

RC3: '[Comment on egusphere-2024-852](#)', Bing Yan, 30 Apr 2024

The manuscript presents findings from four pairs of comparative experiments to discuss the impact of lithological contrasts on secondary faults along major strike-slip faults. It highlights the lithological variations in nature, contrasting with simplifications in previous modeling efforts, which often utilized uniform quartz sand to represent the brittle upper crust. This research contributes to both physical modeling and the field of structural geology along strike-slip faults, showcasing distinctive phenomena. The results are clearly described and thoughtfully discussed. There are a few questions need to be modified in the manuscript or replied.

Thank you for the comments and we have modified the manuscript as indicated below.

The term "Vertical" lithological contrasts might potentially lead to misconceptions regarding the depth-related aspects of lithological contrasts. It is recommended to consider revising this term throughout the text to avoid confusion and enhance clarity.

We agree that the terminology used was open to confusion and have improved the description of the models to make clear that we are focusing on "vertical domains of contrasting mechanical strength in the upper crust". We have also improved Figure 1 to better illustrate the model setup.

To facilitate comprehension for readers unfamiliar with physical modeling, it would be beneficial to include top-view photos in Section 3 displaying the final structures and interpreted results. Integrating all results in one figure is an option.

We have now included top view photos in the figures as a back-ground for the incremental strain figures, and have added a top view photo of the final deformation stage overlain by an interpretation of the fault pattern.

The discussion of the natural example in Section 4.3 appears too brief. I suggest incorporating an additional figure (e.g., Figure 9) comparing experimental results, as depicted in Figure 7, with typical structures observed in nature, as illustrated in Figure 8. Accompanying this with detailed descriptions would enhance the discussion and enrich the manuscript.

We have modified the crustal-example figure, making comparison between our experiments and areas from the NW of Iberian Peninsula. In addition, for each

section of the discussion, which has been substantially modified, explanatory figures about what happens in the models have been added.

Additionally, Table 1 should be reformatted into a table format like Table 2, rather than being presented as a low-resolution image.

We have reformatted Table 1 and 2