The paper presents a highly impressive, huge dataset of paraglacial geomorphological processes at lateral moraines. The multitemporal DGM data derives from archival aerial images reaching back to the 1950s as well as from recent drone imagery (400-1600 images per section) and terrestrial laser scans. Ten glacier forefields were investigated, including 1-3 selected moraine sections in each one. For almost all of the sites, three points in time were available for orthophoto evaluation. On each moraine section between 15 and 79 ground control points were fixed and surveyed by dGPS. These numbers show that a unique dataset is presented that definitely warrants publication in Earth Surface Dynamics.

The data is well presented and the conclusions are very interesting for our understanding of paraglacial adjustment of moraine slopes, and of the validity of a space-for-time substitution approach. Thus I recommend acceptance with **minor revisions**.

L75-80: The aims could be pointed out a bit more precisely.
We add a sentence clarifying the aims.

L190 ff (3.4): I don't know exactly how the 3D block thinning works, but it sounds questionable to just automatically delete points from the point cloud. I doubt that this procedure makes comparability and adjustment of the point clouds any better.
We add an explanation of how the 3D blockthinning we used works.
We used the filter method "mean", where a new point representing the mean value within the defined block is calculated. The horizontal and vertical spacing depends on the density of the point cloud and was selected to be between 0.1 m and 1 m in our case. The blockthinning is necessary for a better adjustment of the point clouds (ICP).

L206 ff (3.5): The section on error estimation should be extended by 1-2 explanatory sentences. That is a bit too little information.
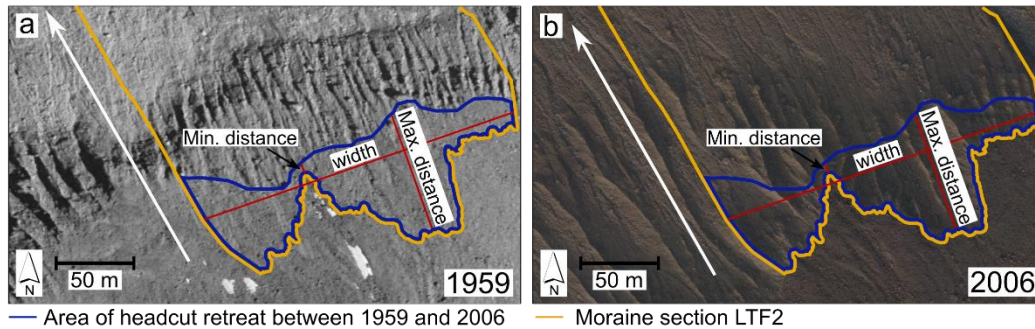We add more information about the selection of stable areas within the DoDs and explain more about the error calculation and its background.

L251: "the profile with the biggest height difference was determined" – why this? That doesn't become clear...
The gully with the biggest height difference between the ridge and the thalweg is the most/deepest incised gully, so it shows the maximum depth of the gullies on the respective moraine slope section. We add that this represents the deepest incised gully.

L257: I tried hard but I do not understand why "the area between the lines was divided by the width of the gullied moraine section". Maybe a small sketch would help.
We add the following sketch:

— Area of headcut retreat between 1959 and 2006   — Moraine section LTF2

Furthermore, we add some information about the calculation of the mean headcut retreat.

L266: "For moraine sections which show so little erosion that no erosion area can be clearly defined, the entire moraine section is considered as erosion area." – I understand the idea behind it; nevertheless, this sounds a bit odd and you might bring a bias into the analysis. When you narrow down active sites to the actual active area, the process rates will inevitably increase. When you don't do the same for less active areas, their rates will be even lower than already. Consider to use the entire slope area in all cases, or give clear reasons why you don't.

We see your point. The problem with considering the entire slope area in all cases is that then the different sizes of the erosion areas compared to the whole slope area determine the erosion rates. As this proportion differs significantly between the moraine sections, that would bring an even higher bias to the analysis.

We suggest to add a table containing the proportion of the area considered as erosion area on the whole moraine section for each moraine section in order to enable better comparability and consider that aspect in the interpretation.

The entire moraine sections were only considered for two moraine sections, APF1 and RKF1. We now define erosion areas also for these two moraine sections, which cover the upper moraine slopes, in a proportion which fits well with the erosion areas of the other moraine sections. The final erosion rates do not change mentionable (only few millimetres) as the area within which we sum up the negative values is also smaller now.

L275: "multiplied by the cell size": Maybe I missed it, but I think the cell size has not been explained nor quantified at this point.

In the line you mention (section 3.6.3), we add a reference to section 3.4 where the cell sizes are mentioned.

L310: "Both parameters are highest for the DoDs based on aerial images." Is this a problem of the method (likely), or could in be that the amount of surface change was in fact higher in the "arial image" period?

We strongly suppose that this is because of the common quality (angle of perspective and distortions in the images, flight altitude etc.) and the resolution of the aerial images. We see big differences between the different aerial image datasets, which also leads to the high variance of the mean values and standard deviations shown in Fig. 3. In general, the older images are worse and get better over time. However, there are also big differences between the Austrian images and the Italian ones regarding quality and resolution. This is highly influencing on the results of the matching algorithms and thus also on the quality of the resulting DEMs and DoDs.

L311 ff: Deviations of up to 76.5 cm are a bit much for "stable surfaces". I understand that this is an outlier; however, the deviations are just shown, and there is no explanation of how this affects the interpretation. Add a sentence on that.

Yes, we are aware that this is a high error for a stable area. This is due to the poor quality of the used datasets which causes a "salt-and-pepper-pattern", with high deviations in some parts of the model. Regarding the interpretation, we took care when comparing erosion rates with low magnitude (high magnitude changes exceed the error clearly) or moraine sections with little difference between their erosion rates and did not put too much interpretation and meaning on these differences. We add a sentence on that.

L 348: "geomorphic activity beyond the subsidence is low" – Beyound the subsidence - probably yes. But the subsidence itself is, quantitatively, a very important process. It might be triggered by ice melt but this process has set the whole slope in motion and so it shouldn't be discarded as irrelevant dead ice melt. Maybe the entire section should be treated as 4.3.1: Geomorphic processes triggered by dead ice melt. Otherwise it appears to the reader that processes triggered by dead ice melt do not count towards morphodynamics. Later in the paper this becomes clearer, but here it is somewhat misleading.

With the sentence "We infer from the existence of vegetation (Fig. 5b) that geomorphic activity beyond the subsidence is low" we did not want to say that the dead ice melt is irrelevant. On the contrary, it is highly relevant for the slope, because it causes its sliding and subsidence. However, we want to differentiate clearly between ice melt and sediment movement itself (erosion, transport, deposition), especially for the calculation of the erosion rates. In this case, presumably a substantial amount of the "moved" or better disappeared volume is the melted ice and not sediment. This is also visible due to the more reddish than blueish colour in Fig. 5a. A separation is impossible in this case. So, we do not account dead ice or glacier melting itself as morphodynamics, but of course as soon as sediment is moved (e.g. subsidence), possibly induced by dead ice or glacier melting, this is morphodynamics and can be considered as a geomorphic process.

We clarify in section 4.2, wherever possible, that e.g. subsidence or sliding induced by melting dead ice are geomorphic processes.

What we meant with "beyond the subsidence" is that we do not see any geomorphic processes directly on the surface, so processes not induced by the ice melting. We will substitute "geomorphic activity beyond the subsidence" by "no geomorphic processes occur directly on the surface".

We suppose you mean section "4.2 Occurrence of dead ice" should be renamed? We think that is a good idea and substitute the sections' name as you suggest.

L395 ff ("On the DoD 1973–2009...") - Start with pointing out that the prominent red area in Fig. 7b is glacier melt! (You know it, but the reader doesn't...)

We add this aspect.

L405: "ground moraine of an earlier glacier flowing eastward" – Odd statement - doesn't the current glacier also flow eastward? Better: "... from an earlier, larger glacier extent."

The Alpeiner Ferner, so the main glacier tongue, flows mainly northwards (north-north-east), and the former glacier came from the west and joined the main glacier tongue roughly with a 90° angle. We clarify that.

L417 (caption Fig. 7): - Indicate top and bottom (it is quite clear when you look at it a bit longer, but you could help the reader); - indicate the glacier extent (maybe with a blue dotted line); - mention the magenta-coloured polygon (bedrock outcrop in g and h) in the caption

We add these aspects.

L437 (caption Table 4): Headcut retreat in which time period?

We add this information. It refers to the retreat between 1953/1954/1959 (oldest available model) and 2018/2019 (newest available model).

L502: what does "colour map batlow10 from Crameri et al., 2020" mean? Does a colour chart have to be cited?

The colour map (values of the colours) is taken from that author (linked on the ESurf Homepage, colourblind-friendly) and it is written that it should be cited like that. Also, the journal homepage writes "Please cite this source when using the package".

L518 (Fig. 10): I feel that the presentation of the data in this figure is a bit awkward. By summarising the data into just three groups, information is lost. Why not present a scatterplot with time on the x axis and erosion rate on the y axis, using different point signatures for deeply gullied and less deeply gullied sections?

We replace the original plot with a scatterplot and adapt the text referring to this figure.
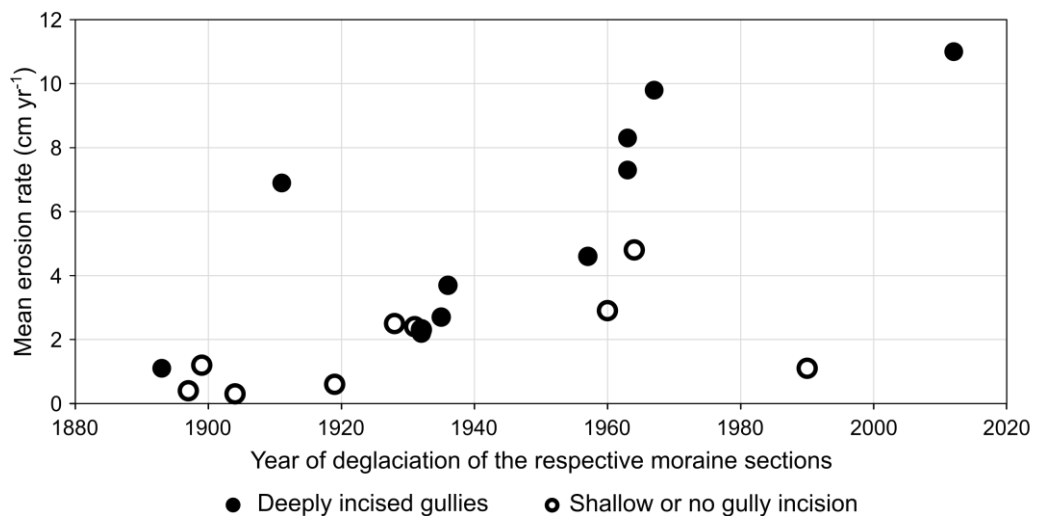
L562: "at different distances from the LIA maximum" – The result is understandable but I feel that the term "distance from the LIA maximum" is misleading. This could as well be downvalley from the LIA moraines. I assume that "100% distance from the LIA maximum" means "at the current glacier margin"? If yes, write it, e.g. "at different position between recent glacier terminus and maximum LIA extent".

100% distance from the LIA maximum corresponds to the upper border of the defined study area (see beginning of section 2), so where the 1950s glacier extent is still enclosed for a bit (which is at lower altitude than the recent position of the glacier tongues). We adopt your suggestion and adapt it.

L584/585: "… show a decrease of the erosion rates" – No, of the slope angle! (or am I wrong?)

You're right, we correct that.

L590 (Fig. 14): Phew, it took me a while to understand what is depicted here. Is there a simpler way to express this?

We change the x- and y-axis in order to have the independent variable (slope angle 1950) on the x-axis and the dependent variable (change of the slope angle) on the y-axis and hope it is better to understand now.
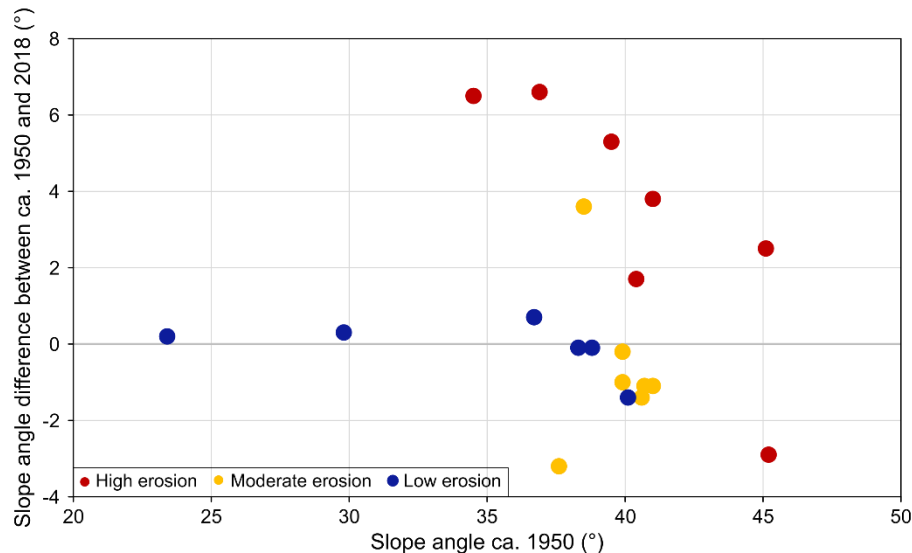
Editorial comments

L83: better "down" instead of "up"
We change that.

L87: delete "mainly the central Alps and the northern and southern Alps" as these sum up to the entire Eastern Alps
We change that

L105: at different distances
We change that.

L132: delete first sentence (because it is meaningless)
We change that.

L288 (Table 3): When the columns DoD1 and DoD2 are identical, it might be better to merge the respective cells.
We change that.

L290: "For the investigation of possible factors influencing the morphodynamics on lateral moraines, besides the detailed analysis of the moraine sections, we conducted also an analysis including the entire defined glacier forefields." Re-arrange this complicated sentence: "We conducted an analysis including the entire defined glacier forefields in order to investigate possible factors influencing the morphodynamics on lateral moraines."
We change that.

L291: "This analysis is based on the negative raster cells of the DoDs and parameters derived from the DEMs." delete – repetition

We change that.

L294: "The most recent DEMs of the entire glacier forefields, so from the 2000s …" Hard to understand, please reword

We change that.

L295: "The resolution of all models is 1 m." This sentence seems to be out of place here, perhaps bring it earlier.

The resolution was set to 1m only for this analysis for reasons of better comparability. Therefore, the information needs to be given in section 3.7. We clarified this with an extension of the sentence.

L389: Delete "gully" at the end of the line

We change that.

L390: "For the gully formation since the 1950s, the moraine section APF3 in the forefield of the Alpeiner Ferner serves as an example" – rearrange to "The moraine section APF3 in the forefield of the Alpeiner Ferner serves as an example of gully formation since the 1950s"

We change that.

L450: "time and again" instead of "again"

We do not know if this happens again and again or if the vegetation cover is constantly destroyed since some years/decades…

L453: show signs of stabilization

We change that.