
Variscan oroclinal arcs: markers and deformation mechanisms

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Résumé

The Variscan Belt is, as many other mountain chains, characterized by the development of oroclinal arcs. Being an old cordillera, they are no longer delineated by relief, so that their geometry has to be traced using geological and geophysical data. Among the former, early Variscan deformation structures are the main markers, although tectono-stratigraphic zonation and plutonism provide additional information. Among the geophysical markers, gravity and magnetic anomalies, together with paleomagnetism, have been used to constrain the amount and timing of limb rotation.

The first and tightest Variscan orocline to be identified is the Ibero-Armorican Arc, but the belt includes a few more open arcs in the Eastern Moroccan Meseta, Central Iberia, the French Massif Central and the Bohemian Massif. Their geological and geophysical features are briefly discussed, concluding that all of them are oroclinal arcs or secondary oroclinal arcs according to definitions by Weil and Sussman (2004) and Johnston et al. (2013) respectively.

All arcs are essentially late orogenic features, but their timing and deformation mechanisms differ. Models explaining their origin have been proposed for some individual arcs, and are generally controversial. Here, we interpret the ensemble of Variscan oroclinal arcs paying attention to their age relative to previous orogenic features as well as to the characteristics resulting from arc development. The latter is related with late Variscan dextral transpression provoked by the relative displacement of Laurussia to the East relatively to Gondwana during the Pennsylvanian and early Permian. Mechanisms operating to form the arcs include ductile transcurrent shearing, indentation, and shortening perpendicular and parallel to the orogenic trend. These mechanisms acted at different time intervals and their importance and imprint vary for each arc.

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References

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Johnston, S.T., Weil, A.B. and Gutiérrez-Alonso, G. 2013. Geological Society of America Bulletin, 125 (5-6), 643-663.

Weil, A.B. and Sussman, A.J. 2004. In: Sussman, A.J. and Weil, A.B. (Eds.), Geological Society of America Special Paper 383, 1-15.

Mots-Clés: Central Iberian Arc, Ibero Armorican Arc, Massif Central Arc, Bohemian Arc