

I have enjoyed reading this submission “Improved Dating of Landslides in Zimbabwe by Combining Satellite Multispectral and Synthetic Aperture Radar Observations”. The methodological approach is interesting and its performance is a significant improvement over the previous work of Burrows et al. (2022), both in terms of the proportion of landslides in an inventory that can be dated, and in terms of flexibility since it can be applied to point inventories and to smaller landslides. Because of this, I do not want to recommend rejection of this manuscript. However, I am recommending major revisions, because I think there is a significant problem with how the method has been validated.

I am concerned that there could be a problem in the methodology, and the only real way to tell is by adding another case study event. The problem is this: the authors are using SAR time series to detect a landslide based on the change in scattering properties caused by the removal of vegetation. This change should be permanent (or at least last for as long as the landslide scar remains unvegetated). However, in Figure 6 and lines 187-193, the authors do not see any sustained change in the SAR time series, they only see a peak in the amplitude. This peak in the amplitude *could* reflect the landslide timing (but in that case, why does the change not last longer?) or it could reflect the increase in soil moisture associated with the rainfall event. For this landslide inventory, the temporary soil moisture increase and the landslide timing coincide, so there is no way to tell. For this reason, I strongly recommend to also test the method using earthquake-triggered landslides where there is no change in soil moisture (and also make sure there is no significant precipitation event at the same time, so not Hokkaido 2018, Turkiye 2023, Haiti 2021 etc.). This will allow you to ensure that you are detecting the landslide itself and not the change in soil moisture. Without carrying out this extra validation, I don’t think you have a reliable test of your method.

I hope what I say is clear enough, essentially, I think right now you could be detecting any of the following:

1. forest → wet bare soil → bare soil with fluctuating soil moisture
2. forest → bare soil (and the fluctuation between wet and dry soil is a smaller signal, so it is not too important)
3. dry conditions → wet conditions → dry conditions (worst case scenario, the landslide is not detected at all in this case)

To me the most likely is case 1, which is ok because you have still detected the landslide timing. But you need to make sure. Otherwise if we apply your method elsewhere, landslides will be assigned the timing of whenever the strongest change in surface soil moisture is.

In case it helps, Cabré et al. 2020 explains well how erosion represents a “permanent” change to the Earth’s surface, while soil moisture changes are only temporary <https://doi.org/10.1002/esp.4868> Their paper covers coherence rather than SAR backscatter and is located in a desert location, but the overall idea is the same. If you want an idea of how SAR backscatter responds to changes in soil moisture, I suggest Bauer Marshallinger 2018 <https://ieeexplore.ieee.org/abstract/document/8444430>

I also have some other, more minor comments as follows:

Figure 4. It is not clear what the different symbols represent in this figure. Why are there two separate sets of unfilled blue circles (one at 100% and the other increasing from 0 to 50)? What are the circles and crosses?

By diameter, do you mean the width of the box? It is a bit confusing to interchangeably use “box” and “buffer”

Also, in the caption, you should specify 1x1, 3x3 etc. “pixels”

Lines 137-138 Is the size of this buffer something that can easily be changed in the code? This could allow you to adjust if you know you are looking at an area with a lot of large landslides. I assume that making it larger from the start would make the code take longer

Line 139 “However, Fig. 4 shows an average of less than 10% of this 100 m radius (200 m diameter) is comprised of the landslides, with most of the dataset falling between 0-10%”
But in Figure 4, it looks to me as if an average of 20% of the AOI is comprised of landslides, not 10%

Line 203 “NDVI is expected to result in a drastic drop” this phrasing is a little odd, I suggest “NDVI is expected to show a drastic drop”

Line 223, I think you mean an improvement in the precision, but a decrease in the sensitivity rather than the accuracy. Is that correct?

Line 230 “the results in this study utilise the descending signal only” why is this? It’s true that more landslides were triggered on eastern facing slopes in this event (as seen in Fig. 9), but there are a reasonable number also on west-facing slopes that might be better detected with the ascending track. Couldn’t using both increase the sensitivity?

Line 238 “Burrows et al. additionally focusses on landslide delineation” This is not really the case. They use landslide polygons, but their method does not delineate these polygons, they were taken from pre-existing studies. Their method provides dating only. For me the complementarity of their method to yours is that while theirs was designed to be applied in monsoon-affected regions (and in a later paper, they go on to use it in Nepal), yours works better when reasonably frequent multi-spectral images are available (as you describe later on in lines 315-320)

Line 315-320 It’s true that this is a limitation, but in monsoonal climates, the 6-month window in which a landslide occurred is almost always known a-priori from the manual mapping. For example there are several inventories of monsoon-triggered landslides in Nepal mapped on an annual basis (see Harvey et al. 2025 for a summary <https://doi.org/10.1007/s11069-024-07013-1>), if you assume all landslides occurred during the rainy season between April-November, could you use this information in place of the constraint you currently place using NDVI?

Section 5.1 Another limitation is that the method only works (or at least has only been tested) in vegetated environments.

Typos

Line 102: no need to capitalise Earth here, since you refer to the material, not the planet

Line 139 “and” should be “an”