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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Transposing an active fault database into a seismic hazard fault model for nuclear facilities – Part A: Building a database of potentially active faults (BDFA) for metropolitan France" *by* Hervé Jomard et al.

Anonymous Referee #2

Received and published: 25 May 2017

The paper presents a database of potentially active faults for SHA applications in metropolitan France, close to nuclear facilities. A seismogenic source model is obtained from the database for the French Upper Rhine Graben.

The work is very technical, with fault data mostly compiled from the literature. It is impossible for me to go into the details of each individual fault and check if all the data have been adequately taken into consideration. I assume that the Authors have adequately taken in consideration all the existing data. It is clear that a huge work is behind the compilation and homogenization of a database such as that presented here. I think

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it is appropriate to publish the database in a scientific journal such as NHESS, provided that the following comments are considered. A number of comments/suggestions are annotated in the attached files.

The manuscript is rather well organized and clearly understandable. Nevertheless, a careful reading from an English mother tongue is necessary. I have found several errors and some sentences should be written in a more formal way.

COMMENTS/SUGGESTIONS ON THE MANUSCRIPT:

1) Segmentation – In earthquake geology, the term “segment” often has a behavioural meaning (i.e., earthquake segment). In this paper the faults are divided in (fault) “segments” exclusively on the basis of static geologic criteria (structural, geometric) defined a priori. It is quite clear to me, but I suggest to state this concept more clearly in the manuscript. In section 4, the fault segments correspond to individual seismogenic sources. Therefore, it is assumed that the static geologic discontinuities used for segmenting the faults correspond to earthquake segment boundaries. Also this assumption should be clearly stated.

I also suggest to add an explicative figure in subsection 3.1 illustrating schematically your segmentation criteria and defining the different typologies of fault sections belonging to a segment (M, P, OB, OX). I suggest the use of the term “typology” (as within the table and .kmz file) rather than family. The term “fault system” is used only in the main text. In the electronic supplement it is used simply “fault”. I suggest to use simply “fault”, if possible. In general, please avoid different terms between main text and electronic supplements. I see this problem also with other terms/parameters (e.g., parameters entering in the RI calculation), please check throughout.

Angular variations and segmentation: variations of 15° are quite small. I have no instruments to objectively criticize your choice, but I feel that this variation might be too small for justifying segmentation. Moreover, I suspect that you did not respect this criterion rigorously for all the faults. For example, in the Rhine Graben, there are faults having

bends larger than 15° without internal segmentations (Faille des Vosges", "Faille de la Forêt Noire 2", "Rampe de Ferrette", ...). Tip distance: did you use the same criterion also for step overs? In step overs, the tip distance should be considered together with fault separation. In fact, tip distance might be large, but separation very short, making segmentation questionable. Moreover, I have found several fault segments that do not respect the 1 km-distance criterion (segment tips closer than 1 km).

2) Active vs inactive faults, age and slip rates – The choice of the database is to consider as potentially active all the faults with evidence of activity since Late Miocene. This choice is motivated by the intracontinental, low-strain rate seismotectonic context, the poor knowledge of active faults and the high criticality of the exposed facilities. Please, be sure that the "syn to post Late Miocene" criterion is respected consistently throughout the paper and, most importantly, in the database. In places, the authors write Miocene (e.g., key to figure 1; .kmz file), in places the entire Neogene or even Paleogene are mentioned (Age parameter in RI calculation at pag. 7). I see that often Late Miocene faults are not isolated, but occur within systems, together with neighbour or aligned faults of younger age (Pliocene or Quaternary), suggesting that the Late Miocene evidence is due to the impossibility of documenting younger activity, for several reasons (lack of sediments, lack of dating, etc). If this is one of the reasons to extend the time window so far back in time (ca. 11 Ma), I suggest to discuss this point in the manuscript.

"UCHR: Undeformed CHronostratigraphic Unit. Local terminology indicating the most recent chronostratigraphic units not involved by faulting" – In order to bracket the age of the tectonic event, you should give the age of the oldest unfaulted/undeformed unit, not the youngest.

3) Source model for the Upper Rhine Graben – The source model in Fig. 4 b appears to me very coarse. For example, the width of the FR and FFN sources is not constant, and the lower tip line is not parallel to the fault trace. Their width is too narrow, also for a dip of 70° (should be 5.5 to 7.3 km-wide, for 15 to 20 km-thick seismogenic layer,

respectively). Perhaps, it is only a graphical problem, but must be solved. Moreover, I do not understand why the true (?) dip of the faults is not considered, and a 70° dip is assumed. I cannot see the geometrical problems described at page 10, lines 5-9. According to my calculations, the width of FR and FFN should vary between 13-17 km (50° dip; considering that 40° dip could be restricted to only the shallowest pat, as suggested) and 9-12 km (60° dip). FR and FFN should not intersect. Possible geometrical "problems" between FR and FRO depend on the choice of the dip and depth, but do not seem too serious.

4) Conclusions – I suggest to add a few sentences on future directions.

COMMENTS/SUGGESTIONS ON THE ELECTRONIC SUPPLEMENTS:

5) Please, add a Readme file explaining the content of the supplementary material.

6) References on the faults are missing. You must add the reference key on the .kmz file and provide a complete reference list in a separate file.

7) In the .kmz file, there are several white fault traces that are neither characterized nor described. Please, describe or remove.

8) I strongly recommend to translate all the information in English (including observations and Tectonic_geomorphology), or at least start doing this for the next updating.

9) In the .kmz file, there are several points. What are those? Punctual data acquired by the authors? Please explain in the main text and add to the legend, or remove.

Other comments are annotated in the attached file (Jomard_Annex_BDFA_TABLES_with-comments.xlsx).

Please also note the supplement to this comment:
http://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2017-96/nhess-2017-96-RC2-supplement.zip

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