Specific comments Abstract:

- ❖ To me it is not clear what methodology you have used. Is it a new methodology? And if so, did it work accurately? I think you could be more accurate in that.
- ❖ I think you can be more transparent in how representative the results are, especially considering that you only analyze a fraction of all landslides within the inventory. Are these results representative for the whole event?

Specific comments Introduction

- ❖ I believe that a more elaborated introduction on the SAR methodologies and the novelty of your work in regards to that would be relevant (around lines 36-39). Also, in the next line you mention InSAR coherence, but this has not been introduced yet (line 40).
- ❖ From line 39 onwards it starts to read like a conclusion, while I think a presentation of aim and objectives is more suitable. Is the aim to create a methodology to identify precursory and reactivation? Or, are you going to use old methodologies and identify their suitability in identifying that? Or, is the point more process-based and you want to understand the occurrence of landslides as a result of this earthquake sequence?

Specific comments Data and Methods

- ❖ To me it seems more relevant to discuss SAR data and processing (section 2.3) before the SAR detection methodologies (section 2.2). I think it is better to first properly introduce the SAR products and their properties, and how landsliding influence this signal before mentioning the detection methodologies. You have mentioned amplitude and coherence before, but what exactly consist of is unclear until section 2.3. I think a better structure and separation is relevant.
- ❖ Figure 1 could use some adjustments to increase readability:
  - o Inlay of location with respect to larger area needed.
  - o Fig. 1b could be improved visually. Needs x-axis + label. I find the forward and backslash a bit strange. Perhaps you can use a straight line with different colors, or patterns? In addition, I think a better distinction for the division in time between the two inventories for example by using different background colors (same as you use in fig1 a) would be relevant.
  - o Perhaps nice and informative to add an elevation map in Fig. 1a
- ❖ The reason for only taking landslides > 2.000m^2 during amplitude analysis and >3.600m^2 during coherence analysis is not well explained. Why 2.000m^2 where amplitude resolution is 20x22 m (440m^2) and 3.600m^2 where coherence is 60x66m (3.960m^2). This means that coherence resolution is lower than some landslide events?
- ❖ Following previous point: Particularly for coherence you have a rather low resolution. How does this influence the detection results? Does this mean that some landslides are only covered by one pixel? How does that work with mixed pixels? This could be the case for many landslides right? How does this influence your methodology? This is not really mentioned. In addition to that, I believe that presenting the size distribution of your inventory is important for the interpretation of the results and their accuracy.
- ❖ I'm also curious why you use a low coherence resolution. A moving window not necessarily reduces the resolution of coherence?
- ❖ Since you are proposing a new application of a methodology using the coherence I think this requires some sort of a sensitivity analysis. Given that the land cover is more or less the same, it would be interesting to see the accuracy in regards to size.

❖ In the end you use less than 10% (after size threshold) of the complete inventory. I think this will affect the interpretability of the results, but this is not really mentioned specifically.

❖ How it is currently written, I do not fully agree with your reasoning to not use optical data (line 96) in the methodology. Cloud cover does not necessarily have to cover the full event completely. There could always be some cloud free spots, especially in regards to earthquake-triggered landslides (where rainfall doesn't play a major factor). This information can be used and does not necessarily rule out the use of optical.

❖ Rainfall could also play a role in influencing the amplitude and coherence values. Was there any (heavy) rain during the sequence that could have influenced the results?

❖ For figure 2. It seems like the coherence of element (13,14) that indicates post-event stable conditions and element (9,10) that indicates reactivation are almost similar to each other? What does that mean?

❖ What polarization are you using and why? I think this needs some elaboration.

Specific comments Results

❖ To me it is rather unclear if (and for which landslides) the SAR-based precursory or reactivation conclusions are validated using optical imagery. Now it reads like this is not really the case. Can this difference in timing be explained by inaccuracies of the methodology? Potential noise? Basically, how reliable are these results? I would like to see a figure where it becomes clear the reactivation or precursory movement defined by SAR products is in fact actual precursory movement or a reactivation. From table 1 to me this doesn't become really clear.

❖ You mention that you are only able to derive only a portion of the landslides. Why is this? I think this is relevant needed information.

❖ I have to say that I was a bit confused by the mentioning of all these landslide timing detection numbers throughout sections 3.1-3.3. A visual would probably help with the interpretation. Maybe a better back and forth with figure 3 could benefit this?

❖ As a suggestive question: In the end I wonder about the use of SAR if there is only ~30% (of the 10% of the total inventory) that can be detected. Were you able to identify more accurately using optical (even if it is manual of course)? Perhaps there is many landslides that now have a more accurate timing using optical than SAR? Mentioning this could increase transparency in regards to the applicability of the methods used.

❖ You seem to assume that when the timing is done, the estimation is 100% correct. The reasoning for this is not clearly explained, what is the uncertainty in this? For example, in line 248 you mention with certainty that they have to be reactivations. Is this really true? No noise at all? Can it just be that the timing detection is wrong? Especially considering that the coherence doesn't always work correctly as you mention 252-253. I think this is an important aspect to address.

❖ Fig 3:
  o Fig. 3f to improve readability maybe increase the size of the circles proportionally
  o Fig. 3f, should 112 be 113? Then 258 adds up to 371 as mentioned in line 261
  o I think you should add a reference to the PGA data of the USGS

Specific comments Discussion

❖ The first two paragraphs under line 278-293 would probably better fit in the method section rather than discussion. In addition, the rest of section 4.1 would better fit in the results section.

- ❖ Fig 4:
  - o Fig4c legend needed, what do the colors represent?
  - o Fig4c why not subdividing them into new and reactivations as well?
  - o the yellow color is not properly readable
- ❖ I think the representativeness of the results should be discussed. You results do not include smaller landslides and they only consist of a fraction of all the events.
- ❖ Figure 5:
  - o Adding a scale bar seems essential for the interpretation in relation with coherence resolution.
  - o No x-label and y-label for 5e, and no x-label for the legend
- ❖ In line with previous comments, I'm not entirely convinced that this coherence change indicates precursor movement, my main concerns being:
  - o How does the resolution affect these processes, especially given that you have quite a low coherence resolution? Also, how does the mixing signal in pixels influence this?
  - o Isn't there any uncertainty in the coherence based timing?
  - o Wouldn't you need a longer time series, to derive a trend (like Dini et al., 2022 and Jacquemart & Tiampo, 2021)? Perhaps it is just a noisy image? Maybe there is still some effect of local clouds, or local rainfall?
  - o Figure 5:
    - ▪ This figure would greatly benefit from adding a coherence map. Then we can see the coherence response, and even see how the coherence pixels cover the landslide location. Now it is not transparent.
    - ▪ From images 18-06-2018 to 01-08-2018 you can see that some of the grasses have been removed. Can the coherence loss be attributed to this vegetation change?
    - ▪ If the precursory movement is due to the 28/07, why is the coherence rather low the image before this event as well (element (5,6))? Or, am I interpreting it incorrectly?
- ❖ NISAR will have a different wavelength than Sentinel-1. This can impose differences and alter the usability of your methodology. This might require elaboration.
- ❖ How has this perpendicular baseline effect affected your results? Could it have induced noise?
- ❖ Were there any rainfall events in your study area during the earthquakes that have affected the results?
- ❖ Figure 6:
  - o Meaning of the color? Legend required. Which image pairs do these dots indicate?
- ❖ Figure 7:
  - o When did this event occur? Why is there little more consistent higher coherence post-event?
  - o There is little explanation on Fig. 7b. I think it could use some more elaboration.
  - o X- and y-labels needed for both subplots

Main comments Conclusion

- ❖ You mention that this study combines optical and SAR. However, this is not what you mention in the introduction and methods. You use optical as validation, right?

Line-by-line comments

Line 3: Adding a timeframe in which the sequence occurred here would be relevant

Line 5/6: Here you use 'many' a lot, I think you should be more accurate and present some percentages.

Line 8: I find this sentence slightly unclear 'weakening effect' of what? Could probably benefit from some rephrasing

Line 13-14: I find the meaning of 'significant mass wasting effect' to be a bit unclear

Line 15: Possible addition: 'In particular, earthquake-induced landslide inventories' to be more precise in which type of landslide inventory you are addressing.

Line 24: What do you mean by: 'cumulative effect'?

Line 24-27: I find this sentence to be a bit unclear. What is the point of this sentence? I would advise to rephrase for clarity.

Line 31: The references here are not ordered the same as the others, maybe better to add the relevant reference after each earthquake?

Line 32-33: The point you mention about medium resolution not being able to capture reactivation or remobilization is not that clear. It now reads like SAR will be able to provide a solution, but how will SAR be able to fix this while the resolution is lower?

Line 60-61: 'few landslides were triggered by this earthquake' . I'm wondering where this statement is based on if there is no imagery available. I think it will be helpful to clarify that.

Line 68: Does these number total to ~15.000 or are the inventories overlapping? It is slightly unclear.

Line 72-73: It is not fully clear if these 991 and 371 landslides are only due to this size threshold, or if there were other factors on which the reduction is based?

Equation 2: Slightly unclear what it does, what is i, what is n?

Fig. 2: I'm wondering if it might be more useful to add the actual dates to get a better understanding of the temporal baseline as well?

Line 75: Differential InSAR comes a bit out of the blue and maybe should be introduced first?

Line 82-84: Wouldn't this sentence be more appropriate at the end of the introduction? Here you identify that it still has an exploratory aspect.

Line 88-90: I think soil moisture should be added here as well, since it influences the amplitude values.

Line 91: This seems to contradicts your point in line 81 where you mention that there are multiple methodologies for this.

Line 103: 'very little prior knowledge on timing': Although this is a relative statement, I would argue that you have rather a lot of information already, a few months accuracy. I would instead mention this few months accuracy instead of 'very little' .

Line 104: 'are concurrent with one of the earthquakes': I'm not an expert in earthquake related landslides, but are there no landslides that occur a few days after the shock? There is no doubt whatsoever?

Line 148: I think it is a bit unclear how this full matrix approach might be able to do that. I think some elaboration is required.

Line 155-160: Why is there a difference between the coherence values before and after the earthquake? You use typically and generally, but it is unclear why. For better interpretability I would relate these values to the actual landscape conditions.

Line 163: 'has failed more than once': I'm curious how certain this is? Can it just be noise?

Line 170-176: I have to admit, that this part is a bit unclear to me. I think this section would benefit some from elaborating a bit more on 'our analysis' and how this relates to equation 1.

Line 195: This first sentences seems unnecessary

Line 201-203: This use of optical data contradicts your initial statement that optical data is not relevant for timing detection here. I think that requires some rephrasing

Line 204: 'Second, many landslides fail more than once': How do you know this? This has not really been clearly presented in the inventory section.

Line 211: 'fitted' what does this mean? Little unclear

Line 227: 'represent the main failure' Why is that? I think this could use some elaboration

Table 1: you use 05/07 instead of 05/08 for optical timing

Line 239-244: While you present the same type of results, you do it differently (with/without percentages/ different way of telling it). I think it is better readable if there is a similar structure.

Line 246: At first, this number (153 of the 213) confused me a little bit since you first say 61 and then 213, but I see now that you mean difference between optical and SAR. I think this should be clarified.

Line: 258: '214' should be 213, right?

Line 258: '170' where does this value come from? In sect 3.1 you mention 307. Or, is this only for the >3600 m2 landslides?

Line 260: First mention of the figure 3 is Fig 3.f shouldn't it be Fig. 3.a then?

Line 265-266: I think this statement requires backup in the form of results or supplementary material for transparency.

Line 272: Is it 259 or 258 (as in line 261).

Line 296: '2.5cm/s' Even lower right? 2.1/2/2

Line 299: degree sign needs to be changed

Line 345-346: References should be between brackets? Ending with a full stop

Line 350-351: I think this statement should be backed-up by some reasoning.

Line 359-360: This sentence seems a bit unclear? Don't you mean to say that the spatial extent is already defined by the landslides that occurred in the main shock? Maybe some rephrasing is needed.

Line 362 & 367: What do you mean by ' mass wasting effect'? amount of regolith mobilized?

Line 381-384: You say it is 'particularly likely' but why is that?

Line 388: Instead of reactivations, could noise be a factor?

Line 444: I think this should be included as a reference, right?