

Interactive comment on “Locating rock slope failures along highways and understanding their physical processes using seismic signals” by Jui-Ming Chang et al.

Anonymous Referee #2

Received and published: 22 January 2021

I have had the opportunity to fully review the manuscript “Locating rock slope failure along highways and understanding their physical processes using seismic signals.” After reading through this manuscript, I have found it interesting and progressive for its attempted to create a real-time warning system. That said, I think the manuscript needs some work and changes before it can be considered for publication. I noticed that this manuscript has been submitted to GRL in the past and thus may be the reason for some information and in-depth analysis to be missing. This paper will contribute to the overall mass flow community as an example of what can be completed in a specific area. Please address my comments and concerns below.

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Major comments:

-ASL does need a priori values, you state they do not on Lines 75,157, etc.. To this extent what are you using for the ASL method for velocity, quality factor, frequency? Likewise, you need to explain how you are estimating "alpha" which contain the a priori values for ASL.

-Source location methods like ASL are influenced by site and path effects, did you try and correct for these? It may reduce some of the large location errors that are shown. If not, there needs to be a statement of why the stations were not corrected.

-For ASL the frequency range of 1-8 Hz was used for every event? Were any other ranges tested to reduce error, or a sensitivity analysis conducted? Looking at the spectrograms there are events that have peak frequencies or high amplitude content above 8 Hz.

-Need to explain how you are estimating the location of events by CC. There is only one line of description in the text. There needs to be more.

-Check out Kumagai et al., 2013, they link ASL to event magnitude

-Both horizontal and vertical components are used for the location process, but they are computed individually, why not locate the source using all three components together? This has been shown in Walsh et al. 2019 to decrease location uncertainty.

-There needs to be more testing, more “blind tests” for location and type of event. In Figure 6 you show 5 events from different processes. Does your conclusions about the frequency content and how the event behaves hold up over many events? I like that you state that source-receiver distance plays a large role, but I think there is not enough emphasis on this especially when it comes to comparing different types of events (e.g. Fig 6) at specific frequencies between 1 km and almost 9 km away. I don't know if 6e holds up?

-I think there needs to be a caveat especially in the conclusion stating that these values

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and inputs that are used in this manuscript are not universal and only apply to this area of Taiwan at close distances, but the methods used can be applied elsewhere, but calibration needs to be conducted.

Line comments:

Line 25: delete first "directly"

Line 70: Add citation for lahars (e.g. Kumagai et al., 2009)

Line 71: change "A" to "at"

Line 71: Change or add "main" or "popular" between "two approaches" there are more than two these are just the most used ones for this purpose.

Lines 80-82: Where does this come from? You transition from location methods to magnitudes and volumes. Maybe try and rewrite the transition so the reader understands the connection between ASL and volume estimations.

Line 131: Why 180 second time windows?

Line 146: Two stations? You state this elsewhere as well, two stations seems very low to locate a source with any kind of accuracy. Walsh et al. 2017 showed that ASL needs at least 4-5 stations to obtain a reliable result.

Line 150: Need reference for ASL (e.g. Battaglia and Aki, 2003)?

Line 158: What is the velocity you are using for CC?

Line 159: Why a 50 sec time window, seems long for a location method, especially for a moving source.

Line 176: Please explain what "N" is defined as better. I had to read several times to understand what "total amount of result location" was.

Line 197: Others have shown station geometry for ASL is important as well, please cite them.

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Line 265: True, but the signals are also influenced by the dynamics and properties of the RSF as well as the medium in which it moves over.

Line 282: Knowing the location of the source, defies the purpose of a test no? or is this a test on volume and not the whole GeoLoc system?

Line 293: add space between "theIRM"

Line 303-311: What about the automatic location estimate of new events?

Line 332: delete everything after "activities" and add "around the world"

Figure 2: Capitalize "n" in both instances. In the text it is an "N"

Figure 3: State what the seismic amplitude value is in the text and that these are filtered waveforms.

Figure 4: Why are the bottom two events filled differently from all other events? This is not stated in the text, only 1-8 Hz is.

Figure 4: What is the red star?

Figure 4: I cannot tell where we are in the location figures, you need to put a DEM or map in the background for the reader to get a sense of where these flows are occurring.

Figure 5: Would be nice to have a map or DEM in background for location results

Interactive comment on Earth Surf. Dynam. Discuss., <https://doi.org/10.5194/esurf-2020-94>, 2020.

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