We thank Anonymous Referee #1 for going through the manuscript and providing feedback on what is insufficient and can be improved. Below, the reviewer comments and line-by-line suggestions are in black. Our responses to their comments are in blue.

The manuscript presents a seismic hazard analysis for Sweden, a low-seismicity country in northern Europe. It includes information about seismicity, geology, the available earthquake catalog, and post—glacial faults there. The preprocessing of the earthquake catalog is explained in detail. The ground—motion logic tree is perused. As outcomes, the manuscript presents two seismic hazard maps for Sweden, with mean estimates for peak ground acceleration corresponding to return periods of 475 and 2500 years, and new hazard curves for four plus one sites. The previous seismic hazard analyses in the country are reviewed and the new results are compared to the new ones. The new hazard maps are also compared to the European Seismic Hazard Map 2020 (ESHM20). My main suggestion is to strengthen the results and align with the previous work for Sweden over 20 years ago by augmenting disaggregation. The line-by-line suggestions mainly deal with lesser issues.

We add disaggregation plots and respond in more detail to this issue below.

Abstract lines 10-11: “the high seismic activity on the post—glacial faults”: this is meant in the national context, but since the calculated ground motion for the 475-yr return period barely reaches the threshold of engineering interest, 0.05g, it would be better to rephrase the expression, the same with "relatively high hazard”

We agree that the seismic activity is not high in a global context. We have now rephrased the sentence as “This is in contrast to previous studies, which have not considered the relatively high seismic activity on the post-glacial faults. We also find the hazard to be relatively high along the northeast coast and in southwestern Sweden, whereas the southeast and the mountain region to the northwest have a relatively low hazard.”

1 Introduction

L37: in essence it is waste, the term "spent nuclear fuel” is also available

We take the suggestion on board and have modified the manuscript as follows : “For sensitive infrastructure sites such as nuclear power plants, repositories for spent nuclear-fuel, dams and mines, seismic hazard estimates are required and there is therefore a need to better define the hazard spatially, estimate potential ground motions and investigate associated uncertainties.”

2 Earthquake activity in Sweden

L77: "Areas of high seismic activity”, cf. above

We have rephrased the sentence as follows: “Areas of relatively high seismic activity include the southwestern part of Sweden across Lake Vänern, along the northeast coast and in the far north, see Figure 1.”

L85-86: How do you know there are Burtraesk earthquakes among the pre—instrumental data?

We know this from the FENCAT catalogue (Ahjos and Uski, 1992), which is a catalogue of earthquakes in northern Europe compiled from all the available historical publications, catalogues, studies and reports from the region. The epicentral coordinates of historical earthquakes (1375-1964) were either reported by the sources from which the data was obtained or were estimated from geographic maps and observation reports. The epicentre for macroseismic events was recorded as the centre of the area of perceptibility or at the site with the strongest intensity observed. Epicentral coordinates were derived from isoseismal maps in the case of detailed macroseismic studies.

-On L511 it is stated that macroseismic magnitudes have significant uncertainties. 4-4.5 does not appear that significant.

We have not studied the historical Burträsk events ourselves, but there was a ML 3.9 event in 1907 and a ML 4.4 event in 1909, where the macroseismic data probably is reasonably good. For earlier events in the Fencat the uncertainties are considered larger.

L90: The family name of the author is Muir Wood, not Wood.
The citation has been updated and appears in the text as follows : “a MS 5.6 event occurred in the waters between Sweden and Denmark (Muir Wood, 1989)”

3 Previous seismic hazard assessments for Sweden
L130—134: It seems that the most important previous hazard analysis for Sweden is by Wahlstroem and Gruenthal in the early 2005. They provided disaggregation, which is the main argument for also providing disaggregation plots in the present work. The current version of the manuscript will be strengthened in the results part. Disaggregation is a basic calculation to identify the earthquake scenarios that contribute the most to a specified exceedance probability of ground—motion levels. It will add to the value of the work.

A new figure has been added to the manuscript, similar to that provided by Wahlström and Gruenthal in their study. This figure plots the results of the disaggregation for two sites, one being the site at which W&G performed their disaggregation and the other being the site at which we estimate the hazard to be the highest. The text has been modified to reflect what is seen in the figure.

4.2 Seismic source areas
lines 152, 172, 208, 284, 285, 290 (possibly elsewhere as well): Seismic source area (SSA) is not commonly used in PSHA. I would suggest replacing it with seismic source zone (SSZ) throughout the manuscript.
The terminology has been updated throughout the manuscript.

4.4 Calculating recurrence parameters
L345—346: ”Although the first seismograph in Fennoscandia was installed in Sweden in 1904, the completeness magnitude of the catalogue has varied during the 20th century from about M4 to about M2.” The first part and the second part of the sentence do not resonate well.
We agree and the following changes have been made to the manuscript: “Estimating recurrence parameters is challenging in a low seismicity area like Fennoscandia, where larger earthquakes are rare and population density low. Very few events have been recorded prior to the installation of more sensitive seismic networks since the 1960s and 1970s. The

completeness magnitude of the national earthquake-catalogue has varied during the 20th century between about M4 to about M2."

4.6 Ground Motion Models
L392 (report Goulet et al. 2018) the article for the NGA—East suite of GMPEs has been published: Goulet CA, Bozorgnia Y, Kuehn N, Al Atik L, Youngs RR, Graves RW, Atkinson GM. NGA-East ground- motion characterization model part I: Summary of products and model development. Earthquake Spectra 37(51), 1231—1282, 2021. https://doi.org/10.1177/87552930211018723
The reference has been updated.

5.1 Seismic hazard maps for Sweden
L462: The input catalog spans 150 years according to Figure 3. How do the authors perceive the added value of the seismic hazard map with 2500-yr return period? Low exceedance probabilities imply rather high—magnitude earthquakes. Do you think the large earthquakes will occur in the areas with recurrent small earthquakes?

The 475-year and 2500-year hazard map were produced as they're the most commonly used. As with most global catalogues around the world with seismic instrumental records dating back to early 20th century, it is tricky to truly estimate the potential of the rarer less-frequent earthquakes. However, in our case, ruptures of magnitude 7 as recently as 700 years ago have been estimated to have occurred on the Stuoragurra fault in northern Norway by Olesen et al., 2021. We therefore consider it reasonable to include the 2500-year RP seismic hazard map.
It is difficult to comment with certainty on whether large earthquakes would occur in areas with recurrent small earthquakes, an issue that is common to all stable continental regions. We elaborate on this in the discussion section 6.3 of the manuscript.

5.2 Hazard curves for seismogenic areas
L477-480: Four sites were picked up to represent areas of enhanced seismicity within the territory, and hazard curves are presented for the four sites in Figure 9. Figure 1 shows five "sites of interest". What were the grounds for picking up the fifth site? It is located in an area with less seismicity than the other four sites.
The fifth site is Uppsala, which is part of a region where no relatively significant difference is seen between the ESHM20 results and our hazard estimates. This allows us to study the spread of the hazard curves, shown in Figure 7, and choose the right weights for the ground-motion model logic tree.
Combining feedback from below, Figure 1 is now modified and accounts for the issues raised by the reviewer here.

6 Discussion
L498 "high seismic hazard", cf. above
Modified as per suggestions by the reviewer to "The inference that the last 20 years of earthquake data in northern Sweden indicates that the area has relatively high seismic hazard is interesting in the light of recent work on the PGFs in the region."

Conclusions
L601-632: this is mostly more like a summary

We have now renamed the conclusions section to summary, to accurately reflect what lies therein.

Figures

Figure 1: add scale and/or coordinates to the map

Modified as per reviewer's suggestion.

The dashed black lines showing the Sorgenfrei—Tornquist etc. zones are very thin.

Modified as per reviewer's suggestion.

Caption: it is more conventional to separate the sites in the map and describe the symbols in the caption, what P, B, H, U, LV mean for instance.

Modified as per reviewer's suggestion, as described further above.

Figure 2: The blue dots should be explained in the figure caption.

Modified as per reviewer's suggestion. The caption now says "Tectonic source zonation scheme (A) and the area source zonation scheme (B) used in this study. The red line indicates a zone encompassing Sweden that is 300 km from the Swedish border or economic zone boundaries. Blue dots show the earthquakes. Numbers detail the zone numbers.".

Figure 3: L223 states that your base catalog begins in 1375, supposedly this applies to Sweden as well. Did you remove dependent events and homogenize magnitude for data from 1875 onwards only? Better to repeat the years in the caption, now it is stated that this is all the Swedish earthquake data.

The caption is now modified to account for the reviewer's concerns and says the following: "Magnitude-time density plot of the earthquakes recorded to have occurred in the Swedish economic zone since 1875 (Blue dots within the red zone in Figure \ref{fig:zones}) from the declustered and magnitude homogenized catalogue."

Figure 4: Coordinates are typically given on the figure frame. At least a scale should be provided.

Modified as per reviewer's suggestion.

Figure 6: Not all readers read the text from the beginning to the end, so writing more complete figure captions is an option to seriously consider throughout the manuscript.

Modified as per reviewer's suggestion.

We consider that the captions describe what is shown in the figures.

Figure 7 caption states that "solid lines show the mean": cannot discern any solid lines in the figure

This was erroneously stated previously and has now been modified as per reviewer's suggestion to say the following:"Mean hazard curves for Uppsala, Sweden, for different GMM implementations, see Section 4.6 for details. Yearly probability of exceedance versus PGA in g. Solid symbols show the mean, while the upper and lower dashed lines show the 0.84 and 0.16 fractiles."

Figure 8: When displaying the two maps parallel, it is not ideal that the darkest shade refers to lower ground motion than the shade used for the largest ground-motion values.

Using the same scale range for 475-year and 2500-year hazard maps makes interpreting the 475-year hazard map almost impossible. We therefore choose to continue using different scale bars for the two hazard maps instead, but have adjusted the range for the 2500-year map.

There are four figures with the figure number preceded by the letter A (A1 to A4). Are they meant to constitute an Appendix? No reference to an appendix can be found.
The first three A—figures are referred to in the text, but Figure A4 is not.
This is probably a formatting issue with LaTeX and the authors have added an appendix section heading to alleviate the reviewer’s concerns.

Figure A2: a more logical scale would be gray — blue - green - orange - red showing the largest clusters
Modified as per reviewer’s suggestion.

References
L837, L874, and others: BSSA abbreviation is misspelled: ”Seimol”
Modified as per reviewer’s suggestion.
L870: the author of this article is R. Muir Wood, not R. M. Wood, cf. L90
Modified as per reviewer’s suggestion.