Nat. Hazards Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/nhess-2019-46-AC2, 2019

Natural Hazards and Earth System Sciences
Discussions
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EGU

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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Received and published: 5 November 2019

0.1 Reviewer B (Julian Garcia-Mayordomo)

(B1a): *It is a very interesting paper describing an active faults database created in the frame of the GEM foundation for the assessment of seismic risk in the Caribbean and Central America. Particularly interesting are the comprehensive descriptions of the active faulting represented along the borders of the plate, missing only the South American border of the Caribbean plate (Venezuela-Colombia) - which I think belongs to a different GEM project called SARA. The first part of the paper describes very clearly the structure and fields of the database and the criteria used to populate it. The database is accessible as complementary material. The second part of the paper*

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Discussion paper

describes the main active faults for areas to a good detail –considering the scale of the work, and very useful information is provide for seismic hazard modellers. Particularly interesting are the discussion on certain slip rate values or even about the Quaternary activity of specific faults, which can provide useful guidance to analysist in a an attempt to capture epistemic uncertainty in PSHA. I think this paper would definitely become a reference for seismic hazard and risk studies in this region.

Yes, the faults in South America are part of the SARA project, as cited in the text (e.g., the caption to Figure 1.)

(B2a): *The paper deserves publication in the journal, although I have few minor concerns that I think could potentially improve even further the quality of the paper, these are:*

(B2b): *A figure illustrating the distribution of some key data in the database would be very much appreciated by the reader. Histograms, for example, showing the distribution of faults vs. slip rate, kinematics, or activity confidence, or exposure quality,... will provide a good overall idea of the contents database in just one look.*

We have added a figure and a few paragraphs of information to the Discussion section.

(B2c): *I believe there is a minimum fault length cut off in the database. If that is right and positive, please, provide the figure in the paper.*

We have added a discussion of this point to the section on mapping:

> In general, faults below 10 km length are not included individually; these may be segments of an anastomosing system and then are therefore mapped continuously if possible, or if they are more isolated they are not included unless of special significance (i.e., very prominent in the landscape or close to a major city.)

(B2d): *The paper does not talk at all about fault seismic parameters (eg, Mw, recur-*

rence,. . .). I believe it would be good to clarify at some point in the manuscript (in the Introduction section for example) that the estimation of these parameters (very much needed in PSHA) are not treated in the paper, and that these values depend actually on the analyst/modeller's decision about the fault-hazard model to be used in the probabilistic calculations (an issue that is out of the paper's scope).

This is a very important point, and was the dominant concern of Reviewer C. We are in agreement with Reviewer B here that these are to be decided by the analyst/modeler if they are not directly observed. To clarify this, we have added a subsection to the database description:

> The CCAF-DB is intended to be used for seismic hazard analysis in the region, and is used by GEM for this purpose in the CCARA project. However, the creation of a fault source characterization for a PSHA model requires more information than is released in this database, and which we do not wish to release with the database. These are primarily characteristics of faults which are not direct observables, either in principle or in the practice of this data compilation; therefore these are effectively modeling decisions to be made by those performing the hazard analysis. For example, the maximum magnitude and magnitude-frequency distribution for each fault may not be directly observed. The upper and lower seismogenic depths are also very hard to constrain, especially in a compilation such as this, and the few constraints from geodesy are often subject to great uncertainty. Similarly, when information on a fault's slip rate is not available, this quantity must be estimated in the absence of strong data constraints, or the fault must be left out of the PSHA model. Because we do not wish to make these decisions for others, and we do not wish to risk the confusion of our estimates for data, we are not including this information in the public database.

(B2e): *A figure showing a seismicity map of the whole working area would be very*

illustrative. This figure could be part A of current figure 1 (and that one figure B, for instance).

Because seismicity is shown in detail in each of the regional figures, it's not necessary to show it in a separate figure. Additionally, our experiments with making one show that it's a A seismicity map of the entire region mostly outlines the Caribbean plate with earthquakes, which are too small and densely plotted to be easy to read (for example it's hard to make out focal mechansisms if they're scaled so that the largest don't cover a huge area).

No changes.

(B2f): *Figure 2, cite properly the source Global Centroid Moment Tensor catalog... (I)f would be desirable to add an additional scale in the figure showing the size of the earthquakes (Mw) against the radii of the "beach balls". As it looks know it is impossible to know the Mw of the earthquakes represented on the map, farther than their relative size.*

The GCMT catalog has now been cited. Unfortunately, it is not straightforward to make a scale for the beachballs, because I have displayed them in QGIS using a customized setup that filters and scales events differently at different zoom levels. It would take me a full day or two of work in order to do this for each figure, and I would have to add the scale to each figure. If this paper was about the earthquakes it would be worth it, but because the paper isn't about that, I don't think it's worth the effort.

(B3): *Page 2,Line 4: .. for use as fault sources for PSHA... I'm not sure this statement is completely right as a fault source in PSHA needs certainly more data than the one showed in the database (for example, maximum magnitude). You could say... for incorporating fault data in the seismogenic source model of the are...*

We have changed the sentence to read:

> ...which is used to create fault sources for probabilistic seismic hazard

analysis (PSHA).

(B4): *Page 2, Line 19: I think the final of the phrase is missing.*

This has been fixed.

(B5): *Page 3, line 15: Something is missing in the phrase. . . All the faults should be considered interpretation of both structures. . . (Which both structures?)*

We have clarified this to read:

> All faults should be considered interpretation of structures as described in the literature as well as structures expressed in topographic, seismological, geodetic and remote sensing data

(B6): *Page 4, line 24: change catalog for earthquake catalog*

This is a reference to the completeness of the fault catalog (this contribution) not any earthquake catalog. We have clarified this.

(B7): *Page 9, line24. Correct distributed*

Fixed.

(B8): *Page 15, line 32. Cite properly INETER catalog*

I haven't been able to find a proper citation or reference point for the seismic catalogs with these data on the INETER website; therefore I refered to my MS thesis in which I had compiled and plotted the data 10 years ago.

I have updated the paper to read:

> Seismicity from the Nicaraguan Institute of Terretorial Studies (INETER) catalog (compiled by Styron (2008) from the INETER website,

https://www.ineter.gob.ni, last accessed in early 2008; this data is no longer available at the original source) is less continuous along the arc than in the Marabios range.

(B9): *Page 16,line 33: I don't see the point of the phrase: It is unclear what the maximum size... It seems to me out of context or misplaced*

The context (which seems obvious to us) is that because faults are small and distributed at the surface, they can't be directly used to estimate Mmax of seismicity as is done in a fault-based PSHA.

No changes.

(B10): *page 17, line 23: There is something wrong here, I think the "though minor..." should not be after the ;*

The sentence is correct as written. The 'though minor' description refers to the amount of obliquity, which is the subject of that sentence clause.

No changes.

(B11): *page 25, line 14.I think the phrase misses "input" right at the end of it*

I don't think I understand what this suggestion refers to; the sentence reads correctly to me.

No changes.

(B12): *Spanish words: please, make sure that all the Spanish words are correctly accentuated across the paper, particularly in the Conclusions section (Panamá, San José,...). Check the correct accentuation of Cofradía across the paper. El Salvador is misspelled in the Conclusions section. Correct Costeña in figure's 6 foot.*

These have been fixed to the best of my proofreading.

(B13): *Capital letter in figure's 5 foot. Correct Cofradía*

Fixed.

(B14): *FIGURES - I think the fault traces would stand out clearer in the figures (maps) if the DTMs were gray/shadows, instead of colour scaled. The same for the "urban areas",they would appear much clearer if the DTM is grey. A coast line would look good as well.*

We have changed the color of the urban areas to orange, which may stand out better, and added coastlines to all figures.. We have experimented with just a hillshade (greyscale) instead of a DTM colored by elevation and a hillshade, and prefer the latter because it's easier to identify familiar or prominent topographic features and therefore to locate structures.

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