Response to Dr. Adrien Gilbert' comments

This paper reports and describes a massive ice-rock avalanche that occurred in the Sedongpu valley in March 2021. The authors show that the detachment originates from a ridge at high elevation where previous events were already documented (Kääb et al., 2021). They show that the initial detachment is of about 50 Mm3 and that it produced a mass flow of unprecedented energy as untouched hills were overridden by the avalanche. The event has important implication as it dams an important river where hydro-power infrastructures and villages can be damaged by potential outburst floods. This event is really similar to the "Chamoli event" (Shugar et al., 2021) which received a lot of media attention recently and could be linked to climate change as suggested by the authors.

The authors use a complete and valuable dataset to describe the event for a rigorous assessment of its timing, size and intensity. I think the paper should be published as a brief communication after some minor revisions.

Reply: We thank Dr. Adrien Gilbert for your detailed and helpful comments on our manuscript. Below we present our point-by-point response.

General Comments:

1. To improve the discussion about the possible link with climate change I would add on figure 3 (d,e,f) the dates of all the documented events of the catchment (see Kääb et al. (2021) section 3.6). Can be a vertical straight line when an event occurred.
   Reply: Following your suggestion, we have added a vertical arrow which indicates the dates of the documented three events.

2. Figure 3a and 3c should be replaced by figure S4 which is much better to understand the setup. Figure 3c is really unreadable.
   Reply: Following your suggestion, we have moved the Figure S4 in the Figure 3.

3. In figure 3b, could you provide the whole DEM difference (do not cut at the catchment edge) ?
   Reply: Following your suggestion, the whole DEM difference without cutting along the catchment edge are provided in new Figure 3b.

4. Be careful to provide high resolution figure in the final version.
   Reply: We provided the high-resolution TIFF figures in this version.

Other comments and corrections:

1. L23-24: *"Sometimes the mass flow's path can cross international borders making…"* It is a very specific situation, I don't think it is necessary here to mention this.
   Reply: This sentence was deleted in the revised paper.

2. L35: *"The People's Republic of China (PRC)"* Not clear what it is for me. You

mean "the Chinese government" ?
Reply: Yes. We have change it as “the Chinese government”.

3. L39: *“Exposure and vulnerability”* of what ? People ? Who or what is more/less exposed and vulnerable ?
   Reply: We re-wrote the sentence as the following: *“Mass flow hazards of cryospheric origin are of significant concern across HMA, particularly when these flows have the potential to affect regions that are experiencing rapid changes in both the exposure and vulnerability of populations and infrastructure.”*

4. L41: *“PRC”* China ?
   Reply: *“PRC”* was changed to *“China”*.

5. L115: *“as ~110 m s^{-1} (~396 km/h)”* Not very realistic no? Maybe comment on this value here.
   Reply: We have deleted this sentence in the revised manuscript.

6. L135: *“(see supplementary video)”* Need to appear in supplementary material (not only in the data availability section)
   Reply: The video information were moved to the supplementary materials.

7. L137: *“the same vicinity”* of what ?
   Reply: We have rewritten this sentence so that it now reads: “*Post-event field photographs and Pléiades orthophotos show that the source area of the March 2021 ice-rock avalanche is located <0.5 km to the north of the large (17 and 33 Mm3) avalanches which occurred in 2017 (Fig. 2d and Kääb et al., 2021)*”

8. L138: *“Fig. S4”* This figure should appears in the main text instead of figure 3a and 3c as figure S3 is equivalent to figure 3a and figure 3c is pretty bad. Figure S4 really helps to understand the setup.
   Reply: The Figure 3a and 3c have been replaced by the oblique three-dimensional figures as suggested.

9. L141: *“the east of the ridgeline”* cite figure 2b
   Reply: Done

10. L148: *“Anomalies”* compared to which reference?
    Reply: Anomalies of minimum air temperature during different season were compared to the mean values during the period between 1980 and 2021. We have added this information in the caption of Figure 3.

11. L149: *“(Bomi, Milin, Nyingchi)”* What is the elevation ?
    Reply: We have added the elevation of each station in Section 3.3.

12. L155: *"Experienced considerably more earthquakes"* On which time period ?
    Reply: The time period is from 2000 to 2020. We have added the relevant period in section 3.3

13. L160-163: *"The eventual 2021 failure at the ridge crest is more commonly associated with earthquake triggering in historical inventories (Densmore and Hovius, 2000) although the 2021 Chamoli event, which was also aseismic, was also sourced close to a ridge crest (Shugar et al., 2021)."* Unclear sentence. I don't understand it.
    Reply: For clarification, we have deleted this sentence and relevant reference in the revised manuscript because on reflection it adds little to the discussion in this paragraph and which centres on our interpretation that seismic activity may have been a conditioning, rather than triggering factor for this Sedongpu event.

14. L165a: *"decrease in precipitation"* Not visible, you could show trends on figure S7b but I don't think there is any change in precipitation.
    Reply: We have revised the description as "*Meteorological records from nearby monitoring station show a significant increase in mean air temperature but insignificant change for annual total precipitation change (Fig. 3a-b)*"

15. L177: *"The AWS recorded a small precipitation event (3.9 mm) in the morning of 22 March 2021…"* It does not make any sense to compare two days as the daily variability is much larger than 2.5°C. At least try to compare against a multi-years (>10years) average to see if 22 march 2021 is particularly warm.
    Reply: We agreed with your comment. And we did compare the mean, max and min air temperature on 22 March during the period from 1980 to 2021. The air temperature on 22 March 2021 was actually slightly lower than the multi-annual mean value. Thus, as suggested by your comment, the relevant comparison was deleted in the revised manuscript.

16. L192: *"This event"* give the number you find and basic description of the event.
    Reply: We have adjusted the text so that it now reads: "*The March 2021 event, and notable events that have preceded it (e.g. ~50 Mm^3 ice-rock avalanche, 2017-2018, and the ~130 Mm^3 glacier detachment in October 2018), reinforce the classification of the basin as a hotspot of catastrophic mass flow activity*"

17. L195: *"Whilst we do not focus in detail on the…"* I don't think this discussion about the international influence is relevant since it is very specific to your case. I would delete this.
    Reply: We thank the reviewer for their thoughts on this aspect of Section 4. We have decided to retain this sentence, but it now appears earlier in the manuscript, as per the suggestion by the other reviewer. Yes, what happens downstream is specific to

this event, but we feel that highlighting the trans-boundary nature of the hazard is important for placing the event in its wider geographical context. We anticipate that the readership will be interested in this detail.

18. Some corrections were also proposed by the reviewer in the original manuscript
    Reply: All the corrections were incorporated in the revised manuscript.

Response to Reviewer 2

General comments:

The authors present a good overview of a recent ice-rock avalanche that occurred in the Sedongpu Valley, which is turning into a global hotspot for large and highly mobile mass movements. The contribution is generally well written, easy to understand, and adequately illustrated with the most important figures. I mostly have some specific comments and questions, which I have outlined in detail below, as well as a number of small suggested technical corrections. To the extent that it is adequate for a brief communication, a bit more information about previous events and some more detailed meteorological analyses would, in my opinion, elevate the publication to a more meaningful contribution.

Reply: We thank the anonymous referee for their considered review of our manuscript. Below we present our point-by-point responses.

Specifically, it would be nice to have some additional context about what kind of terrain the 2021 avalanche encountered. The geomorphology of the valley has changed drastically since the low-angle glacier detachment documented by Kääb et al., 2021: How much ice is left? Is there a lot of loose debris that can be entrained, or is the valley largely scoured of such material?

Reply: The photo taken on October 2018 evidenced that there are limited ice residues inside the valley (Fig 6 in *An et al., 2021*). We have added some text to refer the valley terrain after the 2018 massive low-angle glacier detachment in the Introduction of the revised manuscript. "*After the 2018 detachments, the U-shaped glacier bottom was exposed with loose debris and limited ice residue (An et al., 2021).* "

An, B., Wang, W., Yang, W., Wu, G., Guo, Y., Zhu, H., Gao, Y., Bai, L., Zhang, F., and Zeng, C.: Process, mechanisms, and early warning of glacier collapse-induced river blocking disasters in the Yarlung Tsangpo Grand Canyon, southeastern Tibetan Plateau. Sci. Total. Environ., 151652, https://doi.org/10.1016/j.scitotenv.2021.151652, 2021

Additionally, I think it would be very informative if a map/table of all previous events could be provided: Did these all originate from the same ridgeline? When exactly did they occur, how large where they etc. Some of this can be gathered from various places in the text and the supplementary information, but it would be nice to have it all in one place. I am not suggesting an in-depth analysis of all these events, but just showing the key parameters would provide really useful context.

Reply: A new table is provided to summarise recent events that have occurred in the Sedongpu valley, including the dates, location, magnitude of these events. This table appears in the Supplementary Material

Table S1. Information on previous disaster events in the Sedongpu valley

Time	Event type and source regions	Source Magnitude	References

Between 1969 and 1974	Possible ice avalanche-induced debris flow witnessed by the fresh deposits covering the Sedongpu valley and destroyed vegetation-covered residual dam	-	*Kääb et al. (2021); Li et al. (2022)*
Between 2013 and 2015	Ice-rock avalanche from northern ridge of Gyala Peri	~4 Mm^3	*Li et al. (2022)*
October 2017 and into 2018	Rock avalanche from northern ridge of Gyala Peri between 20 and 27 October 2017 Debris flow on 3 November 2017 Ice avalanche on 21 December 2017 Debris flow in January 2018 Debris flow on 26 July 2018	~50 Mm^3	*Kääb et al. (2021)* *Tong et al.(2018)*
Between 19 September and 26 October 2018	Ice-rock avalanche from the south-western flank of Gyala Peri	~9 Mm^3	*Kääb et al. (2021)*
17/18 October 2018 29 October 2018	Glacier detachments from the tongue of Sedongpu Glacier	~130 Mm^3	*An et al. (2021)* *Chen et al. (2020)* *Kääb et al. (2021)* *Tong et al.(2018)*
29 October 2019	Small scale ice-rock avalanche from northern ridge of Gyala Peri	-	*This study*
22 March 2021	Ice-rock avalanche from northern ridge of Gyala Peri	~50 Mm^3	*This study*

With regards to the meteorological data, can you show more specifically for all the events what the meteorological conditions where in the days/weeks preceding the event (rather than focusing only on mean values). Possibly use positive degree days, positive degree content etc. Are the temperatures you show (Fig. 3) lapse-rate corrected for the elevation of the failure?

Reply: Following your suggestion, we have checked the meteorological condition where in the two weeks preceding the three representative massive events (ice-rock avalanche on 22 October 2017, glacier detachment on 17 October 2018 event, ice-rock avalanche on 22 March 2021 event). Please see the following figure. We found that the agreement between high air temperature and ice-rock avalanches (2017 and 2021). However, such two-week examination are less representative if comparing with the seasonal mean value (as shown in Figure 3c,d,e and Figure S7). In particular for the glacier detachment on October 2018, there doesn't appear to be a direct link between the event timing, and short-term antecedent meteorological conditions. However, when we extend the analysis and consider seasonal averages, we find that the events occurred concurrently with, or shortly after, recorded positive air temperature anomalies in the preceding months. We thus still used the seasonal minimum and mean air temperature for explaining the possible driving mechanism in the revised manuscript.

The air temperatures in both Figure 3 and Figure S7 are the original station records at Bomi, Milin and Nyingchi for representing the regional climate change, rather than the lapse-rate corrected air temperature at the elevation of the failure. Thanks for your concerning on the possible melting at the elevation of 6500 m near the avalanche zone. Indeed, the extrapolation of daily/monthly air temperature from low-elevation to high data-scared regions are restricted to underestimate surface melting at the failure due to the large diurnal variation of air temperature(e.g. the mean air temperature is zero degree but the above above melting temperature in the afternoon). It is pity that hourly air temperature data from three stations are not available. Thus, the AWS record near the outlet of Sedongpu valley was used to estimate the possible air temperature at the failure by using the different possible lapse rate (-0.60 ºC/100m). We found discontinuous positive air temperature at avalanche source region of 6500 m asl during the period from May to October. We have added this information in Section 3.3 as "*The extrapolated half-hourly air temperature by using the AWS records near the Sedongpu basin outlet and the constant lapse rate of -0.60 ℃/100m evidenced discontinuous positive air temperature at the avalanche source region (6500 m asl) during the period from May to October.*"

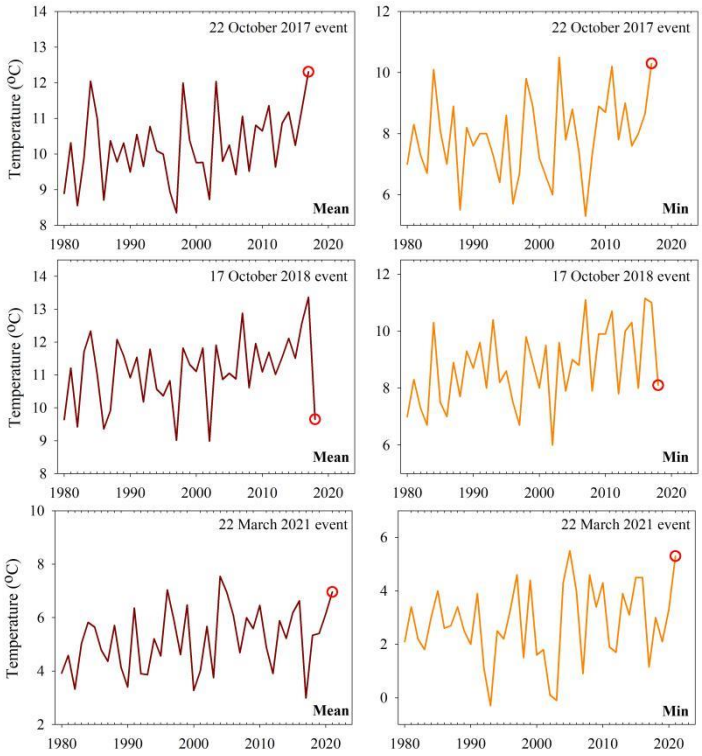

Figure. Mean values of both daily mean and minimum air temperature where in the two weeks preceding the three representative massive events, which were recorded at the Milin meteorological station

Specific comments:

1. L26: ...*considering the lens*... what do you mean by this? Can you be more specific.

Also, consider separating this sentence clause from the previous, rather different ones.

Reply: This sentence was separated from the previous one, and was changed to "*In turn, this information can be useful for assessing the potential hazards to life, settlements and energy and transport infrastructure, for example (Evans et al., 2021; Kääb et al., 2021).*" "

2. L29: *...region which ... Plateau interior* - unclear whether these glaciers are more sensitive to climate change because they are temperate or because there is some regional difference to those of the Plateau interior (or is the difference thermal)?

   Reply: Yes, the temperate glacier in the low-elevation southeastern Tibetan Plateau are more sensitive to climate change than those for continental glaciers in the high-elevation Plateau interior. Specifically, a recent analysis (Wang et al., 2019) revealed that the dominant drivers of mass balance sensitivity vary according to location: for temperate/maritime glaciers, temperature is the main driver, whilst continental glaciers are more sensitive to temperature, precipitation seasonality and whether precipitation falls as snow or rain. We have revised the manuscript to make our meaning clearer.

3. L37: *...with development of its attendant economic corridor...*unclear what this means, please clarify.

   Reply: The economic corridor here refers specifically to the economic development zone from eastern China to Tibet along the Sichuan-Tibet highway and railway. In the revised manuscript, we change it to "*Furthermore, the region is the focus of considerable investment by the Chinese government, including the construction of the high-speed Sichuan-Tibet Railway (anticipated completion 2030) and the development of adjacent areas along this emerging economic corridor, which links the cities of Lhasa and Chengdu (Fig. 1a) and passes through mostly mountainous terrain. A key aspect of regional economic development includes the construction of new large-scale hydropower projects to serve an increasing regional and international demand for electricity.*"

4. L61: *...led to the installation of ... by the authors, by local authorities, ...*? Please clarify who installed the instrumentation.

   Reply: The instruments were installed by the Institute of Tibetan Plateau Research, Chinese Academy of Sciences. We have added this information in Section 2.

5. Fig. 1: Some suggestions: Indicate river flow direction in panel b); is Brahmaputra the correct label for the river in panel b)?; can you indicate the locations of e)f)g) in panel b). There are lots of panels in this figure – I wonder whether separating them into two figures, and also including something about the geologic context – which is currently completely missing – would be an option. It would be nice to see panels c-d) a bit bigger.

   Reply: Following your suggestion, we have added the river flow direction in panel

b. The river name was changed to the Yarlung Tsangpo. We did not indicate the precise location of e-g in panel b, but note that the location of the AWS and time-lapse camera is a common feature in panel b and panels c-e. But we provide the detailed locations of each figure in the figure caption. Because this manuscript is a Brief Communication, we are limited to a maximum of 3 figures and/or tables, and we are already at this limit. It is pity that we can not separate the Figure 1 into two figures. But we provided the bigger panels c-d and other field photos in the supplementary Figure S1. We also provided the high-resolution TIFF figures in this version. Thanks for your understanding.

6. L98: Were the stage data also used for local alerting of authorities or only of scientific interest? This could be an interesting piece of context to provide here?
   Reply: The stage data was both used for local alerting of authorities and for scientific interest. The alerting information on 22 March 2021 was informed to the local Nyingchi government. In the revised manuscript, we added one sentence as "*In addition to generating data of scientific value, the system was used for local alerting of rising water level caused by the temporary damming of the Yarlung Tsangpo.*"

7. L101: Two events provide very little information about the true return period of such a catastrophic event. Maybe rather than being somewhat vague in saying that the data *provides insight in the minimum return period…* I think it would be better to be specific and just state something along the lines of: *…indicate that no event of similar magnitude has occurred here in the past 200 years.*
   Reply: Agreed. Manuscript revised as per suggestion.

8. L103: I presume you didn't actually just assume an overtopping height of 200 m, but rather measured it somehow. Please specify how and where this was measured.
   Reply: We measured the elevation difference by portable GPS between the valley bottom and the highest elevation destroyed trees on the moraine. We have added this information in Section 3.1.

9. Figure 2: can you indicate avalanche travel direction in panel b)?
   Reply: We have added avalanche travel direction in panel b

10. L115: What makes you assume that the avalanche could have exited the valley within 100 seconds? The velocities this gives you are extraordinarily high (faster than the speed of sound!!) and seem rather unrealistic, so you should provide more background on how you came up with this number.
    Reply: We have deleted this sentence in the revised manuscript.

11. L128: What exactly do you mean by *maximum depth*? Is this the maximum surface

lowering in the source area? Or of the deposits? Or everything? Please clarify.
Reply: It was the maximum surface lowering in the source area. We have added the relevant information as "*The mean and maximum depth of surface lowering in the source detachment area was ~140 m and ~300 m, respectively*"

12. L136: *incorporating rock as it descends* - this formulation implies that the avalanche started as an ice avalanche and entrained (incorporated) rock as it descended. However, in the video we cannot see the avalanche runout, so we cannot know whether rock was incorporated along the way. What we CAN see (in my opinion), is that the avalanche is initially made predominantly of ice (white dust clouds), but transitions to something that involves much more rock in the second part of the video (dust clouds get darker, we can see falling rocks). If this is what you were intending to describe, consider reformulating.
Reply: Thanks for pointing such processes. Following your suggestion, we have changed it as "*Videography by the corresponding author captured in October 2019 (see Supplementary Information) shows an avalanche originating from approximately the same source region on the mountain ridgeline as the March 2021 event. From its appearance, the avalanche appears to be comprised mostly of ice and snow to begin with, and transitions to comprise more rock and debris later in the video, which provides some site-specific insight into how the composition of such events can transform following an initial detachment.* "

13. L141: can you put the 15.1 Mm3 of deposited material into context with the total volume? Your next sentence implies that you expected more deposition, but you don t state this explicitly. Also, what area is the valley that you mention here? In other words, which area did you consider for this statement? All material has to go somewhere, so if the mobility of the flow was high, the material might just be further away. If the summation of all deposited material amounts to only 15 Mm3, then there are several options for why this could be the case: 1) 35 Mm3 were ice that melted and can no longer be detected in DEM differences 2) the material was deposited over such a large area that the resulting deposits are thinner than what can be detected in DEM differences 3) a lot of material was washed down the river. Of course any combination of factors can be the case. It would be interesting to get your perspective on the most likely scenario(s).
Finally, you say there that *most of the avalanched materials were widely distributed on the valley bottom, neighboring glacier and the outlet of the valley valley.* Similar to the comment above: where did the rest (that is not most of the avalanched material) go? I get the sense that you have an assumption about this (e.g., transported away by the river), but you don t explicitly say so.
Reply: This is a really interesting point of discussion and remains a source of uncertainty. At this point, and as the reviewer concludes, it's probably a combination of factors that explains the volumetric discrepancy in the DEM of difference. We speculated that the 'missing' ice-rock material from the avalanche source area

was either dispersed thinly along and adjacent to the flow path on the valley bottom, the neighboring glaciers and the outlet of valley basin (Fig. S5a), or directly entered the Yarlung Tsangpo river (Fig. S5b), which was difficult to detect using DEM differences. In the revised manuscript, we have revised it as "*We detect 5.2 Mm^3 of net deposition at the foot of the avalanche region within a slope-distance of 3.5 km from the source. A further 12.4 Mm^3 was deposited along the flow path lower down in the Sedongpu valley, and at least 1.3 Mm^3 was deposited in the form of a temporary dam on the Yarlung Tsangpo (Fig. 2a). We speculated that the 'missing' ice-rock material from the avalanche source area was either dispersed thinly along and adjacent to the flow path on the valley bottom, the neighbouring glaciers and the outlet of valley basin (Fig. S5a), or directly entered the Yarlung Tsangpo river (Fig. S5b), which was difficult to detect using DEM differences. We therefore infer that the flow was highly mobile, an observation in line with previous events in the basin (Kääb et al., 2021) and elsewhere (Shugar et al., 2021).*"

14. Figure 3: I think it would be very informative if you added an outline of the runout path to panel b). I also suggest making panels d-f their own figure: This is very different information, and I think the meteorological data deserve a bit more prominence on their own.
Reply: Firstly, as shown in Figure S5, the avalanche materials were widely distributed on the valley bottom, neighboring glacier and the outlet of valley basin. Sorry that it is hardly to add an detail outline of the runout path along the valley. Secondly, following your suggestion, all three figures were redesigned (the maximum of three figures/table for Brief communication) and the Figure 3 only focus on the meteorological conditions. Please see the new figures.

15. L154: During which time has the Gyala Peri region experienced more seismicity? Are you simply saying that its seismically more active than other regions (why do you compare to Namjagbarwa?) or are you making this statement for a certain time period associated with the occurrence of the mass movements?
Reply: The time period for seismic statistics is from 2000 to 2020. Yes, our intention was to highlight that this is a seismically active region, and draw a comparison with a (topographically, glaciologically) similar nearby region. For simplicity, we have removed the reference to Namjagbarwa in the text, and have streamlined the text here to instead state the number of earthquakes in the Gyala Peri >M3.5, with a reference to the relevant figure in the Supplementary Information, which provides additional context. The new text reads:
"*Seismic activity, a known mass movement avalanche trigger, has been proposed as a possible trigger mechanism for avalanche-driven debris flows originating from the Sedongpu valley in 2017 and into 2018 (Zhao et al., 2019). Indeed, the Gyala Peri region is seismically active and has experienced >20 earthquakes >M3.5 during the period 2000-2020, which is higher than other nearby glacierized centres (e.g. Fig. S6)*"

16. L161: eventual 2021 failure at the ridge crest is more commonly associated with earthquake triggering in historical inventories It is not clear to me what you are intending to say here. Please clarify.
    Reply: The other reviewer had a similar query. In response we have deleted this sentence because on reflection it doesn't really add much to the preceding sentences and points raised therein.

17. L164: significant increase in mean air temperature and decrease in precipitation. Consider showing this information in a figure?
    Reply: The linear trend was added for the mean air temperature in Figure 3a. The statistical information was added in the figure caption as "*showing the significant air temperature rising (the dashed black line) at the rate of 0.28 ℃/decade (p<0.001)* "

18. L185: *v) increased meltwater lubrication at the bed of perched ice masses* - It s not clear whether the temperatures you show are for the elevation of the failure or not. Are there enough positive degree days to create significant melting?
    Reply: As the reply to the above general comment, we did not extrapolate the station records to the source region because of large underestimation for estimating surface melting from daily and hourly records. However, the discontinuous positive air temperature in the ablation season at the elevation of failure was confirmed by extrapolating the half-hourly AWS records. We have added some text in the manuscript as "*The extrapolated half-hourly air temperature by using the AWS records near the Sedongpu basin outlet and the constant lapse rate of -0.60 ℃/100m evidenced discontinuous positive air temperature at the avalanche source region (6500 m asl) during the period from May to October*."

19. L193: *event occurred outside the regular summer ablation season* - make this point earlier, not only in the conclusions
    Reply: We have moved this sentence to Section 3.3, and also reference the timing of the event in the penultimate paragraph of Section 1.

20. L195: Are there specific plans for hydropower development close to this valley (you say *in the region* but it is not clear how large of a region you are referring to) or are you making this as a general statement for places anywhere?
    Reply: Yes. The Sedongpu valley is located in the immediate vicinity of the planned Yarlung Tsangpo Dam hydropower project (which has elsewhere been dubbed the 'Three Gorges Dam Project 2.0'). To our knowledge the exact location of new hydropower infrastructure has not been confirmed, hence why we remain a little vague here. We have revised the manuscript to reference the 'Yarlung Tsangpo Grant Canyon' – the Sedongpu basin is at the western (upstream) limit of this region.

21. L196: *turbidity* - maybe mention this earlier? No details needed, but it's strange to

bring up completely new facts in the conclusion.
Reply: Agreed, we have moved these sentences to the end of section 3.2.

Technical corrections:

1. L15: *highly mobile flow - highly mobile mass flow*
   Reply: Done.

2. L23: *...international border, making it ...*
   Reply: This sentence was deleted in the final version.

3. L24: *...complex events* … geomorphic legacy. Rather awkward sentence construction that is a bit hard to read.
   Reply: This sentence was deleted in the final version.

4. L38: Use of *Indeed* is not logical, since the following sentence does not really refer to anything that was mentioned in the previous sentence.
   Reply: This word was deleted in the revised manuscript.

5. L42: *...in the southeastern Tibetan Plateau* - suggest removing this superfluous information
   Reply: Done

6. L44: *...at its confluence with* - the instead of *its*
   Reply: Done

7. L49: *...the valley has recently* - delete *has*
   Reply: Done

8. L49: *...experienced large ice-rock avalanches…* - can you specify whether there were **two, three, several, a suite of** … ice rock avalanches that totaled 50 Mm3 (is it coincidence that this number is the same as that of the 2021 event?)
   Reply: According to the history of river blockages, there are at least massive avalanche-induced debris flow inside the Sedongpu valley (Tong et al., 2019; Chen et al., 2020; Kääb et al., 2021). However, no suitable high-resolution DEMs were available for quantifying the magnitudes of each ice rock avalanche that totaled 50 M^3 during the period from 2015 to 2018 (Kääb et al., 2021). In the revised manuscript, we reframe used the **several**.

9. L52: *...damaged **or** seriously threatened roads, power lines…* - which one is it? Damaged or threatened? Or did both things happen, in which case **and** would be the more appropriate conjunction
   Reply: Yes, the water level rising in October 2018 damaged and seriously threatened

roads, power lines, hydropower stations. We have used *"and"* instead of *"or"*.

10. L57: remove *of difference*
    Reply: Done

11. L69: delete *away*
    Reply: Done

12. L74: use *determine* instead of *establish*?!
    Reply: Done

13. L75: use *calculate or estimate* instead of *establish*
    Reply: Done

14. L76: what exactly do you mean by the *immediate flow path*?
    Reply: The *immediate* was deleted in the revised manuscript.

15. L97: sudden *lack thereof* instead of *lack of*
    Reply: Done

16. L114*: If the avalanche material runout…* incorrect use of runout as a verb
    Reply: This sentence was deleted in the final version.

17. L133: *Analyses…* This and the next sentence are very long, combining clauses that don't fit together very well, making them somewhat confusing. What is close to what? When were the things? Consider improving.
    Reply: This sentence was separated into two sentences and the later sentence was changed as "*Post-event field photographs and Pléiades orthophotos show that the source area of the March 2021 ice-rock avalanche is located <0.5 km to the north of the large (17 and 33 Mm^3) avalanches which occurred in 2017 (Fig. 2d and Kääb et al., 2021)*"

18. L137: Something is either *in the vicinity of* [*something else*]or *in the same region as*, not *same vicinity*
    Reply: It was deleted in the final version.

19. L141: Replace *preservation of deposits associated with the event* with simply *deposition*(- *Such limited deposition implies that …*)
    Reply: Done

20. L153: either *put forward as* or (more simple) *suggested* or *proposed*
    Reply: we used *proposed*.

21. L156: suggest removing *massive*
    Reply: Done