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

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Response to Referee #2 (Dominique Jacques)

We want to thank Dominique Jacques for the thorough review and insights provided.

We have followed all the suggestions and corrected all typos, spelling mistakes and suggestions annotated in the attached PDF.

Apart from stylistic and orthographic corrections Dominique Jacques has some in detail comments:

**DJ: "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."**

Here Dominique is right, C3 and C4 are roughly N-S shortening events (in present day coordinates) , that likely respond to the same strain field. The same could be said in the Iberian sector of the Variscan belt about C1 and C2. This paper is a review and we followed the most recent terminology for the Central Iberian Zone for consistency (Martínez Catalán et al., 2014). In addition, we think that phase naming does not need to reflect only dynamic or kinematic separate events, but also structural styles or metamorphic conditions changing progressively in accordance with the orogenic evolution. In this sense, we think C1, C2, E1 C3, C4 and E2 is a really useful terminology for the Central Iberian Zone. We have slightly changed the description of C4 to clarify this point:

**DJ: "The N-S shortening (in present day coordinates) of C3 deformation continued through the Early Permian under brittle conditions (so-called C4 event) (e.g. Dias da Silva et al., in press) and overlapped with the formation of E2 extensional faults (Fig. 2A; Dias and Ribeiro 1991; Dias et al. 2003; Rubio Pascual et al., 2013; Arango et al., 2013; Fernández-Lozano et al. 2019; Dias da Silva et al., in press). C4 N-S compression produced a series of NNE-SSW and NNW-SSE brittle faults (Gil Toja et al. 1985; Dias and Ribeiro 1991; Dias et al. 2003; Fernández-Lozano et al., 2019) and associated sub-vertical and sub-horizontal widespread kink-bands (e.g. Aller et al., 2020; Dias da Silva et al., in press) that are today exposed in Northern Iberia. E2 developed core complex-like structures with extensional shear zones that further telescoped M2 metamorphic isograds between the anatectic cores of gneiss domes

and the associated hanging wall units. This event favored sub-horizontal folding, and crenulation cleavage development in the footwall together with kink-band generation in the upper low-grade structural levels."

"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)."**

Dominique Jacques is right about the west- and south-wards evolution of the Variscan Alleghanian orogen. In our paper, however we are reviewing exclusively the structural and kinematic evolution of Iberia, where all studied C4 structures (developed in Early to Mid Permian) indicate N-S shortening in present coordinates (which would be WSW-WNW in paleogeographic coordinates). We have added extra references supporting the C4 N-S compression in Iberia. Our kinematic model is restricted to Iberia and it is out of the scope of the paper to fit it within a global or large scale plate reconstruction. We want to remark that strain patterns in Iberia do not necessarily indicate or contradict any particular far field stress. Instead, these strain patterns should be taken into account for regional paleogeographic and global tectonic models, and not the opposite.

**DJ: "What about the stratigraphic successions of the Southern Central Iberian Zone and the West Asturian-Leonese zones, which are connected in the Shaw et al. (2012) model (Fig. 2C)? Can these indeed be connected from this viewpoint, because litera-

ture appears to suggest that their lithological succession is different. As your Fig. 3A demonstrates, the lithological succession in the WALZ is much more proximal to the Gondwana shelf than in the CIZ, which consists of more shallow marine lithologies.In a similar fashion, is the metamophic grade of regional metamorphism (mainly active during D1-D2) in both zones comparative?"**

This is a good question that is still unsolved. The stratigraphy of the southermost part of the Central Iberian Zone has been studied in lesser detail, probably because of its poorer exposure. Best stratigraphical sections coming from Almadén area are quite similar to the Tamames area. However, the area covered is small and the correlations are not yet certain. This is another exciting problem yet to be solved. Nevertheless, there is consensus that the stratigraphical architecture is controlled by the presence of structural highs and troughs that caused differences in the shallowness of the deposits and, if so, it cannot be correlated directly with proximity to the Gondwanan shelf. From this point of view, the deeper facies rocks in the WALZ only indicates the presence of a marked through, despite its location within the Gondwanan margin.

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