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Comment on nhess-2021-339

Anonymous Referee #2

Referee comment on "Brief communication: Seismological analysis of flood dynamics and hydrologically triggered earthquake swarms associated with Storm Alex" by Małgorzata Chmiel et al., Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2021-339-RC2, 2022

First, I apologize about the long delay in returning this review.

In this paper, the authors use data from a permanent seismic network to explore the seismic signals generated by an extreme precipitation event in the south of France. The data provide insights into the flood generated on one of the highly affected rivers and identify a swarm of small earthquakes apparently triggered by the storm. I found this an interesting and nice-presented paper. Destructive floods like the one described here are indeed difficult to observe using traditional methods, and this paper demonstrates the potential of seismic methods for flood observation. As well, it's not so often that major flash floods occur within such a conveniently laid out seismic network, so it's great to see this opportunity exploited. Overall, I found this an enjoyable paper to read, and I have no major concerns to raise, just some relatively minor comments about clarifications and presentation.

How were the thresholds for the peaks selected? It would be nice to indicate both the start and end of each peak in figure 2 - you've selected a set of points for each peak in fig. 2G, but we can't tell exactly what those correspond to in the time series. It could also be interesting to identify on the waveform and power plots where the breaks in slope in fig. 2G are. Especially with the different units, it's a little difficult to compare to panel A. Otherwise, I really like figure 2!

The detection of an earthquake swarm related to the storm is quite interesting. This is not my expertise, so I can't properly comment on this aspect, but I found the discussion clear and reasonable. I do wonder if you've tried calculating dv/v over this time period? Maybe this would provide some insight into the state of the subsurface in the months after the storm?

Line 54: this statement makes it sound like there was higher rainfall in 1997, but I guess 1997 was just when the record starts. This should be made clear, as it's a big difference.

Line 68: "particularly adequate" is a strange combination. Particularly suitable?

Lines 79-80: this is basically a repeat of lines 58-60

Line 156: Roth et al., 2016 could be cited here

Line 161: it's not clear how are proposing that a slope failure would cause a sustained change in the peak frequency? I could imagine a slope failure that increases the local river noise (due to sediment input, geometry changes, roughness, etc) in a more distant segment, but I'd think that the failures themselves would produce much more punctuated signals.

Line 183: you haven't been mentioning times throughout this paragraph, so specifying night here sounds a bit funny – like there's something diurnal that makes the time of day matter, which I guess is not the intention.

Lines 199-205: Could the lack of peaks also be influenced by the larger sampling area of the TURF station? Because of its farther distance, it will have a similar sensitivity to a pretty long stretch of channel, which should smooth out moving peaks.

Line 237: stick with "central", not "middle"

Fig. 1: the precipitation colors on top of the Google earth colors make this a bit busy. It is ok – we can see the precip pattern, but it might look much nicer with a hillshade for the background. In panel D, the labels on the waveform y-axes are too crowded. Maybe you could make panel C shorter to give panel D a little more space?

Fig. 2: It would be helpful to have the frequency range used for A-C in the caption