, we also emphasize that our measurements are consistent with other analyses of snow from the Uinta Mountains and with values predicted by the Online Isotopes in Precipitation Calculator. Thus, it seems appropriate to consider our values to be broadly representative of snow in the Uintas, which is sufficient for our purposes in this study (Lines 253-259).

The Referee also felt that our calculations comparing the subsidence volume on RG-2 with the estimated spring discharge seems like a "last minute" addition to the paper. However, as we explained in our response document, we intentionally placed this at the end of the discussion because our numbers are inherently imprecise (both the timing of when the observed depression formed and the true rate of spring discharge cannot be known). Thus, we are simply endeavoring to note that there is evidence of subsidence and that the magnitude of that subsidence is compatible with relatively recent change in the mass balance of ice in this rock glacier system. If we had more robust measurements, we could make this a more central part of the discussion. But given the uncertainties, it seems prudent to include this as more of a supporting note, rather than a main argument.

Specific Comments (*with our response in italics*)
L77. Probably you mean that no *clean glaciers*, remain in the Uintas.

-Changed to "ice glaciers" (Line 77)

Fig1. This figure could be complemented with a layer showing the delineation of known rock glaciers in the basin. Is the Spring sampler upstream of the Stream sampler? it is not clear from the figure.
-We added the mapped rock glacier outlines to the figure, and clarified the position of the spring and stream samplers in the text. (Line 122)

L90. Replace “samples” with “samplers”.
-We made this change. (Line 101)

L107-109. Were these data loggers active for this research? if so, their location should be shown in Figure 1.
-The data from the loggers were presented in the referenced paper (Munroe, 2018). They were located at the same positions at the water samplers in this study.

Methods section. Please provide accuracy estimates for isotopic signatures based on the analytical procedures and instruments employed.
-We added these statistics in our revisions. (Lines 146-148)

L151. Replace “was” with “were”.
-We made this change. (Line 152)

Figure 3. Why are samples from RG1 not shown in this figure? I can’t see a mention to this in the text.
-It was not possible to return to the more distant RG-1 sampler early in the season to collect a subsample as we done with the other more accessible samplers. A note explaining this was added to the text. (Line 134)

Table 2. RG1 samples seem to be less depleted than those from RG2. Is this difference significant?
-The difference is statistically significant, we noted this in our revisions. (Lines 190-191)

Figure 4. Why are snow, rain and melt samples not plotted in this graph? the number of samples in these cases is very low, but nonetheless it would be interesting to see where they fall in the graph.
-We experimented with presenting the precipitation values in Figure 4, but with so many data points already plotted for the water samples, this addition made the figures too crowded. The low values for the snow, in particular, also required adjusting the axes with the result that the datapoints for water samples were even more clustered. Because the intent with this figure is to visually present how the isotopic composition of the water samples evolves during the melt season, we elected not to include the precipitation values and reduce the readability. As noted below, ranges for the precipitation values are presented in Figure 6.

Figure 5. Why are symbols for RG2 in July different?
-As noted in the caption for Figure 5, the small green diamonds present reconnaissance data collected for RG-2 in the fall of 2020 during a preliminary phase of this project.

Figure 6. It makes little sense to plot snow values as an average, with so few samples. Better just plot the individual samples in the graph. Same with snowmelt.
-Presenting the range is a visual way to highlight that our snow measurements are but a few

datapoints in a spread of values. Plotting the individual points cluttered the figures and de-emphasized the likely continuum of snow values. We retained the brackets presenting the range.

L250. The technique is called "principal" component analysis. Please review and correct throughout the text.
-Our mistake, we made this change throughout the text.

Figure 9. It would be nice to try and discriminate the water samples among stream, spring and rock glaciers. Maybe you could select major ions and plot in this graph as well.

-We updated Figure 9 so that the water samples are presented with the same colors as in previous figures. We also note in the caption the order in which the four sites are presented from left to right to aid readers who do not have access to the color version.

L311. This inference might be correct, but I think that it is unsupported by the available data, which is very scarce in terms of snow and snowmelt isotopic composition.
-True, our number of snow samples is small. But here we are noting the correspondence between the similarly depleted isotope values for both snow and groundwater, and emphasizing that groundwater values are most depleted. The most logical explanation for that observation is that groundwater is primarily derived from snowmelt.

Snow at different altitudes can have a large spread in the isotopic signal, and melt can favor preferential elution, which muddles the picture when trying to link stream and snow samples.
-We added mention of this in our revisions. (Lines 252-259)

L318 and elsewhere: please use a more direct time referencing to help the reader follow your analysis. Talk in terms of specific months, at the very least.
-Thank you for the suggestion, we endeavored to do this throughout our revisions.

L318. low values of what?
-As we are referring to the GMWL here, we thought it would be clear that we are talking about low value of deuterium and $\delta^{18}O$*. We made this more explicit. (Line 334)*

L333. these large reservoirs have not been described previously in the text (except for one lake). They should be mentioned in the study area description and their storage volume at least approximately quantified.
-We changed "reservoirs" to "volumes". (Line 350)

Figure 10. In this end-member mixing analysis, error bars should be provided, moreover considering the very low number of snow samples.
-We considered how to include this information in our revision, but ultimately decided that it unnecessary. We are not, in Figure 10, attempting to quantify the abundance of each end

member in a given water sample. Rather, we are aiming to visually present evidence that the overall composition of the water samples collected at the two rock glacier sites during the coruse of the melt season transitions away from the typical composition of the snow (isotopically depleted and fresh) toward rain (less depleted and still fresh) toward something else (intermediate isotope values and much higher dissolved load). In Figure 6 and in the text we are clear that the values in the snow samples vary, but for the purpose of this visual argument, the range of the error bars is non-essential.

L384. "Thus these samples…" Yes, but may not necessarily be a valid representation of snow MELT at this time, or of basin-wide snow composition, because of preferential elution and spatial (elevation-dependent) isotopic signatures of accumulated snow. The authors must discuss this source of uncertainty and incorporate somehow in their estimates.
-We understand the reviewer's point, but would argue that the similarity of our measured values to other collections from the region and to values predicted by the OIPC supports the assessment that our samples are a reasonable indication of the isotopic composition of snow in this study area. We make this point in our revised text (Lines 256-259, 335-336, 400-401)

L389-395. the fact that this potential bias in the data (originated by the road) is brought up this late in the paper seems problematic to me. Are these data included in all the previous analysis? Why? should this data be discarded altogether?
-We agree that the possibility that road dust influenced the precipitation samples collected at the spring site is concerning. This is why we relied on the precipitation collected at RG-2 (far from any road) to constrain precipitation chemistry (Lines 411-413).

L403. The authors should discuss why this significant estimated contribution from RG is not reflected in the stream isotopic composition time series, which remains stable although there's a strong trend in the RG series (figure 6).
-In reality, only the spring (groundwater) time series is stable (Figure 6); the streamwater exhibits rising isotope values late in the season that are consistent with an increased rock glacier component.

L413. but you also estimated 15 l/min for one of the glaciers. So, the rate of ice melt is hugely uncertain! Although this surface depression analysis is interesting, the way it is presented here feels rushed and somewhat contrived. The authors should expand: what is the total area of RG mapped in this basin? What is the range of glacier ice available? etc.
-We previously discussed our logic in presenting the implications of this surface depression so late in the discussion. We added mention of the total area of rock glaciers mapped in the basin (Line 81). We previously mentioned that glaciers are absent in this region. (Line 77)

Figure 12. I'm afraid that I can't see the depression the authors refer to. This data should be presented much earlier, in the data section, and not in the discussion section.
- As we have discussed already, given the uncertainties we feel it is prudent and appropriate to include description of this depression and its possible significance late in the discussion section.

To aid clarity and to highlight the depression we refer to in the text, we added contour lines to the figure and changed the color of the oval call-out to yellow.

L428. Based on only one sample of snowmelt water, it is tenuous to make strong statements about snowmelt similarity or influence on streamflow throughout the season. This is a major problem of the material presented here, and should be discussed by the authors.

-As noted above, we added a more explicit statement about the limitations imposed by the small number of snow samples (Line XXX). In this part of the discussion, where we explore the rock glacier contribution to streamflow late in the melt season, the composition of the snow is not an issue because the calculations are based off the triangle defined by the other end members: rain, groundwater and rock glacier water (Figure 11).