

We thank the reviewer for her thoughtful and constructive review. We agree with the points made by the reviewer and would like to revise our manuscript according to the suggestions. We include our responses to the individual comments in the following (reviewer comments in *grey italics*, our response in black).

“General comments”

The submitted paper presents the systematic work conducted and the criteria followed with the aim of producing a new dataset of earthquake-induced landslides occurred over the last two centuries in Norway (Norwegian EQIL), while contributing to the understanding of some characteristics of earthquake-induced landslides in intraplate tectonic settings/conditions.

Large databases concerning earthquakes and landslides (e.g. NNSN, UiB, SEA, NLD) are cross-checked to this end, and the criteria for attributing a trigger-response connection between earthquake and landslides are well detailed (e.g. locations in time and space allowing to establish temporal and spatial coincidences between an earthquake and associated landslides).

The paper presents a clear in-depth analysis of the listed events, discriminating between earthquake-induced landslides with a lower degree of uncertainty, and those associated to a higher degree of uncertainty caused by the inability to locate the landslide or the earthquake or by an insufficient documentation of the failures' link to a seismic trigger. Hence, it is appreciated that the inclusion of records into the final dataset is presented in a clear and transparent manner.

Although the output slope failure dataset is reduced in number (containing merely 22 events), which is recognized by the authors as a shortcoming of their study, its value, and hence that of the study, resides in the pioneering effort put into designing and following a systematic approach for producing a first dataset of seismically induced landslides for an intraplate region. Such an initial database could form the base for a future much developed one, which could be updated through remote sensing, as the authors mention. The study also contributes to supporting the idea of potentially much larger maximum landslide distance limits and landslide-affected areas than previously estimated by global studies, but in accordance with findings from other intraplate regions.

The manuscript is well structured and written and illustrations and tables are all necessary. The conclusions are concise and comprise the most important findings related to the significance of the constructed EQIL catalogue. Overall, it was a pleasure reading this submission, and, for the reasons listed above, the paper is valuable and worth publishing with only some minor revisions which are suggested below.

“Specific comments”

1. On the Figure displaying earthquake of $M \geq 2$ in the region (Section 1.2 Seismicity of Norway, Fig. 1), I would recommend the inclusion of some tectonic features which would enable a better understanding of the general seismic and tectonic settings of Norway, defining the region as an intraplate one.

We agree that such information on the tectonic features would be helpful. We will include plate boundaries and other important tectonic features in Figure 1 in the revised manuscript.

2. For Section 1.3 Landslides in Norway and their trigger mechanisms, a figure with photos of representative landslide types in Norway would be very helpful. In such a figure, of interest would be

to also find at least one photo of a known seismically triggered landslide. If not here, then at least later on in the paper, (a) photo(s) of recent recorded EQIL would help the reader understand the types of movement triggered by earthquakes.

Unfortunately (to our knowledge) there are no photos of Norwegian EQIL. However, we would like to include photos of a rockfall and a landslide in clayey soil to exemplify the events as suggested by the reviewer.

3. From what I understand, Table 1 (section 3 Results) lists the EQIL dataset constructed in this study. For more clarity, maybe you could add “Norwegian EQIL” in brackets in the table caption. Also, for more clarity, a column listing the “No” would help seeing that this table refers to the 22 EQIL. Further, in this context, I find the explanation “ indicates an uncertain event” a bit confusing. As far as I understand, this table doesn’t contain the uncertain events, which were eliminated from the dataset, as was explained in Section 2 Methods (page 5, lines 129-134). Then, what is indicated with “*”? Does the uncertainty refer to the existence of the landslide? Or does it refer to the movement type attributed to it? This is not very clear and should be explained, in a table footnote or/and in the text.*

We will update the table according to the suggestions of the reviewer.

The issue of the “uncertain event” (which is explained in more detail in section 3.6) was also raised by another reviewer, and we will move this event to section 2.9 and thus remove it from the table.

4. Section 2 Methods, page 5, line 122: The search for seismically induced landslides is restricted to earthquakes of magnitudes $M \geq 5$. An explanation would be needed at this point as to why this magnitude threshold was selected when constructing the EQIL catalogue.

The magnitude limit considered is 4.5. We explain the choice of value in the following section “Data”: “Whereas smaller events may trigger landslides as well, we select the lower magnitude threshold of $M=4.5$ in order to have a systematic overview of the landslide-triggering-potential of earthquakes nationally.”

5. In Section 4 Discussion, when discussing the landslide distance limits and landslide-affected areas, I would suggest the following:

- page 17, line 348: please specify “limit curve” in: “the empirically derived limit curve of maximum landslide area...”;

We do not use the term “limit curve” for landslide area, but rather write “the empirically derived curve of maximum landslide area”. We will clarify that this is “the empirically derived curve of maximum landslide area vs. distance”.

- I would recommend using a softer wording for formulating some conclusions, like at page 18, line 349: since the number of observations is small, indeed, I would suggest rewording with the vaguer “seem to confirm the systematically larger distance...” instead of just “confirm the systematically larger distance...”;

We agree but would rather like to rephrase to “are in agreement with the systematically larger distance...”.

- page 18, lines 352-353, caption of Fig. 6: for clarity, I would find it necessary to list the areas’ names and corresponding citations for the grey dots in the caption as well (not only in the text); I also would write the extended explanation for the black curve: “maximum landslide distance limit for disrupted slides and falls from Keefer (1984)”;

We agree, we will update the caption.

- page 18, lines 355-356, caption of Fig. 7: I would suggest adding the reference for the maximum landslide distance corresponding to the 2011 Virginia earthquake; I also would write the extended explanation for the black curve: “maximum landslide area limit from Rodriguez et al (1999)”;

We agree, we will update the caption.

- page 20, line 375: I would suggest putting more emphasis by replacing with: “...lead to differences in the identified/estimated landslide distance limits”, since the differences do not concern the limit itself but rather its identification or estimation based on the available data;

We agree, we will update the text.

6. The discussion of the relation between EQIL and ground motion intensity for the 1904 earthquake is very important; at this point it would be interesting to also include in the discussion a map displaying EQIL distributed in relation to the Peak Ground Acceleration, if available.

There are no nearby instrumental recordings available for the 1904 earthquake. The issue of ground motion values (e.g., PGA) is also raised by another reviewer. Two major challenges in discussing the levels of ground motion at the locations of the EQIL are that all events occurred before dense monitoring networks were established and that there is no reliable ground motion prediction equation (GMPE) available that is based on Norwegian data. We will try to estimate ground motions for the events from GMPEs from tectonically similar areas, but the derived values will at best be rough estimates that can serve as basis for a more general discussion of the levels of ground motion leading to landslide triggering.

7. With regard to the role of precipitation (presented in Sections 3.3-3.8., pages 13-16, in Section 4 Discussion, page 20, lines 378-385, in Section 5 Conclusions, page 21, lines 412-414, and in the Abstract, lines 15-16), in my opinion, the triggering and the preparatory roles of precipitation are presented a bit confusingly. While in the Results section, precipitation is being analyzed in order to rule out a possible precipitation trigger for the events included in the EQIL dataset (i.e. from a trigger perspective), in the Discussion and Conclusions sections, precipitation is discussed more in the context of its possible contribution to increasing terrain proneness to landsliding (i.e. from a preparatory perspective, of antecedent precipitation leading to soil moisture conditions). While from a trigger perspective, it is common to analyze precipitation amounts up to 5 days before an event, for drawing conclusions regarding the antecedent precipitation conditions, it would be recommended that the period prior to the earthquake and, thus, to the earthquake-induced landslides be a little extended, e.g. commonly at least up to 30 days (e.g. Rosi et al, 2019). Therefore, I would suggest either extending the period prior to the events in order to be able to draw conclusions related to the antecedent role of precipitation potentially increasing terrain susceptibility to landslides, or being more precise in the Discussion and Conclusions sections about what could be found so far, namely that antecedent moisture conditions may have played a role in preparing the slopes to respond to seismic shaking but that the preparatory role of precipitation and its combination with the earthquake trigger was not investigated in this study. E.g. line 412-414: instead of writing “and for three of the earthquakes triggering EQIL, precipitation is expected to have increased the susceptibility of the affected slopes before the earthquake”, you could write only what has been found/is suspected until now: “and for at least three of the earthquakes triggering EQIL, precipitation is expected to have increased the susceptibility of the affected slopes before the earthquake”.

We agree that the descriptions of the role of precipitation are not entirely clear. In the revised manuscript, we would like to consistently display the precipitation for the 30-day period prior to each earthquake (instead of just showing the month of the earthquake as is currently the case). We will

also clarify the discussion in terms of the difference between antecedent precipitation and the direct triggering of landslides by precipitation.

8. When discussing that all landslide-triggering earthquakes in the constructed dataset are contained in the period April-October (in Section 4 Discussion, page 20, lines 379-381), for more clarity, it should be put into the context of the larger earthquake database which also includes earthquakes occurring in winter but for which no corresponding records of induced landslides were found (Appendix A); this would make the reasoning much clearer.

We will clarify in the text that earthquakes are distributed evenly throughout the year, whereas EQIL are only observed during April-October.

“Technical corrections”

- Section 3, page 9, caption of Table 1: all the abbreviations in the table (ML, MS, MW) should be explained (either in the caption or as a table footnote);

Explanations of the abbreviations will be included in the caption.

- Section 3.1, page 10 line 183: please replace “from” with “of”;

Will be corrected.

- Section 3.1, page 10 line 193: please replace “from” with “of”;

Will be corrected.

- Section 3.1, page 10 line 196: please insert a comma after “In this study”;

Will be corrected.

- Section 3.1, page 10 line 200: please move the word “almost” after the word “being”;

Will be corrected.

- Section 3.1, page 11 line 201: please replace “identified for this earthquake” with “identified in connection to this earthquake”;

Will be corrected.

- Section 3.1, page 12, Table 2: although it is clear in the text, NLD should also be explained for the table (either in the caption or in a table footnote – depending on the journal’s guidelines). Please also replace the comma with a point in: “Referred to as Storstrand in NLD. NLD...”;

Will be corrected.

- Section 3.3., page 13, line 240: Please replace the singular with the plural form in: “The precipitation data (Fig. 5) show ...” (since „data” is a plural noun);

Will be corrected.

- Section 3.3., page 13, line 248: I think you mean “300-400 m” and not “3-400 m”, right?;

Will be corrected.

- Section 3.3., page 13, line 249: You mean “70 m² of forest” and not “70 m”, correct?;

The eye-witness report actually states that 70 m of forest is destroyed, but we agree that this is unclear. We will rephrase to “An approximately 70 m-long stretch of forest along the slope is reported to have been destroyed.”

- Please pay attention when writing the dates. If you choose the British style for dates, I think there shouldn't be any "." sign after the date (see lines 247, 254, etc.): e.g. "7 October"- not "7. October"; It is correct that according to the journal guidelines, dates should be written without the ".". We will revise the manuscript accordingly.

- Section 3.4, page 14, Figure 5: please export this illustration with a better resolution, as the graphs appear a little blurry; please standardize the notation on the y-axis: either 24-hour or 24-h"; also, the word "precipitation" on the vertical axes of the graphs appears underlined/underlined - for esthetic reasons this should be removed;

We will revise the figure according to the recommendations from the reviewer.

- Section 3.5, page 15, line 262-263: please change the sentence to: "had a magnitude $M_L=4.6$ and a maximum intensity of V ";

Will be corrected.

- Section 3.5, page 15, line 281: please replace "the" with "a": "We expect that this rockfall was triggered by a combination of ...";

Will be corrected.

- Section 3.7, page 15, lines 284-285: Please change the phrase as follows: "...with a magnitude of $M_W=4.9$. The event was felt throughout the Nordland region with a maximum intensity of V ";

Will be corrected.

- Section 3.7, page 16, lines 292-293: the sentence needs reworded as follows: "This supports the interpretation/hypothesis/conclusion of the earthquake being the main trigger...";

The sentence will be rephrased: "This supports the hypothesis of the earthquake being the main trigger of the landslides."

- Section 3.8, page 16, lines 295: please delete "it": "...and was strongly felt in..."

Will be corrected.

- Section 3.8, page 16, line 296: please change to: "with a maximum intensity of V ";

Will be corrected.

- Section 3.8, page 16, line 298: I think "the" would need to be changed to "a", as follows: "where a respondent describes ...", right?;

Each questionnaire in the archive has been filled out by one respondent, and we therefore think it is correct to refer to "the respondent" in this case.

- Section 4, page 19, line 359: please replace with the plural form: "...at similar or higher latitudes";

Will be corrected.

- Section 4, page 19, line 360: I would recommend replacing "may" with "would", as follows: "the landslide area would have been larger if...";

Following a comment from another reviewer, we will rephrase the sentence and rather focus on the fact that most of the area south of the epicenter and within a plausible distance limit is covered by water and thus landslide observations are less likely.

- Section 4, page 19, line 367 (caption of Fig. 8): I think you mean “Blue squares”, not “Grey squares”;
Will be corrected.

- Section 4, page 20, line 374: please insert “the” in: “...also suggest that differences in the levels of investigation...”;
Will be corrected.

- Section 4, page 20, line 377: please remove “it”, as follows: “...and is thus directly comparable to the global studies”;
Will be corrected.

- Section 4, page 20, line 378: I am not sure future is the correct tense to be used after “It is expected”, maybe it should be: “It is expected that slope susceptibility is important for the extent...”; please check the tense;
Will be corrected.

- Section 4, page 20, line 389: Please check the English regarding the beginning of the phrase “This is as expected for earthquakes...”, it’s not very clear; maybe it could be replaced with something like: “This is in agreement with the effects of earthquakes of moderate magnitudes...”;
The sentence will be rephrased: “This is in agreement with the expected effects of moderate-magnitude earthquakes that cause...”

- Section 4, page 20, line 390: please introduce a comma after “From a hazard perspective”;
Will be corrected.

- Section 4, page 20, line 396: I would recommend replacing “Most of the most landslide-prone areas...” with “Most of the high landslide-prone areas...”;
This sentence will be rephrased following a comment from another reviewer, and landslide-prone areas will no longer be mentioned.

- Section 5, page 21, line 410: please use the full word instead of “1/2”, as follows: “...and half to one order of magnitude larger than...”;
Will be corrected.

- Section Appendices, page 21, lines 422-424: In the caption of Table A1, also the abbreviations ML and Mw should be explained as are the others;
Will be corrected.

- Please be consistent with the use of tenses throughout the paper: e.g. in section 3 Results you use, for similar statements, both present tense (line 242: “and the event is not included in our list”) and perfect (line 289: “the debris slide has not been included as a separate event”).
We will check the paper for use of tenses and revise.