

Manuscript Review for nness -2016-397, Historical Analysis of Rainfall -Triggered Rockfalls: the Case Study of the Disaster of the Ancient Hydrothermal Sclafani Spa (Madonie Mts., Northern-Central Sicily, Italy) in 1851 (authors: A. Contino et al.)

Review 6 June 2017

Scientific Significance. Does the manuscript represent a substantial contribution to the understanding of natural hazards and their consequences?

Rating: Good.

The manuscript presents an interesting approach on how to reconstruct a hazardous historical rockfall event, by combining a detailed description of the geological setting and by tracing possible sources of information in historical records and existing literature. In such a way an important geo-hazard concerning the studied area, has been brought to the attention of the scientific community.

Scientific Quality. Are the scientific and/or technical approaches valid?

Rating: Good.

The authors have done a good job to collect all relevant information from historical sources. Generally the historical analysis of the event is of very good quality. The interpretation of the geological setting is also of good quality and informative to the reader. Furthermore, the production of the geomorphological map (presented in figure 5) as a result of detailed field mapping is of great importance for a correct reconstruction of the event.

By carefully reading the manuscript, I have gained a natural interest about the specific event and this has motivated a preliminary personal study on this specific site, mainly by collecting geographical information from internet resources (Google earth-maps etc.) Based on this study I would like to point out -suggest to the authors the following:

- It would have been great to include some kind of 3D information concerning the studied area. This could help the reader to get a better impression of the geological setting. It would also assist in a better geo-referencing of all exposed information in this research article. It might worth the effort to work in 3D and to produce a valid 3D model of the studied area. This would also enable a reconstruction of the event, by means of numerical modelling. The authors are correctly pointing out that geomorphological alterations in the area through time, make it difficult to model the rockfall event (i.e. rockfall trajectories), but my opinion is slightly different. A correct 3D model of the existing topography enriched with information concerning possible rockfall release positions and size of boulders (rockfall scenarios), could provide enough information for a preliminary dynamic analysis of the event by means of rockfall numerical modelling (in 2D or 3D). At least the 'Rockfall potential' of the given slope could be explored. This in turn, could yield information about the energy magnitude and the travel path of the historical event as well as for possible future events at the area. I have the feeling that the authors can greatly improve the manuscript by including such kind of information. The following figures come as a result of my personal study, driven by reading the manuscript and I am **only** including them in this review process, in order to make my points clearer to the authors:

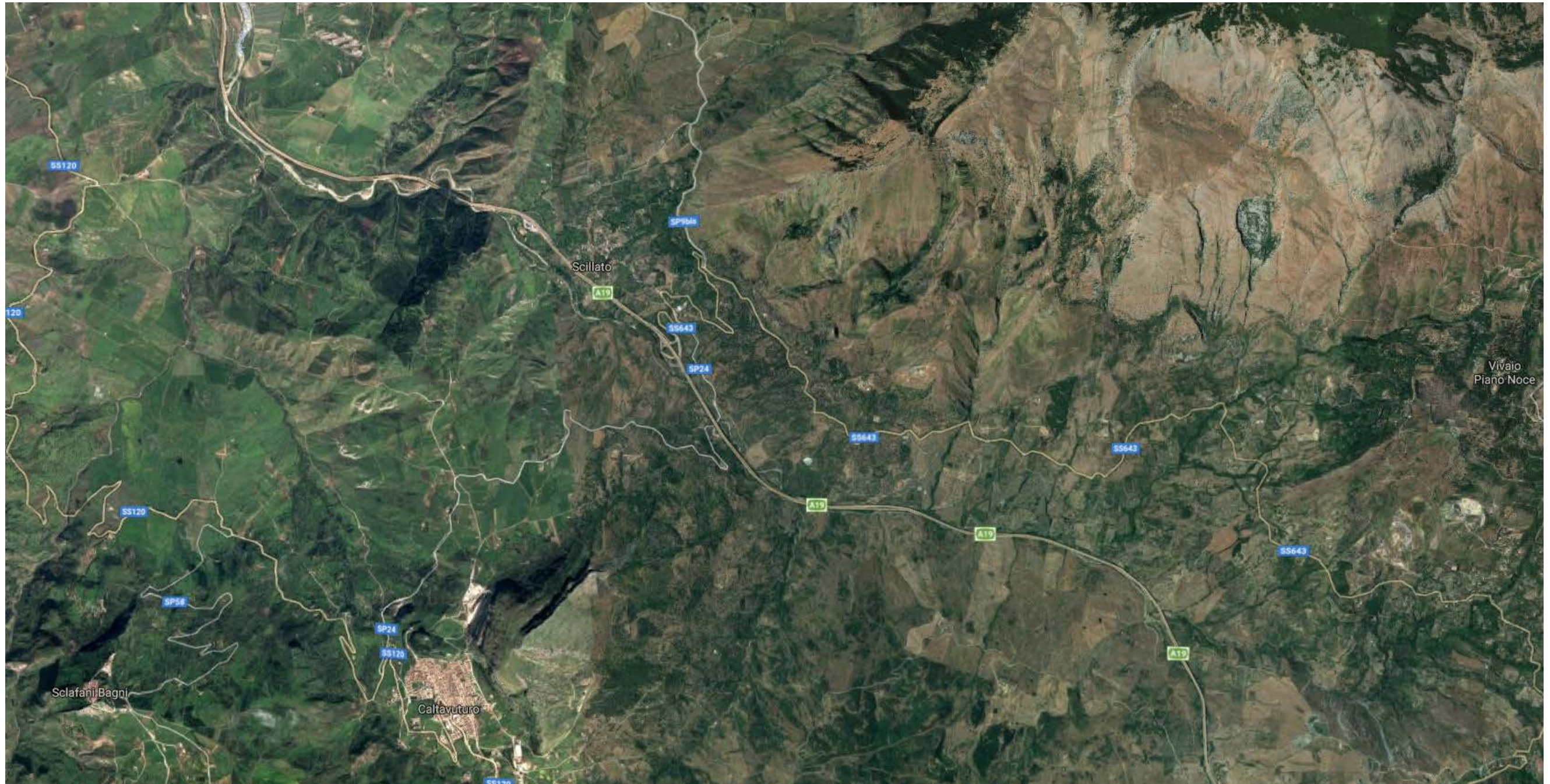


Figure 1: Study area, satellite imagery relative to figure 2 in the manuscript. Satellite imagery or ortho-photographs can assist in transmitting crucial information to the reader. In example, the structural geology (faults and other structural elements) of the studied area could be better explained with the aid of a proper ortho-photograph or satellite imagery. Of course, the image above and following images in this review, arrive from standard internet resources (Google maps). It might be possible to obtain satellite images of better quality from other sources.



Figure 2: Satellite imagery relative to the geomorphological map in figure 5. Geological formations could be better visualized on an ortho-photo or satellite imagery.



Figure 3: 3D overview of the area, assisting in a correct interpretation of geological structures. The cross section presented in figure 3 of the manuscript (Lower Cliff, Lower Talus Slope etc.) could be much better explained on the basis of a 3D model.



Figure 4: Georeferencing of data with the help of a 3D model?

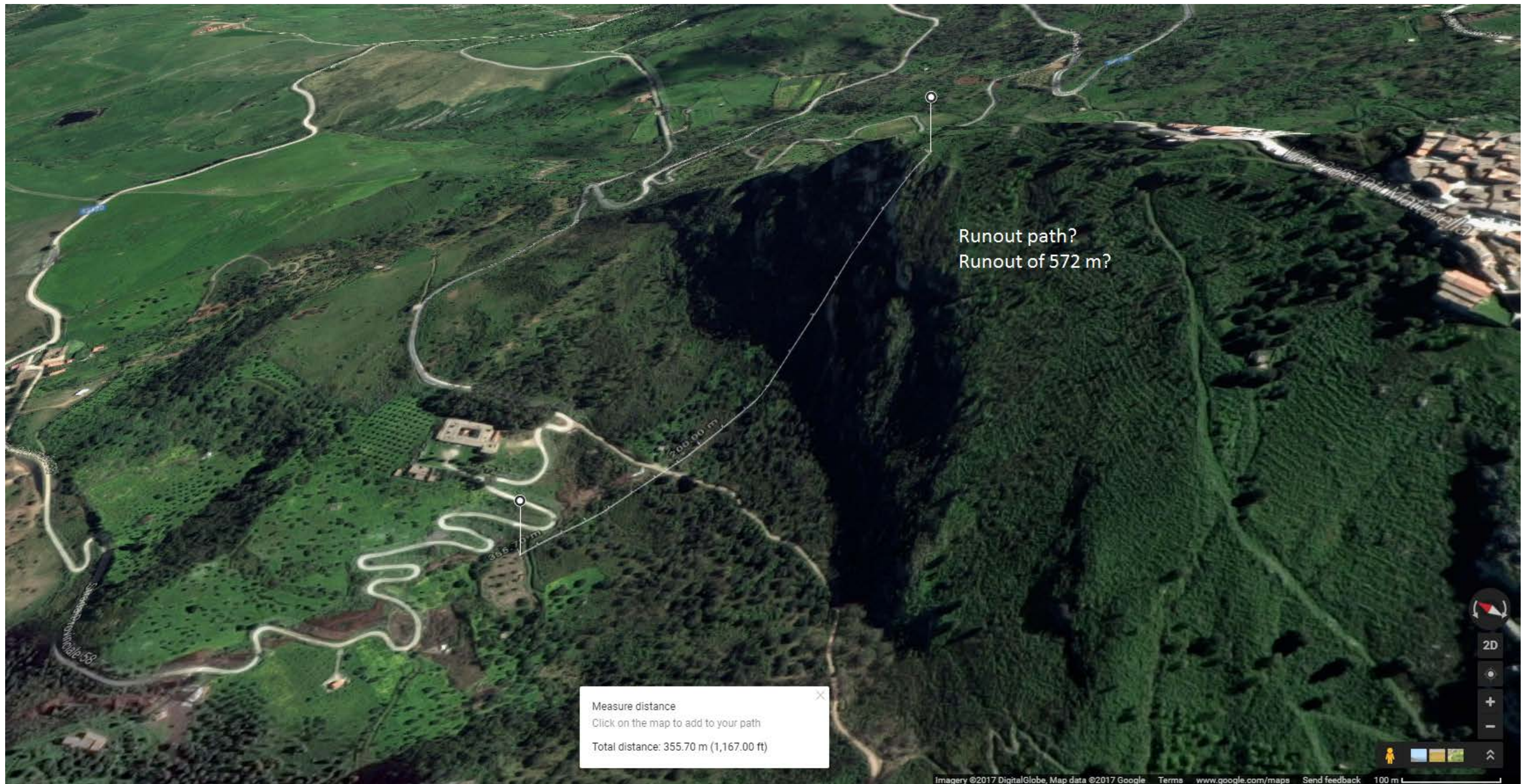


Figure 5: Possible Rockfall scenarios? Identification of the position of the historical Sclafani Spa?

My personal view is that there is not enough information in the manuscript that could enable a “dynamic-kinematic” reconstruction of the analysed event.

The description of the deposit and of the landform created as a consequence of the 1851 event could had been more detailed. The addition in the geomorphological map in figure 5, of the exact position of some silent witnesses (boulders transported by gravitational movements) concerning rockfall events at the same slope, could assist in quantifying the “slope dynamics” relative to rockfall events. A better description of size and sorting (there is only information about some very large boulders (in line 339: the largest ones are approximately equidimensional, 4 m in size?). This kind of additional information could assist towards a dynamic analysis of the event.

On the hydrological record concerning the studied area, is there enough data to allow the calculation of the recurrence interval (return period) of such powerful events as the described storm and the associated rainfall? This information could be usefull for risk calculations.

To conclude with: The historical analysis is of great quality and highlights how such an approach can provide with valuable information concerning geo-hazards. The geological description of the site and interpretation relative to the analyzed event is also of good quality. There is a lack of information that could enable a correct *dynamic* analysis of the event.

Presentation Quality

Rating: Good.

I believe the scientific data, results, and conclusions have been presented in a clear and well-structured way. I would have liked to see a properly scaled geological cross section similar to the one presented in figure 3, based on the geomorphological map in figure 5. A cross section indicating the event’s travel path (i.e. from release position to the location of the ruined historical spa, according to the understanding of the authors) would in my opinion also improve the article. English language is properly being used throughout the manuscript, with limited typos, and the narrative style I have found it to be very interesting.

For final publication:

My opinion is that the manuscript should be accepted subject to minor revision.