

Answer to the Editor:

From the last comments of the reviewer, it is evident that he has still some concerns with the model set-up and the comparison with the studied area. We are convinced that most of these concerns result from the misunderstanding of the main objective of the modeling program we have conducted and the scale of the modeled structures. We are aiming only to reproduce upper crustal structures at the transition from basement-involved structures with an attached cover (being the basement reproduced by wooden blocks as in many works existing in the literature) to a decoupled fault system, detached on a thick salt layer. We have not pretended to reproduce the deformation at crustal scale or the entire Cantabrian-Pyrenean orogenic system and so we have addressed it in the manuscript.

Thus, some of the initial comments by Frédéric Mouthereau arguing the similarity of the modeling approach with previous numerical models explain such misunderstanding. For example, the initial comment by the reviewer: *“The role of rift evolution with application to the deep structure of the Pyrenees has been investigated using “accordion” numerical modelling in Jourdon et al. 2019. Why it is not cited here. This is a paper focused on the same question and using modelling”*, reflects such misunderstanding. We do not pretend to model an accordion deformation at crustal scale, and we are addressing a different question than what was done in these previous works (Jourdon et al. 2019, among others). We think that with the revised version, which has considered all the comments by the referees, we have conveniently explained the scope and the scale of the modeling work. Thanks to these comments, we are convinced that the manuscript has improved significantly and is clearer now.

Yet, the reviewer refers to the fact that we have not checked other interpretations at crustal scale, such as the structural model proposed by Pedrera et al., 2020. And we have not, because again, this is not the aim of the work. We have referred to this paper because they considered the Basque Pyrenees as an entire thick-skinned system with no decoupling along the Triassic salt regardless that the presence of salt structures and subsurface and field observations contradict such interpretations. We only pretend to refer that there are other interpretations different from the one we propose. We do not pretend to discuss their interpretation at crustal scale or what could be the effect of a possible absence of salt underneath the Bilbao anticlinorium during the propagation of the deformation forwards. In addition, the Bilbao Anticlinorium is outside the area modeled in our work. Regardless of this comment, we have accepted the proposed modification by the reviewer.

With respect to the other comment raised by the reviewer concerning the way we have reproduced in our set-up the deformation of the basement at the **eastern edge of the thick-skinned Asturian massif**, it is not only the absence of a weak layer, but it is mainly the wooden (rigid) blocks that simulate the basement. The sand layer underneath them would represent the reactivated former Variscan and extensional faults. So, the transition from the thick-skinned to the thin-skinned domain has not been reproduced merely by a difference of friction at the bottom of the cover succession. Instead, it has

been simulated by the transition of an area with wooden blocks above sand (basement-involved deformation or thick-skinned) to an area decoupled above a silicone layer.

Once clarified these ideas on the new version of the manuscript we consider that the title proposed by Frédéric Mouthereau does not really correspond with the main content of the manuscript. Even if there are limitations to the way thick-skinned tectonics can be simulated in an analogue model, we consider that “thick- to thin-skinned transition” is a key part of the content of the manuscript and should remain in the title. We reluctantly propose an alternative title: *“Role of inheritance during tectonic inversion of a rift system in basement-involved to salt decoupled transition: Analogue modelling and application to the Pyrenean – Biscay System”*. We can change the title if necessary, but that would not change the results of our work and the way they should be interpreted. We leave that decision to the editor comparing the old and the new proposed title.

Sincerely,

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