

Space-time partitioning of the Mesozoic deformation along the Iberia/Eurasia diffuse plate boundary

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Since the 1970s, the Mesozoic kinematic evolution of the Iberian plate has been largely debated. In particular, no consensus exists on the timing, kinematics and partitioning of the deformation along the Iberia/Eurasia plate boundary during the Late Jurassic-Early Cretaceous. Most of the plate kinematics models suggest that this plate boundary must have accommodated ~400 km of left-lateral displacement between the two plates in this time lapse. However, no field evidence exists for a narrow transform plate boundary that could have accommodated such displacement. In the last decade, several authors have tried to partition this deformation between two/three transtensional corridors centered in the Pyrenean realm, but still without resolving the discrepancy between postulated and observed displacement. In this work, we propose a reappraisal of the Mesozoic Iberia/Eurasia plate boundary by reviewing the tectonic and kinematic evolution of the numerous rift basins located between the Iberian Chains System (to the S) and the Armorican Shelf/Northern Aquitaine System (to the N). This allows to define the transition between the two plates as a ~400 wide NW-SE trending diffuse plate boundary across which the deformation is partitioned. Its polyphased evolution consists of four main steps: i) a Late Jurassic phase of left-lateral transtension localized at the northern and southern boundaries of the system, while the rest of the rift basins underwent orthogonal rifting; ii) a Neocomian phase of tectonic quiescence; iii) a Barremian-Aptian phase of diffuse left-lateral transtensional rifting, while the North Pyrenean Rift System underwent orthogonal rifting; iv) an Albian-Cenomanian phase of transtension localized along the Basque-Cantabrian/North Pyrenean corridor, following the onset of oceanic spreading in the Bay of Biscay margins, while the rest of the rift basins underwent post-rift stage. Finally, we discuss the role of structural inheritance and pre-rift salt in favoring distributed rather than localized deformation at the plate boundary. This review allows to make inferences on the timing of rotation of Iberia during the Mesozoic and to highlight the contribution to the evolution of the plate boundary of some domains within the Cenozoic foreland basins of the Pyrenees which have been often disregarded.

Mots-Clés:

Iberia/Eurasia plate boundary

Diffuse plate boundary

Pre-rift inheritance

Orthogonal vs. oblique rifting