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Interactive comment on "A reconstruction of Iberia accounting for W-Tethys/N-Atlantic kinematics since the late Permian-Triassic" *by* Paul Angrand et al.

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1. Response to the major point

We acknowledge the comment done by an anonymous referee about our manuscript. This comment raises a major issue about a geological implication of our model that needs to be clarified. This is about the role of the Ventaniella Fault as a good candidate to accommodate the Iberia-Ebro relative motion.

This point is critical as most of the recent models accounting for a segmented Iberian plate invoke the Ventaniella Fault as a main boundary fault accommodating a large

amount of Iberia-Ebro movement (Tugend et al., 2015; Nirrengarten et al., 2018). As pointed out by the referee, the estimated left-lateral displacement along the Ventaniella Fault (after correction of the right-lateral Cenozoic displacement) is expected to be in the order a some kilometers during late Paleozoic-middle Cretaceous (Tavani et al., 2011).

We actually do not propose that the Ventaniella Fault accommodates in our reconstruction the large displacement between the Ebro block and Europe. We made this point clearer by reorganizing the discussion (please note that the shape of the final version in the revised manuscript may differ a little bit from this one). The structure of the discussion is now:

"Discussion: Implications for strike-slip movements and the Europe-Iberia boundary

1. Amount of strike-slip displacement # former discussion section

2. Strike-slip structures in the intra-Iberian basins # new section

Despite the requirement of 245 km left-lateral strike-slip displacement along the Iberia-Ebro boundary from 160 to 100 Ma, there are no simple geological evidence in support of a unique major crustal-scale fault in the Iberian Range-Basque Cantabrian Basin system.

Several studies have suggested that a left-lateral shear zone can be recognized along the Iberian Range and the Basque-Cantabrian rifts system. Geological evidence includes the High Tagus Fault in the Iberian Range (Aldega et al., 2019; Aurell et al., 2019) and the Ventaniella Fault in the Basque-Cantabrian region (e.g., Tavani et al., 2011). The latter fault is often considered in recent reconstructions to accommodate alone the Iberia-Ebro movement (Tugend et al., 2015; Nirrengarten et al., 2018). However, the estimated left-lateral displacement along the Ventaniella Fault is only in the order of magnitude of a few kilometers (Tavani et al., 2011) and therefore cannot be used as a North Pyrenean Fault equivalent.

In the Basque Cantabrian Basin, the Ventaniella Fault is part of a NW-SE fault system that acted as left-lateral shear zone during the Late Jurassic-Early Cretaceous and has been subsequently inverted with a right-lateral kinematic during the Cenozoic (De Vicente et al., 2011; Tavani et al., 2011; Cámara, 2017). These faults have a Triassic origin (Tavani and Granado, 2015). Tectonic activity along these faults gets younger NE-ward (Ubierna fault: Late Jurassic-Early Cretaceous; Zamanza-Oña fault: Early-Middle Cretaceous; salt tectonics in the center of the basin, Cámara, 2017). The required Iberia-Ebro displacement could have been distributed along these structures.

The role of the weak Triassic evaporites in efficiently decoupling deformation in the pre-salt basement from the thin-skinned extension in sedimentary cover has been emphasized largely in the Pyrenees (Lagabrielle et al., 2020; Grool et al., 2019; Duretz et al., 2019; Jourdon et al., 2020). Salt tectonics has also been suggested to have been particularly significant from the Jurassic through the Early Cretaceous in Mesozoic basins that shaped NW-directed boundary between Ebro and Iberia, including the Basque-Cantabrian Basin (Cámara, 2017), Parentis Basin (Ferrer et al., 2012), Cameros Basin (Rat et al., 2019) and Maestrat Basin (Vergés et al., 2020). The surface expression of the crustal strike-slip movements is inferred to have been limited in supra-salt layers."

2. Responses to minor points

L2: done

L3: done

L4: we shortened this sentence: "The Late Permian-Triassic Iberian rift basins have accommodated extension, but. . .Âă"

L8: done

L19-21: done

L42: "An alternative scenario has recently emerged (Tugend et al., 2015; Nirrengarten et al., 2018, Tavani et al., 2018), proposing a spatiotemporal partitioning of the defor-

mation in a wider deformation corridor than the single Pyrenean belt. It suggests that the major strike-slip movement required to accommodate the eastwards movement of Iberia first occurred during the Late Jurassic-Early Cretaceous in Northern Iberia along the NW-SE-trending Iberian Massifs. Indeed, along these massifs, several extensional basins registered major subsidence and strike-slip deformation during the Late Permian to middle Cretaceous time interval (Álvaro et al., 1978; Salas and Casas, 1993; Salas et al., 2001; Aldega et al., 2019; Aurell et al., 2019, Soto et al., 2019)."

L 46: merged with L42.

L 59: We add a sentence about the stratigraphy. "This late Permian-Lower Triassic phase is associated with the deposition of thick detrital non-marine deposits in intracontinental basins. Sedimentation became carbonaceous during the middle Triassic. Finally, the Late Triassic is characterized by a thick evaporitic (mainly salt) sequence (e.g., Orti et al., 2017)."

L 71: We keep this as we added informations about the stratigraphy.

L 76-81: This paragraph is needed to introduce the following paragraph.

L 82-83: We reorganized this paragraph according to RC2's comments.

L 90-93 and L 93-94: "The persistence of shallow-marine to non-marine deposition during this period contrasts with the large accommodation space that is required at larger scale to sediment the giant evaporitic province in the Late Permian (Jackson et al., 2019) and in the Late Triassic (Stolfova and Shannon, 2009; Leleu et al., 2016; Orti et al., 2017). Therefore subsidence associated with crustal thinning expected for this period does not fit with increase of tectonic subsidence as predicted by modeling (McKenzie, 1978)."

L 94-104: We prefer keeping this paragraph in that position as it supports the extension phase we discuss later in the text.

L 96: done

L112-115: done

L119: We agree that it would be interesting to add more subsidence data but we chose on purpose to limit the number of curves to not overload the figure. In addition, and as reported by the referee, subsidence curves in Gomez et al. (2002) are not covering the all Mesozoic and do not show the Triassic phase.

L 139: we removed "strike slip deformation".

L 174: done.

3. References

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