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Comment on nhess-2021-101

Anonymous Referee #1

Referee comment on "Monitoring and analysis of Woda landslide stability (China) combined with InSAR, GNSS and meteorological data" by Bingquan Li et al., Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2021-101-RC1, 2021

The study by Li and co-authors presents a combined InSAR and GPS displacement time-series of a landslide in Eastern Tibet over a 15 months time interval and investigates the relation between displacement and rainfall.

I have several major concerns regarding this study, which is not sufficiently prepared, the scientific question is not addressed, the errors on the measurements are not analysed, the analysis between landslide displacement and seasonal rainfall is based on a 15 months time-series, not sufficiently long to analyse a seasonal effect, the time-series presented do not appear the same in the different figures, the results are not discussed in terms of mechanisms. I provide below some more detailed comments on the different major concerns I have, that might help the authors to design future works for a more robust study:

The paper is not sufficiently prepared. For instance the introduction starts with a paragraph on the InSAR and source inversion of the Kumamoto earthquake, which has nothing to do with the landslide investigated here.

The problematic of the study is not addressed. Is the main question related to landslide detection? Or a methodological paper on the combination of InSAR and GNSS? Or the study of the triggering factors on landslides?

The data and methods section does not present the GNSS data, the sampling frequency,

the type of instrument, the way they are processed.

The results section does not present the GNSS results and the errors associated with the measurements. This is of specific concern, when looking at the Figure 11 and 12, where the GNSS time-series of the same point don't have the same sampling rate in the two Figures, and where the GNSS positions seem to fluctuate by about 20mm with a 1 month sampling frequency. I am a bit surprised of such a large fluctuation for GNSS measurements. Knowing the type of GNSS (simple, double frequency) and the way the data are processed would help to rely on these data.

The comparison between the InSAR and the GPS time-series at the same locations show large discrepancies (Figure 12), which is very lightly discussed (authors mentioned at lines 217 a different spatial resolution, and some cumulative errors without being precise on these errors). Errorbars on the different time-series should be shown, and sources of the errors must be discussed.

The rain gauge used to analyse the data is 50km away, which is certainly too far to study a local response of a specific landslide. Also the rainfall time-series shown in Figures 15 and 16 are not the same. Are they coming from different locations?

Authors claim to see a seasonal effect rainy/dry seasons on the landslide displacement (Line 220), that I don't see. I clearly see an acceleration on a GPS time-series (GNSS5) at the end of the period of observation, which would be interested to investigate, but no seasonal motion. The time-series of 15 months is too short to analyse the correlation between landslide displacement and seasonal rainfall. At least 2 years would be required for investigating a seasonal effect.

Figure 16 shows a time-series of InSAR displacement between July 2018 and October 2020, whereas authors state they process InSAR data between July 2019 and August 2020. Where does the July 2018-July 2019 time-series come from?

Showing a correlation between rainfall and landslide displacement is not really novel. What do you learn from this correlation on the physical processes of the landslide?

On Figure 8, where is the landslide situated? Also the range of the colour scales are not the same, which makes hard to compare the 3 different images.

Why is the sampling frequency reduced in Figure 12 compare to the original sampling rate of both InSAR and GNSS time-series?

Figure 13 claims a landslide profile, which I don't see. It is clearly an information missing in this manuscript, together with an interpretative cross-section of the landslide.

Other forcing factors than rainfall must also be investigated; River sapping? Earthquakes? For instance Figure 1 shows the location of several earthquakes (Mw4.5+) in the vicinity of the landslide. Is there an impact of these earthquakes on the landslide displacement?