For research article

Response to Reviewer 2 Comments

1. Summary

Thank you very much for taking the time to review this manuscript. Please find the detailed responses below and the corresponding revisions/corrections highlighted/in track changes in the re-submitted files.

2. Questions for General Evaluation	**Reviewer's Evaluation**	**Response and Revisions**
Does the introduction provide sufficient background and include all relevant references?	Yes/Can be improved/Must be improved/Not applicable	
Are all the cited references relevant to the research?	Yes/Can be improved/Must be improved/Not applicable	
Is the research design appropriate?	Yes/Can be improved/Must be improved/Not applicable	
Are the methods adequately described?	Yes/Can be improved/Must be improved/Not applicable	
Are the results clearly presented?	Yes/Can be improved/Must be improved/Not applicable	
Are the conclusions supported by the results?	Yes/Can be improved/Must be improved/Not applicable	

3. Point-by-point response to Comments and Suggestions for Authors

Comments 1: clarify what is meant by the red bed...if international readers are going through your work, they are not known by "Red Bed". first, in the title it is termed as Red Bed landslides and in abstract section, it is associated with reservoir. vague statement.

Response 1: Thank you for pointing this out. I agree with this comment. Therefore, I have inserted some introduction of red bed in Abstract.

"The red bed is a clastic sedimentary rock layer dominated by red continental deposits. It is mainly composed of sandstone, mudstone and siltstone. The lithology is diverse and uneven."

Comments 2: what is meant by reservoir area and it is termed as a reservoir with respect to water resources or petroleum resources? secondly, if it is associated with petroleum, specify that it is conventional or unconventional.

Response 2: Thank you for pointing this out. "Reservoir area" in this paper means water reservoir of the Wudongde Reservoir. It has nothing associated with petroleum.

Comments 3: the application and significance of the study are not well-defined. revise the statement accordingly.

Response 3: Thank you for pointing this out. I agree with this comment. Therefore, I have improved the application and significance in the Abstract.

"In this manuscript, we delve into the dissolution traits of red-bed soft rock in the Wudongde reservoir area, using a landslide case as a reference. We simulate this rock's dissolution under environmental water influences, examining its interaction with diverse water types through rigorous experiments and simulations. This study's importance lies in its potential to shed light

on the crucial engineering characteristics of red-bed soft rock."

Comments 4: add the keywords: Scanning electron microscopy (SEM); siliciclastic rocks and evaporites

Response 4: Thank you for pointing this out. I agree with this comment. The new keywords were updated.

Comments 5: describe the significance of Red Beds. and their regional or global presence.

Response 5: Thank you for pointing this out. I agree with this comment. Therefore, I have improved the introduction.

"The red layer exhibits a degree of concealment, its distribution dictated by the fractured rock structure of the fault zone. This rock mass demonstrates a high hydrophilicity, leading to potential engineering geological issues such as seepage, softening, and disintegration upon water exposure. Typically, red bed landslides are triggered by rainfall or reservoir water level fluctuations."

Comments 6: what are the key engineering characteristics of red beds that result in natural disasters and landslide movement?

Response 6: Thank you for pointing this out. The key characteristics is water-rock interaction.

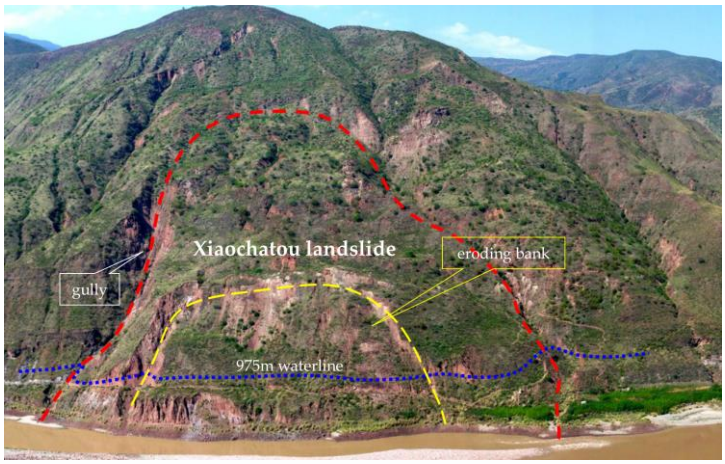
"Under the influence of groundwater seepage, weak interlayers are water-softened, evolving into slip zone soil. The presence of this unique water-rock interaction is intimately tied to the rock mass type and structure, as well as the content of hydrophilic minerals, such as clay minerals."

Comments 7: The site description is written without referring to the literature. include the key references regarding the landslide location and description.

Response 7: Thank you for pointing this out. The information in this paragraph is from the geological report, so there is no reference to the published literature.

Comments 8: fig 1 should be labeled with font color with contrast for better visibility. increase the resolution of the figure and redraw the key features of the figure to explain the components of the landslide.

Response 8: Thank you for pointing this out. I agree with this comment. The redraw pictures are as follows:



Comments 9: a section related to the explanation of samples/dataset and key lab analysis should be added to the manuscript.

Response 9: Thank you for pointing this out. I agree with this comment. I add some explanation and key lab in this section and change the order of express.

Comments 10: Revise the section "3. The characteristics of the reaction of water-rock interaction in red bed rock" as "Lab analysis"

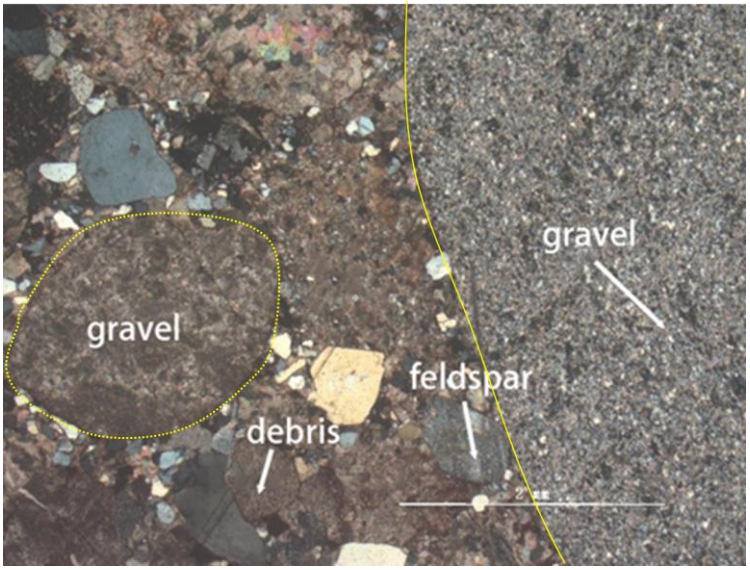
Response 10: Thank you for pointing this out. I change the title of section 3.

Comments 11: Fig.2a: The images should not contain the shadow of the person or any object. replace the figure with the better one

Response 11: Thank you for pointing this out. I replace with the better picture.



Comments 12: Fig. 2 a-e: the scale of the rock sample could be added for better presentation.
Response 12: Thank you for pointing this out. I add some presentation about sample.
"(a) Conglomerate XCT-0, a calcareous sand conglomerate with gravels ranging from 2mm to 50mm, mostly round and sub-round shapes. Iron-rich sediment appears as reddish-brown dust mixed with rock debris. (b) Sandstone XCT-0', a fine-grained, calcareous sandstone primarily. Debris is mostly angular to sub-angular, with particle sizes ranging between 0.05 and 0.2mm, exhibiting poor roundness but good sorting. (c) Mudstone XCT-3, a fine-grained sedimentary rock composed of silt and clay-sized particles. (d) Dissolved sandstone XCT-2'', with develop some distinctive textures and structure, including enlarged pore spaces, dissolution vugs, and cavernous or pitted surfaces."
Comments 13: Figure 3a: what is meant by debris? it should be properly explained and the gravel could not be smaller than feldspar grain. check the labeling of the photo microscopy and label them correctly.
Response 13: Thank you for pointing this out. The debris in this picture is about 0.15-2mm in size with a composition similar to gravel. I add the edge of gravel in this picture.

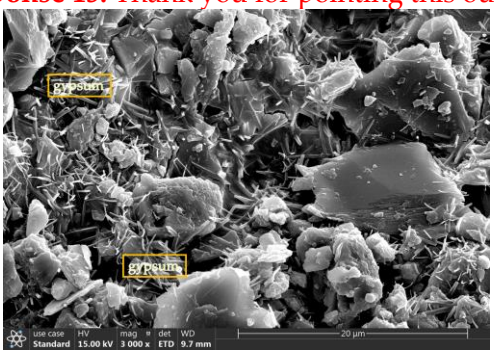


Comments 14: Figure 5: include the scale of the images and label them with all the features.
Response 14: Thank you for pointing this out. I replace with the better picture.

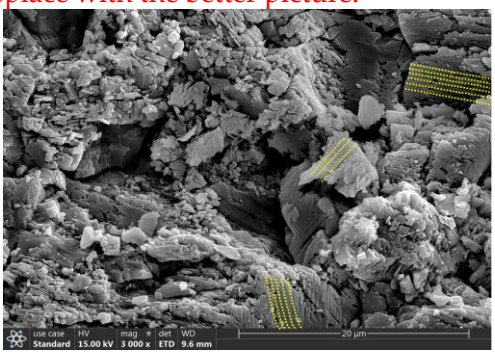


Comments 15: label the SEM images with details and use a font color that is visible in the figure.

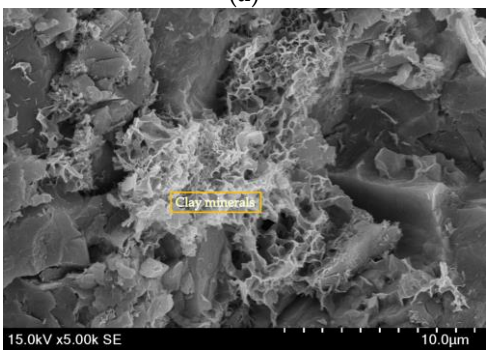
Response 15: Thank you for pointing this out. I replace with the better picture.



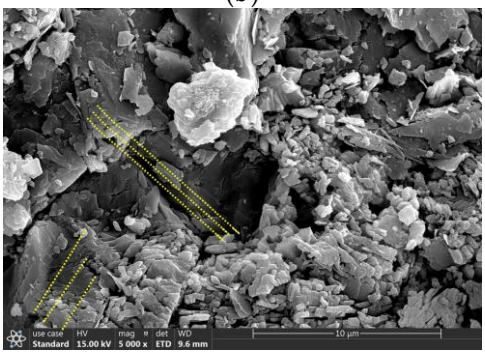
(**a**)



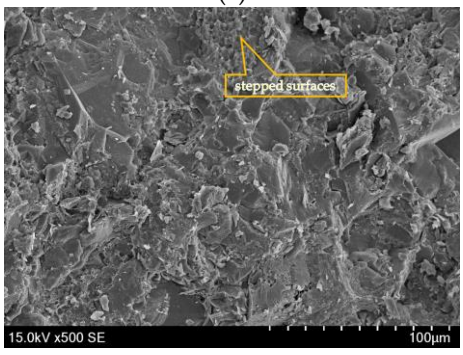
(**b**)



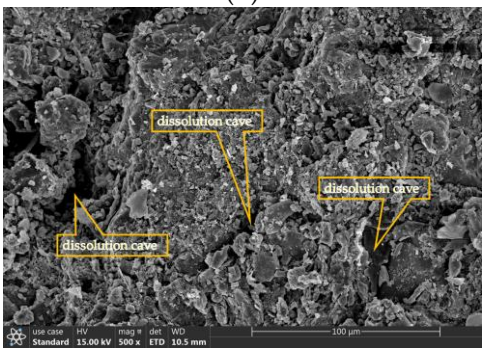
(**c**)



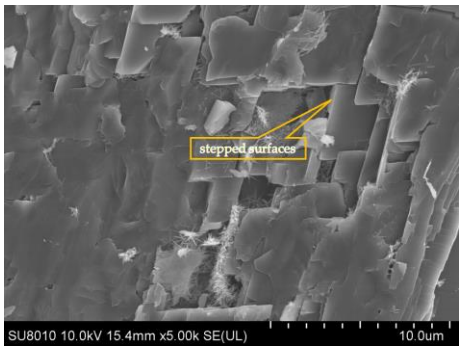
(**d**)



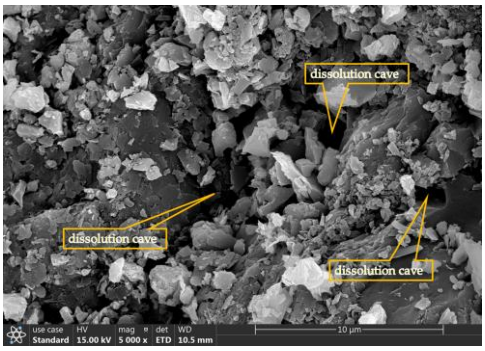
(**a**)



(**b**)



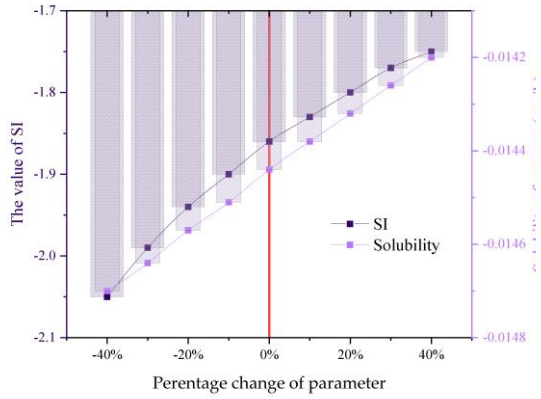
(**c**)



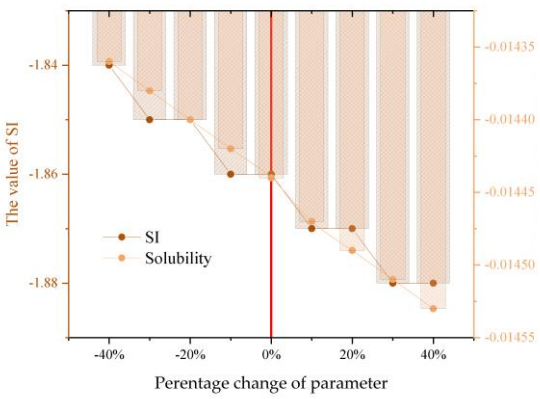
(**d**)

Comments 16: Fig. 9: The axis label is not clear in the graphs. redraw the graphs or increase the resolution.

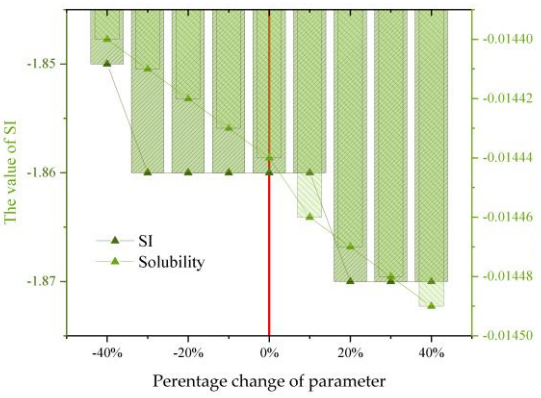
Response 16: Thank you for pointing this out. I replace with the better picture.



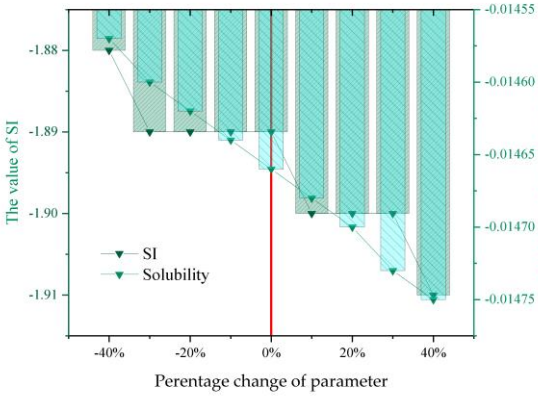
(a) Ca^{2+}



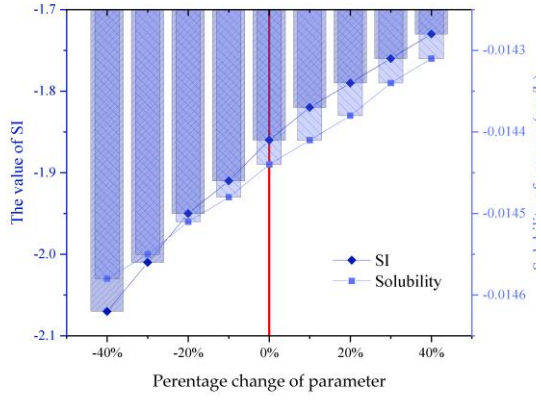
(b) Mg^{2+}

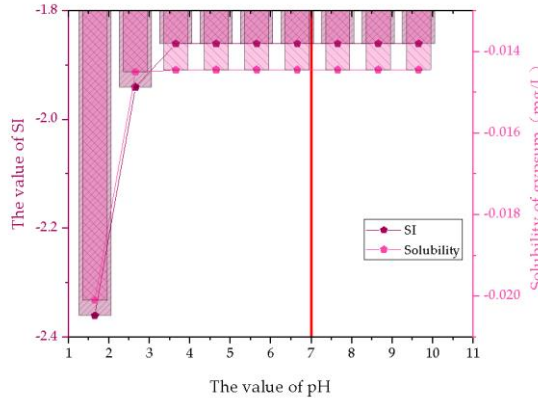


(c) Na^{+}

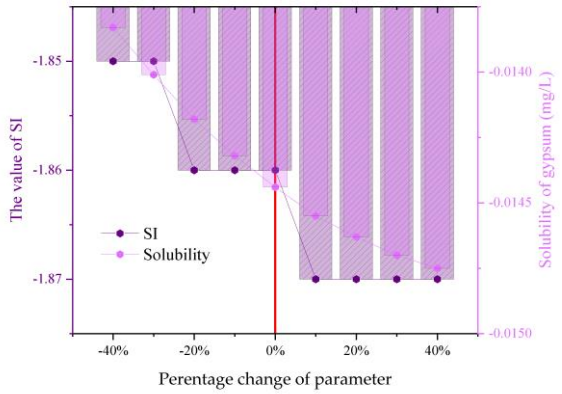


(d) HCO_3^{-}





(e)SO_4^{2-} (f) pH



(g) SUM

Comments 17: include a subsection in the discussion paper to discuss the results of mineral analysis and lab analysis.

Response 17: Thank you for pointing this out. I agree with this comment. I add lab analysis in this section.

"The composition of both XCT-0 and XCT-0' revealed by XRD is further elucidated when combined with SEM images of these two samples. The result of test shows a presence of fibrous and elongated gypsum cement, which is prominently dispersed across the rock mass surface. Additionally, it is observed that certain clay minerals, such as gypsum, under dissolution water.

The soluble minerals within the conglomerate and sandstone are predominantly composed of gypsum, calcareous cement, and chlorite. According to the high concentration of Ca^{2+} and SO_4^{2-} ins in the deionized water utilized in lab analysis, gypsum is identified as the primary minerals under dissolution. "

4. Response to Comments on the Quality of English Language

Point 1: reduce the similarity index. and don't use AI writing tools as it is 15% in your manuscript.

Response 1: Thank you for pointing this out. I have reduced the similarity index.