

Point-by-point Response

Reply to:

09 Oct 2024, Topic editor decision: Publish subject to minor revisions (review by editor), by Yang Chu

Comment: Public justification (visible to the public if the article is accepted and published):

One of the previous reviewers and myself have both finished reviewing and give some new comments on this manuscript. Although the review suggests minor revision, but more work should be done before its final acceptance. As the reviewer points out, the current structural evidence cannot support the tectonic model. This manuscript staddles between a review and a research paper, providing only a large-scale geological map and field photos, while lack of small-scale geological maps of the region and cross-cutting relationship hinders reconstructing deformation sequence. By adding new geological maps and field evidence, this manuscript can create a solid link from deformation features and superposition to deformation sequence and their tectonic interpretation.

Reply: Thanks for review. Though there are many deficiencies in our MS, we still think that our model is much better than previous studies. The improvements includes the re-interpretation of the Tan-Lu fault zone, and the model for the formation of the Bohai Sea Basin. Although the Bohai Sea Basin is a part of the Bohai Bay Basin, there are still many differences between them. Therefore, we focused our discussion on the Bohai Sea Basin, not the Bohai Bay Basin.

Comment: I totally agree with the reviewer's third point, which also bothers me a lot, that is the mixing of geological and geographical terms. For example, Bohai sea is a geographical unit, which covers half area of the Bohai Bay Basin, and the boundary faults have nothing to do with, or plays a negligible role in the formation of the Bohai sea. Jiaodong and Liaodong peninsulas are also confusing. If they are irrelevant to tectonic blocks, just abandon them after the geological setting. In the sections of Introduction and Geological setting, such mixed-use leads to different understanding and interpretation in the final discussion. I strongly suggest removing all of geographic terms, except those for locating geological units. In addition, every local names must be marked on maps to locate.

Reply: Thanks. We have changed the Bohai Sea into the Bohai Sea Basin or Bohai Sea region. Also, we changed the Jiaodong and Liaodong peninsulas into the Jiaodong and Liaodong blocks.

Comment: Deformation of faults and the study region also lacks one section to list field and chronological evidence before discussing the structural evolution, i.e. the part 4.3.

Reply: In this MS, we focused the discussion on the Tan-Lu fault, which is the most important fault related to our model for the origin of the Bohai Sea Basin. Since there are so many faults in the studied area, we have no place to discuss all of them.

Comment: Given these problems, another round of revision is necessary. Although there may be a lot of corrections, the main part does not need a substantial change, and I think this new idea will attract more discussion in the geological evolution of the Bohai Bay Basin. Here I give a recommendation of moderate revision, but the authors should be careful when incorporating the comments into the revision of text.

Reply: Thank you very much for the review. We will make careful revisions and hope our modifications can make significant improvements of the MS.

Comment: Some changes in text and figures:

Title: Bohai Bay Basin is better than Bohai Sea.

Reply: Thanks. We think this MS is about the origin of the Bohai Sea Basin, not the Bohai Bay Basin, so, we changed the title as *Origin of the Bohai Sea Basin, North China Craton and implication for bi-directional back-arc extension in East Asia continental margin*.

Comment: Line 7: northwestward

Reply: Okay.

Comment: Line 15: correlation->comparison

Reply: Okay.

Comment: Line 19: trench-parallel and trench-perpendicular extension

Reply: Okay.

Comment: Line 24-34: This is what I am baffled. Origin of a sea may have many climatic and oceanographical reasons, much different from origin of a basin.

Reply: Thank you. We have changed the Bohai Sea into the Bohai Sea basin or Bohai Sea region.

Comment: Line 29-30: What is this region? Most large earthquakes occurred onshore.

Reply: We have changed it into the BBB and surrounding region.

Comment: Line 31: deconstruction->destruction

Reply: Okay.

Comment: Line 56: Strange to have geographical and geological units together.

Reply: We have changed the Bohai Sea into the Bohai Sea region.

Comment: Line 70: Same as the last comment.

Reply: We have changed the Bohai Sea into the Bohai Sea region.

Comment: Line 81-84: These sentences have nothing to do with the geology.

Reply: Okay. We have deleted these sentences.

Comment: Line 85: Jiaodong Block is more important than Jiaodong peninsula in this ms.

Reply: Yes. We have changed the Jiaodong peninsula into the Jiaodong Block.

Comment: Line 98: with similar time to->coeval

Reply: Okay.

Comment: Line 121: Late Jurassic continental arc

Reply: Thanks. We have rewritten the sentence.

Comment: Line 122: Why is the Shizhuizi pluton emphasized here? Where is it?

Reply: The Shizhuizi pluton is a small pluton in the Liaodong block. It is not important. We have deleted it.

Comment: Line 145: Meaningless sentence. Use geological units in this paragraph!

Reply: Okay.

Comment: Line 169: Strike-slip faulting

Reply: Okay.

Comment: Line 187: Delete much later stage

Reply: Okay.

Comment: Line 189-191: Awkward sentence. Consider rephrasing.

Reply: Okay. We rephrase the sentence.

Comment: Line 193: This fault is suspicious. Could you provide some direct evidence for the fault, instead of dashed lines in the figure?

Reply: The Honglazi fault is a coastal fault. It is inferred from the different distribution of strata layers in its both sides. In its western side, there are pre-Cenozoic strata outcropped in the surface. However, it is difficult to know what strata are in its eastern side in the Bohai Sea, except for possible Cenozoic sediments. Therefore, there are some kind tectonic relief between the two sides of the fault.

Comment: Line 207-208: I need a detailed map to see it.

Reply: The EBF is a coastal fault. The relationship between both sides of the fault is clear. More detailed map is not available in this time.

Comment: Line 240: weathered paleo-crust. One-meter-thick magenta clay layer.

Reply: Okay. Thanks.

Comment: Line 246: What do you mean the North Yellow Sea fault form the Jiao-Liao fault?

Reply: We change the form into compose. What we mean is that the North Yellow Sea fault is a segment of the Jiao-Liao fault.

Comment: Line 278: Again, peninsula and block are together.

Reply: Okay. We change the peninsulas into blocks.

Comment: Line 289: interrelated->coeval. Delete just

Reply: Okay.

Comment: Line 296: gold deposits

Reply: Okay.

Comment: Line 307: delete an assumption of

Reply: Okay.

Comment: Line 310: Bay may not be opened, but basin is.

Reply: Okay.

Comment: Line 314: Change to NE-striking extensional structures and NW-SE extension, and Cenozoic WNW-striking normal faults.

Reply: Okay.

Comment: Line 316: Delete this is to say. Common->similar

Reply: Okay.

Comment: Line 320-321: Better discuss the geological connection, not geographical connection.

Reply: You are right. Previous studies have detailed correlational analyses between the Jiaodong block with northern part of the Korean peninsula, which makes it clear that there are something losing in the North Yellow Sea Basin. However, we do not know very well what are the really loser in the North Yellow Sea. More detailed geological and geophysical correlation is still needed for the future.

Comment: Line 324: correlational analysis->comparison

Reply: Okay.

Comment: Line 328: Is there any age constraint on the Jiaoliao, East Bohai and Honglazi Faults?

Reply: Currently, there is only geological constraint on faulting time of the Jiaoliao, East Bohai and Honglazi Faults. In the future, we still need to do some geochronology work to make more detailed constraints on the faulting times.

Comment: Line 344: It is not useful to have several sentences the describe location of the segments of the Tanlu Fault. Mark the different segments on map.

Reply: Okay.

Comment: Line 351: Bohai bay...

Reply: Okay.

Comment: Line 354: Delete other.

Reply: Okay.

Comment: Line 364: Delete Anhui and Jiangsu provinces.

Reply: Okay. (Line 366)

Comment: Line 377: Show Dongying depression on the map.

Reply: Okay.

Comment: Line 378: Delete that is to say.

Reply: Okay.

Comment: Line 378-379: Not a clear sentence.

Reply: The sentence is rewritten as a clear one.

Comment: Line 381: excluded as a part of...

Reply: Okay.

Comment: Line 383: What method has been used for these ages?

Reply: Apatite FT dating of footwall rocks of extensional normal faults.

Comment: Line 385: Use widespread for universally developed.

Reply: Okay.

Comment: Line 391: Delete magnitudes.

Reply: Okay.

Comment: Line 393: How is 340 km calculated?

Reply: The displacement of ca. 340 km is calculated from the model, when the Jiaodong and Liaodong blocks are put together, and the Jidong and Liaodong blocks are also put together.

Comment: I do not find any new implications and discussion in section 5.3. All the sentences and figure 11 can be deleted.

Reply: We deleted the figure 11 and all the sentences in section 5.3.

Comment: Figure 1: Nice figure. What do different colors represent? Show the location of the Bohai Sea and BBB.

Reply: Thank you. We have shown the tectonic regimes represented by different colors in the figure. Due to that the map belongs to the entire Asian region, the Bohai Sea and Bohai Bay Basin are relatively small and not suitable for differentiation. Therefore, figure 1 only shows the approximate location of Bohai Sea (BS). The specific ranges of Bohai Sea and BBB are shown in Figure 3.

Comment: Figure 3: What is the evidence for the block boundary? Fault? Surface outcrop areas?

Reply: We divide the scope of geological blocks based on mainly the distribution of faults and geological bodies. These blocks were relatively independent in the Cenozoic, but were mostly connected in the pre-Cenozoic.

Comment: Figure 5: Difficult to read the text with red colors. We have an original pic for 5C, why not one for 5A?

Reply: We have changed most of the red characters in the picture to white characters for easier recognition. Due to the large space occupied by the images, we only provided the original image of Figure 5B. The local structure in Figure 5B is much detailed, while Figure 5A is more regional.

Comment: Figure 6: Same problem as Figure 5.

Reply: We have changed most of the red characters in the picture to black ones for easier recognition. Due to the large space occupied by the image, we only provided the original image of Figure 6B. The information in this image is more typical and detailed.

Comment: Figure 7A: I do not see early fractures cut by later ones. Any clear photos?

Reply: Both the early and late fractures belong to the nature of fractures and do not have significant displacement, the cutting relationship between them is not particularly obvious. In fact, they formed almost simultaneously and cut each other apart. However, early developmental fractures have a longer duration and length.

Comment: Figure 9: Any geological evidence for the 162 km displacement?

Reply: The current geological evidence related to the displacement between the Jiaodong and Liaodong peninsulas mainly comes from the comparison of Early Cretaceous extensional structures (such as metamorphic core complexes) and granite intrusive rocks between the two peninsulas, as well as the distribution of pre-Cretaceous geological bodies and the development of fault structures. The Linglong dome has a good connection with the Liaoning metamorphic core complex, which can be used to calculate displacement, approximately 162 km.