

Solid Earth Discuss., author comment AC2
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Reply on RC2

Chao Deng et al.

Author comment on "Impact of basement thrust faults on low-angle normal faults and rift basin evolution: a case study in the Enping sag, Pearl River Basin" by Chao Deng et al., Solid Earth Discuss., <https://doi.org/10.5194/se-2021-92-AC2>, 2021

Dear Daniele,

Many thanks for your comments on the manuscript, and I think they are very good for improving it. Following is my reply to your questions.

- Geological framework: in section 2 (lines 88-100) the Authors describe three rifting events but then only two are reported in figure 2, with the collisional phase that overlaps with the older rifting event described in the text. Therefore, the Episode 1 reported in the figure (Early Eocene) does not correspond to the Episode 1 reported in the text (Late Cretaceous-Early Eocene). I suggest the Authors to amend rift names as this may create some confusion.

I agree with the reviewers that the rifting episodes in the description is confusing, which have also been mentioned by the first reviewer. I will change the name in the revision.

- Results description: section 4 provides detailed description of observed faults but some parts are slightly mixed with interpretations (e.g., lines 171-184). I would try to keep separated description and interpretations as much as possible and I therefore invite the Authors to consider if these latter may be moved to a separated section.

I understand your point of separating description from interpretation, so I put the interpretation of the basement structures in a separated section, lines 171-184, after the description of their geometries. I think it is OK to put it in the present place because it is the only part about the intrabasement structure in the manuscript.

- High-angle and low-angle faults definition: the Authors state that "rift-related faults can be divided into low-angle (<30° dip) and high-angle (>30° dip)" but seismic sections are shown in TWT. I therefore wonder what do angles mean, as sections do not appear depth-migrated and fault may therefore bear a different inclination in reality. I therefore invite the Authors to clarify this aspect and to detail how fault angles were measured in the Method section of the manuscript.

The angle of fault means the dip. We do not measure the exact dip of the faults in seismic sections as they are shown in TWT as you mentioned. However, we are able to know the relative dip of those faults. For example, the cover faults or minor faults developing in the post-rift strata should be dipping at $\sim 60^\circ$, so we stretch and compress the sections to let them be approximately dipping at 60° in cross-section, which appear similar to the sections of depth-migrated. In that way, it is reasonable to determine whether other faults are high-angle or low-angle.

- The Authors have the possibility to measure fault throws and lengths, and in fact they produce T-x plot for a target fault (F1) and T-z profiles for faults F4, F5, F8. The following is not a strict request (Author's interpretations are already well supported), but I wonder if log-log D-L plots (see e.g. Rotevatn, A., Jackson, C.A.L., Tvedt, A.B., Bell, R.E., Blækkan, I., 2019. How do normal faults grow? *J. Struct. Geol.* 125, 174–184. <https://doi.org/10.1016/j.jsg.2018.08.005> or Walsh, J.J., Nicol, A., Childs, C., 2002. An alternative model for the growth of faults. *J. Struct. Geol.* 24 (11), 1669–1675. [https://doi.org/10.1016/S0191-8141\(01\)00165-1](https://doi.org/10.1016/S0191-8141(01)00165-1).) may provide further insights on how faults grow and eventually reactivate in the study area. This may be interesting considering that the Authors at line 700-704 talk about "constant length" fault grow model.

Very good point. We are happy to show more D-L plots of faults in a wider area to the northeast of the present study area for the next paper we are preparing, where there are a lot of reactivated basement faults. That may be a good supplement for this point.

- Paper length: the paper is written in very good English and therefore it is easy to read but it is also quite long and I feel that some parts may benefit from cuts. Particularly, some discussions are quite long and may be shortened. E.g, paragraphs 6.1 and subparagraphs may be largely shortened and even merged into one single section to better focusing on key concepts, the length of some description, despite well written, makes hard to follow the reasoning.

Yes, we can shorten the length of the discussion in the revision, as also mentioned by the first reviewer.

- Literature: literature is not an issue in this manuscript, as the Authors largely support their findings and discussion with proper references. Nonetheless, some recently published papers may be added to the introduction and further discussed in the manuscript as they may be particularly useful for discussion in section 6.2 and 6.3. I have provided several references in the annotated pdf of the manuscript.

OK.

Hope I have answered all your questions.

Kind regards,

Chao Deng