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Interactive comment on "Transposing an active fault database into a fault-based seismic hazard assessment for Nuclear facilities. Part B: Impact of fault parameter uncertainties on a site-specific PSHA exercise in the Upper Rhine Graben, Eastern France" *by* Thomas Chartier et al.

Anonymous Referee #1

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Revisione paper: Transposing an active fault database into a fault-based seismic hazard assessment for Nuclear facilities. Part B: Impact of fault parameter uncertainties on a site-specific PSHA exercise in the Upper Rhine Graben, Eastern France by Chartier et al.

In general the manuscript is simple and it cited too many times the companion paper (Part A, submitted to the same special volume by Jomard et al.). Part A describes the transformation of an active fault database in a fault-based seismic hazard model,

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Discussion paper

Part B explore the impact of the fault parameter uncertainties in the estimate of the hazard. Even if I did not read in detail the companion paper, in my opinion the two manuscript could be merged in a single, more robust and interesting paper. But this decision pertains to the editor. The main goal of the manuscript is to describe how the determination of the parameters of the active faults can modify the seismic hazard for long return period. So, it's almost surprising that the first comparison proposed is between 4 GMPEs, not the most recent GMPEs available in literature (probably authors used those GMPEs implemented in CRISIS software). In my opinion the adoption of several GMPEs could be source of confusion for the readers with the respect to the impact of the geological information.

About single points in the paper, my remarks are the following: - Page 2, row 20; for the use of background sources and fault sources in fault-based approach some reference to application in PSHA could be useful for users; - page 3, row 2; in the sentence "The maximum possible magnitude that each fault segment can release is then determined based on the mean value given by the Wells and Coppersmith (1994) empirical scaling relationship" is not clear what is the mean value since they have one area value for each fault and a single slip type; the authors mean the value proposed by the regression without considering the standard deviation? - Page 4, row 1; I don't agree with the sentence "the MFD is defined between a value Mmin below which earthquakes are considered as non-damaging. . ."; the seismic hazard is not only for defining damaging levels that moreover depend on vulnerability, not only on magnitude; - Page 4, row 28; "These equation use different distance metrics"; I would like know how the authors handled this very important aspect for the computation. Are the distance metrics managed by the software or the authors had to modify some parameter that describes the fault geometry? - Page 5, row 2; "The UHS hazard level strongly depends on the GMPE used". This is a well known issue (even if the hazard depends on all the parameters, for the faults-based models depends strongly on the maximum magnitude for long return periods), but not confirmed by your exercise: in figure 7 you show that the uncertainty related to the slip rates is comparable (if not greater) to that relate to GMPEs. - Page

5, row 5; “PGA dispersions differ from one GMPE to the other due to their different sensitivities to the parameters explored, in particular the geometry of the faults”. As for a previous comment, the problem is the geometry of the faults or the distance metrics adopted by the GMPEs? - Page 5, rows 12-20; the comments of the disaggregation plots by the authors is about the faults’ contribution to the large return period estimates. The contribution comes from the large magnitudes, that in your model is modeled with faults, but the result is not different by using area sources; - Page 5, section 5 Sensitivity study; You start with “In order to quantify” but not for all parameters is presented a quantification; - Page 6, row 4; the sentence “The reduction of the fault dip leads to a 10 to 15% increase of the UHS” is not consistent with the result presented in figure 5c, where higher UHS are for bigger dip. Probably in figure 5c the legend is wrong. - Table 1; the maximum magnitude derives form rupture area, but the table reports the length. Can you explain why FR3 and FFN3 faults have the same Mmax (6.3) with a so different length? - Figure 1; the logic tree scheme is not clear with the graphics you adopted; - Figure 2, 4, 5; the figures are made by panels with letters a), b), etc. The letters are not report in the captions, but I think that the letters will help the reader;

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