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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "CCAF-DB: The Caribbean and Central American Active Fault Database" *by* Richard Styron et al.

Richard Styron et al.

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0.1 Reviewer C

(C1): *General comments: This discussion paper describes a database of ~250 active faults recently released on GitHub. After the introduction, the authors describe clearly and in exhaustive manner the purpose, mapping methods, assignment of attributes, and data format of the database. Then, the authors, after a short overview of regional faulting, describe the database, dividing it in several areas, such as Central America, Middle America Trench, Lesser Antilles and so on. Overall, the discussion paper is well written and organized, and the number of figures is appropriate. The purposes of the database compiled by the authors range from seismic hazard analysis, to earthquake*

and tectonic research, to educational and general interest, in order of decreasing importance, as written by authors (page 3 line 2-3). Even if I am not an expert of active faults and tectonics of Central America, the database seems to be up do date. Anyway, due to the nature of the database, a public and open-source one,this is not a crucial issue; the database can be updated when important information about new active faults is published or if important information are missed.

(C2): *Instead, from a seismic hazard modeller point of view, the database seems to be lacked of some crucial parameters, such as the seismogenic thickness. In my opinion, a database like this one must be ready for any kind of seismic hazard calculation, it is the geologist that compiles a database and gives the "numbers" to the hazard modeller and not vice versa.*

This is a very valid point and one that we discussed internally several times. In the end, we decided that it is important to maintain a clean separation between data/observables and estimates/modeling decisions. We do not want to include estimates or modeling decisions in the database because they can and will be incorporated into other compilations or studies and treated as observations (though they are not). Reviewer B agrees with this stance (see (B2d) and the response).

(C3): *So, the following improvements (specific comments) are required before to consider it for publication. Specific comments:*

(C4): *1) Give information about the seismogenic thickness, how we can compute the area of the source without this parameter? And, where are the upper and lower of the seismogenic thickness? Can these sources break the surface? Or they are blind faults? In my opinion, this is a key parameter that is not listed in this database and this information is mandatory for each fault-based PSHA and also in OpenQuake.*

This is a very difficult parameter to estimate and it was not possible for us to do so through our data compilation. It is often assigned regionally, and not specifically to individual faults through observation. In our CCARA project, we chose to use a mixture

of using earthquake scaling relationships based on the fault's size and aspect ratio, and the vertical distribution of seismicity in the region, to set this parameter. This is completely a modeling decision, not an observable.

No changes.

(C5a): *) Slip rate maybe is the most important parameter in any fault-based PSHA. I know that probably it is also the most difficult parameter to estimate but I think that adding some additional information is mandatory.*

In our experience compiling slip rates, it is unfortunately common for an estimate to be later treated like data. Therefore we do not want to run this risk. What to do in the absence of data is indeed a modeler's decision though consultation of a geologist or geodesist may be required.

No changes.

(C5b): *Can you add some additional information such as the number of faults in the database with at least one value of slip rate? Where are they come from? Geodesy, geology; are they long-term values?*

We are clear in the text where slip rates are derived from in the discussion of each structure or region. It is not always clear-cut enough to give a geologic rate or a geodetic rate, and even so geologic rates can vary greatly and encompass a wide range of timescales (i.e. paleoseismology to neotectonic to bedrock studies: a thousand to ten million years). In geodetic block modeling studies, furthermore, it is possible to fix some of the block boundaries based on a prior geologic slip rate. Therefore we did not chose to distinguish between these methods in the database itself–interested readers may consult the journal article for the discussion.

We have added a short discussion of slip rates throughout the database, as well as a figure that illustrates their distributions for each fault type.

(C5c): *Moreover, can you give at least an estimate value for those faults without a*

value? For example a wide range 5 - 10 mm/yr? In order to allow the modeller to use a mean value of the slip rate (that's better than nothing!).

It is important, but it can be worse than nothing if our estimates end up being treated like data later on–this is a violation of the scientific process. We did estimate these values internally for the CCARA PSHA project and the estimation process did not inspire enough confidence in the results that we felt we should publish them alongside the data (but for a PSHA it was necessary, as Reviewer C has written!).

(C6): *3) Typos, comments on the figures, and other minor required changes are highlighted in the attached pdf.*

These have been changed as appropriate considering the discussion above re: estimation.

Additionally, a few structures which are offshore and/or far from the major regions are not individually shown in figures, as requested in these comments. We would have had to reduce the scale of some of the figures or make additional figures; neither of these options is worth it as these structures are not of major significance.

A few other minor suggestions have not been changed. For example, in the figures, geographic locations are given in a different font than faults, and therefore we use an acronym for the names only when it improves clarity in the map, rather than as a means of distinguishing between locations and faults.

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