Solid Earth Discussions

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Reply on RC2

Abeer Al-Ashkar et al.

Author comment on "Tectonic Geomorphology and Paleoseismology of the Sharkhai fault: a new source of seismic hazard for Ulaanbaatar (Mongolia)" by Abeer Al-Ashkar et al., Solid Earth Discuss., https://doi.org/10.5194/se-2021-91-AC2, 2022

Dear Laurent Bollinger,

We start with our best wishes for 2022 and good health.

All the co-authors thanks you very much for your detailed review of our submitted paper about Sharkhai fault, the propositions of correction and the comments that allowed us to improve our first submission.

Here under, you will find our answers to each of your comment. There is no opposition and we agree with them.

Comments

1 - Part 1 Introduction and context :

I find the introduction not well structured. Indeed, in my opinion, the succession of paragraphs from line 50 to the end of the introduction go too much back and forth (e.g. from paragraph line 50 : Ulanbaatar exposure to earthquakes, then active faults, then geology, the Ulanbaatar exposure and risk, then the targetted faults

I suggest either :

-to separate the general introduction from the local seismotectonic setting.

-or to change the order of the paragraphs of the present introduction so that the succession go less back and forth

Answer: The introduction has been reconstructed to be more linear and clearer.

2 - Table 1 :

You estimated 7 cumulative offsets of geomorphic features along the fault, and found that two fall around 57 meters and three around 35 meters. I think that a discussion regarding whether the geomorphic features offset by these quantities could be related (or not) with

a specific climatic events would enrich your work.

Answer: The rates of deformation are first estimates associated with too large uncertainties to be correlated with climatic events. We nevertheless added a complement in the text for the two "groups" of cumulative offsets.

3 - Line 289-290 and Figure 15g

The geological units logged in the trench are well described in the text. However, a point remains unclear to me : several faults are mapped as possibly affecting the base of Unit U11 (red dashed line on figure 15g). In the meantime the text mentions that « Between 0 and 3m and between 5 and 7.5m all ruptures terminate at the top of U30 and are truncated by the upper erosion surface« (see line 289-291). This is either not coherent, or the text do not sufficiently expose the observations and their uncertainties.

Answer: The phrases are corrected, Between 0 and 3m the ruptures truncated actually the unit U11, So they are considered MRE.

minor blemishes and technical corrections

Introduction :

4 - Line 32 : why opposing strike slip and uplift ? structure and motion ? replace by « numerous strike slip structures and minor thrust or normal faults … «

Answer: We agree and include your proposition.

5 - Paragraph around line 55 : Figure 2 should be referred in that paragraph, before introducing the local fault names.

Answer: We agree and include your proposition

6 - Figure 2 : Gunj fault is missing on this figure. The kinematics associated to Avdar and Sharkai fault are missing

Answer: We agree and include your proposition

7 - Paragraph 85 : about 1.5 million in the capital of 3.2 million : unclear, rephrase Line 86 : insert 'airport' in « replacing the actual 'airport' too short and now too close to the city »

Answer: We agree and include your proposition

8 - Line 91 : suppress « , which shows clear evidence for a major seismic activity » or

replace it with something less strong. It is still the introduction and you already mention your results are clear and strong. The reader will make is own opinion.

Answer: We agree and include your proposition

9 - Line 97 : with 2 earthquakes, it is difficult to speak about a « recurrence time ». An « interevent time between the penultimate and latest earthquake » is more appropriate.

Answer: We agree and include your proposition

10 - Line 102 : you mention the « very well-expressed geology » but I missed a description of the lithological nature of the bedrock along strike. Could be helpfull to understand the along strike variations of morphology of the two compartments of the fault.

Answer: The lithological nature of the bedrock along strike has not been analyzed in this work dedicated to the activity of the fault and not to geological context. We did not add such a work despite the fact that we agree with the reviewer that it could be a complementary work for the description of the area.

11 - Line 124 : replace « the « large extensional step-over, by « a » large….

Answer: We agree and include your proposition

12 - Line 148 « limiting possible records of displacement » : rephrase

Answer: We agree and include your proposition

13 - Table 1 : Specify the GPS location (in geographic) of P1 to P7 , as well as the location of the trench

Answer: We agree and include your proposition

14 - Table 2 (and the text) We miss an information about where the samples were sent (which laboratory ?), what was their lab number (this table could also present their Delta 13C, and recall that the radiocarbon age were determined on bulk sediments)etc .

Answer: We agree and include your proposition

15 - Line 220 : Could you be more specific about the nature of the massive Carboniferous

bedrock ?

Answer: We agree and include your proposition

16 - Indeed, in your introduction, you mention that the lithologies exposed in the region's carboniferous rocks comprise sandstone, mudstone, conglomerates … but I found no mention to what was found in the field along strike Sharkai fault and in the trench.

Answer: Same answer as for the similar question at line 102: The lithological nature of the bedrock along strike has not been analyzed in this work dedicated to the activity of the fault and not to geological context. We did not add such a work despite the fact that we agree with the reviewer that it could be a complementary work for the description of the area.

17 - Line 257 : suppress « both »

Answer: We agree and include your proposition

18 - Line 279-280 : suppress the parenthesis after 15 b-e , replace 14g by 15g

Answer: We agree and include your proposition

Data and ressources

19 - I suggest adding information on the radiocarbon dating (which lab ?) within that section.

I suggest listing the date of acquisition of the images that were used in the study (at least the date of acquisition of the images illustrating Figures 5-7-8-9-10-11-12.

Answer: We agree and include your proposition

%References :

20 - I noticed that some recent references (post 2018) on faults in UB vicinity and central Mongolia are missing probably because your study took place years before the most recent works published was undertook. Updating the bibliography with recent references will make your paper more exhaustive and up-to-date.

Answer: We agree and include your proposition

21 - Line 512 : Replace Reimer, P : by Reimer, P et al., …

Answer: We agree and include your proposition

Thank you again for the review.

With kind regards

Co-authors