

## Review: Risk-informed representative earthquake scenarios for Valparaíso and Viña del Mar, Chile

'Review of nhess-2023-186', Executive director NHESS, 20 May 2024

Dear Hugo Rosero-Velásquez, Mauricio Monsalve, Juan Camilo Gómez Zapata, Elisa Ferrario, Alan Poulos, Juan Carlos de la Llera, and Daniel Straub:

I am pleased to accept your manuscript "Risk-informed representative earthquake scenarios for Valparaíso and Viña del Mar, Chile" for publication in our journal NHESS subject to some minor revisions with a quick check by the editor of your changes.

We thank you for accepting our manuscript. In the following we reply to the minor revisions

These very minor revisions are as follows:

\* Abstract. Please be a tad more rigorous in reporting values for data/methods/results in the abstract. It is currently fairly high level and not really a summary. For example, how many scenarios, what is the size of the synthetic earthquake catalog, down to what magnitude, how many scenarios did you identify? There is a lot more 'summary' that you could put in for your paper to be useful to someone who has 'just' the abstract to read.

We modified the abstract as follows:

(...) With this approach, we identify representative earthquake scenarios for the return periods of 50 yr, 100 yr, 500 yr and 1000 yr in the Chilean communes of Valparaíso and Viña del Mar, based on a synthetic earthquake catalog of 20 000 scenarios on the subduction zone with magnitude  $M_w \geq 5.0$ . We consider separately the residential building stock and the electrical power network, and identify and compare earthquake scenarios that are representative for these systems. Because the representative earthquake scenarios are defined in terms of the annual loss exceedance rates, they vary in function of the exposed system. The identified representative scenarios for the building stock have epicenters located not further than 30 km from the two communes and magnitudes ranging between 6.0 and 7.0. The epicenter locations of the earthquake scenarios representative for the electrical power network are more spread out, but not further than 100 km away from the two communes, and with magnitudes ranging between 7.0 and 9.0. For risk management activities, we recommend considering the identified scenarios together with historical events.

\* I believe this paper will be much more useful to the reader if you have a table of variables and acronyms, and what they mean, that you introduce early on in Section 2. This is because you have a large number of these, and it makes for dense reading.

We included an annex with tables of variables and acronyms.

\* Figures 2, 3, . Font size is getting too small to read for some of the text.

We amended the figures accordingly.

\* Table 1, text, Figure 5 x- and y-labels, . Be clear when you put degrees in, whether this is E, W, N, S.

We amended the maps and tables accordingly.

\* Units. Everywhere you have something like "500 x 500 m" it should read "500 m x 500 m" (you've left off units for first 500. You have m in non-italic and s in italic, in section 5.3. Please throughout your manuscript be consistent (check NHESS guidelines for guidance).

We amended this throughout the text.

\* Figure 6a. I found it difficult to differentiate the colours in your legend and then go to the actual figure. For the counts, you have duplicated numbers for your bins (500 appears twice, 1000 appears twice, 1500 appears twice). It should be 0-499, or 501-1000, etc.

We modified the figure considering this.

\* Figure 7 and associated text. Wherever you mention USD, you need to be clear what year this is for, as it changes (significantly) with inflation). So you cannot compare USD from one decade with two decades later.

We now specify that the reported monetary values are from 2016, which corresponds to the year when the replacement cost of the considered building types were estimated (Yepes-Estrada et al, 2017). Similarly, we also report a value in USD in 1985 values, corresponding to reported losses due to the 1985 earthquake event.

\* Figure 8. If you are going to use RP, then define it in the figure caption (Return Period). I'm not able to easily see the colours of the buildings and differentiate them.

We modified the figure caption accordingly.

\* General. (e.g., Figure 10). Black on dark purple is very hard to see.

We amended the figures accordingly.

\* The discussion is good, but could be broken out into clear topics, and let the reader know at the beginning what those distinct topics will be.

We now divide the section into two subsections, whose titles tell the reader the two topics (i.e., "On the results for the communes of Valparaíso and Viña del Mar" and "On the definition of representative scenarios and the methodology for identifying them")