

Interactive comment on “The enigmatic curvature of Central Iberia and its puzzling kinematics” by Daniel Pastor-Galán et al.

Dominique Jacques (Referee)

dominique.jacques@kuleuven.be

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The manuscript presents an excellent review of a long-standing debate on the nature and origin of the conspicuous Variscan orocline(s) in the Iberian Massif. Firstly, the evolution of the debate on the nature of the Central Iberian curve from its onset towards its current state is accurately presented. Secondly, the relevant paleomagnetic, structural, stratigraphic and sedimentological data that have been collected are discussed. And finally, the authors critically evaluate the different hypotheses of the Central Iberian curve considering the existing kinematic and paleomagnetic criteria. Based on all the literature and performed analyses they attain the most plausible conclusion: the Central Iberian curve should not be considered as a veritable orocline. At its core the Central Iberian curve is a primary feature of the Variscan orogenic belt that does not

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show any late Carboniferous to early Permian vertical-axis rotation, while in its external hinge zone it is an ‘artefact’ from recent Alpine tectonics.

The paper is well-written, clearly structured, its bibliography is extensive and up-to-date and the figures are relevant and of high scientific quality. Hence, I can strongly recommend the manuscript for publication in Solid Earth, taking into account some minor revisions.

Besides mostly spelling mistakes (see annotated pdf), the most significant of these revisions concerns the supposed existence and nature of the post-Variscan C4 stage. The authors suggest a subdivision between a C3 (315-300Ma) and C4 (300-280Ma) deformation stage, although both stages are characterized by N-S shortening and the widespread development of shear zones. The main distinction is the contrast of mainly ductile C3 folding and C4 brittle faulting. I would argue that a gradual evolution from ductile to brittle deformation as the orogeny is uplifted and cools does not warrant a separate deformation stage if the dynamics remain similar. Figure 13E even suggests continued tightening of the orocline, prior to E2. In addition, I also disagree with the notion that the early Permian (i.e. posterior to oroclinal buckling) was characterized by N-S compression. Instead, literature generally agrees that Gondwana-Laurussia convergence during this time period was NW-SE to W-E directed. In the southern Variscan orogeny this led to NW-SE transpression and strike-slip deformation, especially observed in Stephanian-Permian intramontane basins. Simultaneously, to the west of the Variscan orogeny, frontal collision of Gondwana and Laurussia led to the formation of the Alleghenides, Mauritanides and the Ouachita-Marathon-Sonora orogenic belts. The authors do not take into account the related literature, which are not in accordance with their geodynamic model in Fig. 13E. Hence, I would suggest that the authors either (i) limit themselves to the geodynamics of oroclinal buckling (C3 – 315-295Ma) in their interpretation, or (ii) strongly extend their literature study on the kinematics of post-Variscan deformation (295-280Ma). A more detailed account of the above comments and related literature have been added to the annotated pdf in

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attachment.

Please also note the supplement to this comment:

<https://www.solid-earth-discuss.net/se-2020-51/se-2020-51-RC2-supplement.pdf>

Interactive comment on Solid Earth Discuss., <https://doi.org/10.5194/se-2020-51>, 2020.