Author Response to Reviewers for egusphere-2022-1064
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Reviewer 2:

The manuscript of Schneider et al. addresses the problem of the correct representation of seismic hazard models, to give the public the right information on the hazard levels at the various sites. The problem is deeply felt by those who produce seismic hazard models and I find it is important that it is tackled in rigorous scientific terms. I'm talking as a researcher involved in seismic hazard model elaborations and in their dissemination and the reading of the manuscript was very pleasant and flowing.

The work is very well organized and reaches the result after very serious analyses, also including tests with possible users.

I believe the manuscript can be published with sligthly revisions.

Regarding the detail of the structure of the article, I find the bibliographic research on the choice of the right colors very interesting, based on studies also carried out in different disciplinary fields.

I have no critical observations to make about the manuscript, except the constant reference to the criteria defined in sections 1 and 2, which require you to scroll back and forth through the pages.

We thank the reviewer.

What in my opinion needs an explanation to the reader, for the work to be usable in other countries as well, is the problem of the limited number of classes and the definition of class intervals. The German model proposes very low values, if compared with those of other European nations. In Italy the map with 10% of probability of excess reaches 3 m/s2, double the maximum value in Germany. In Greece and Turkey there are higher values. If we then take into consideration estimates of 2% in 50 years or estimates of spectral accelerations, the values are much higher, even up to 20 m/s2, an order of magnitude higher. Since the authors never mention this issue, I would like to know if the authors plan to use for any output the same color palette and modify the classes, or to add more classes; in the first case it would be impossible to compare maps for different return periods or for different spectral periods and the information that there are higher values in one map than in another would be lost. I think this information will be useful for many future users of the method, myself included.

We agree with the reviewer's argument that different regions would require different classifications. To answer the reviewer's question (do we "plan to use for any output the same color palette and modify the classes, or to add more classes"?): we do not propose to use the same color palette for a different seismic region or map. Rather, we propose to select a classification scheme using the three criteria given in lines 269-274 and a corresponding color palette using the five criteria given in lines 205-212. The point of our method is that, following

these criteria for selecting classifications and colors, map designers can create maps to fit the patterns of hazard in their map.

Another question is whether the 3 classes used for values lower than 0.4 m/s2 are not too many, to the detriment of a higher resolution of the higher values, for which I personally would prefer a greater number of classes. Personally, I am convinced that up to 10-12 classes are better for covering wider range of values.

We understand the reviewer's argument that "three classes used for values lower than 0.4 m/s2 [may be] too many." The motivation behind this choice, as described in Section 3.2, was to appropriately communicate the dynamics in the "lower" region of seismic hazard (or areas with hazard < 0.4 m/s2). We discuss in the manuscript (lines 313-318) our experimentation with different classification schemes, which included 5-9 total classes, split in several ways between the "lower" and "higher" parts of the distribution. We explain that our classification scheme was chosen because it was the smallest number of classes in each part that sufficiently communicated the spatial patterns of hazard across Germany, which corresponds to criteria L2. That is, three classes was judged to be the smallest number needed to show the patterns within the "lower" zones of seismic hazard in Germany. Having more classes (i.e., in the "higher" part of the distribution) would be possible, but violates the numerous research articles that conclude that humans have difficulty discriminating many colors off maps (e.g., Padilla et al (2016); Cöltekin et al. (2017); Miller 1956; MacDonald 1999). There is a lack of research on what the ideal number should be and so we have posited that it should be based on using only so many classes as can completely convey the important patterns in the data (leading to criterion L2). This is described in detail in lines 228-235.

Figure 3b has a different legend than those reported in the supplement as Figure S2. Maybe I misunderstood the caption of figure 3?

We thank the reviewer for noticing this discrepancy and will update the legend in Figure S2. Figure 3b has the correct legend.