

Interactive comment on “From mapped faults to earthquake magnitude: A test on Italy with methodological implications” by Fabio Trippetta et al.

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I welcome the comments by Referee 1 and thank him/her for the time spent on this manuscript. Together with my co-authors, I will soon respond point-by-point to each comments. We will surely consider these comments to improve the manuscript.

A first reply is however necessary. The Referee’s comments seem strongly influenced by an initial misunderstanding. The Referee states: “the manuscript does not represent a substantial contribution to scientific progress in seismic hazard assessment and seismic risk reduction, as required by a high-level Journal as Solid Earth ... with consequently a poor scientific significance of the manuscript.”

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I would like to acknowledge that this is not at all a contribution to seismic hazard assessment and seismic risk reduction.

At the end of the Introduction we state: “We anticipate that, with this work, we do not intend to propose an alternative method for seismic hazard assessment or to better previous methods (e.g., Giardini, 1999; Jiménez et al., 2001; Michetti et al., 2005; Field et al., 2009, 2015; Reicherter et al., 2009). Our main aim is to test whether solely considering the known mapped faults (both active, inactive, and undetermined) and disregarding further information (e.g., historically- and instrumentally-recorded earthquakes as well as the regional stress field and strain rate) it is possible to provide, through existing seismic scaling laws of faults and earthquakes, reasonable assessments of the maximum possible earthquake magnitude over an entire nation. The resulting (assessed) magnitudes (PEMM) are compared (i.e., the mathematical difference) with catalogued earthquake magnitudes that are the only existing points of reference against which assessed magnitudes can be compared.”

In other words, our work is a test (novel for the scale and mode of application) on the empirical scaling relationships between fault size and earthquake magnitude at the national scale (Wells and Coppersmith and subsequent modifications/improvements by Leonard). The scientific relevance of this test is quantitatively provided by the number of present citations received by the paper by Wells and Coppersmith (1994): at present, on ISI Thomson Web of Science, this number reaches almost 3,500 (i.e. about 140 citations per year). I deem therefore that testing these empirical scaling relationships at the national scale on a very seismic country like Italy is scientifically significant.

Seismic hazard is defined as the probability that an earthquake will occur in a given geographic area, within a given window of time, and with ground motion intensity exceeding a given threshold. Simply, this is not the aim of our work.

Seismic risk refers to the risk of damage from earthquake to a building, system, or other entity. Seismic risk has been defined, for most management purposes, as the

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potential economic, social and environmental consequences of hazardous events that may occur in a specified period of time. Also in this case, seismic risk and its reduction are simply not the subject of our paper.

I reaffirm that “Our main aim is to test whether solely considering the known mapped faults (both active, inactive, and undetermined) and disregarding further information (e.g., historically- and instrumentally-recorded earthquakes as well as the regional stress field and strain rate) it is possible to provide, through existing seismic scaling laws of faults and earthquakes, reasonable assessments of the maximum possible earthquake magnitude over an entire nation.”

Concerning the used database of faults, I fear that also in this case there may be a misunderstanding. The used database is not the one of Fig. 5 (which contains only the longest fault for each square cell). The fault database is the one of Fig. 2 and the database is publicly available at this link (external repository): <http://pmd.gfz-potsdam.de/panmetaworks/review/924b171fd21c78f295d58a7e9e321e8ad07667ab6201634>

I thank again the Referee for his/her constructive comments. We will soon respond in more detail and try to do our best to follow his/her indications to improve our manuscript.

Sincerely

Andrea Billi

Interactive comment on Solid Earth Discuss., <https://doi.org/10.5194/se-2018-98>, 2018.