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Deciphering the Triassic extension in Iberia and North Africa by anisotropy of magnetic susceptibility (AMS)

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During the Triassic, Iberia and nearby areas of the North-African systems constituted the transition zone between the North Atlantic Ocean opening and the westernmost Tethyan realm. Unravelling the stretching direction (i.e. primary magnetic lineation) during this period can help to understand the tectonic setting of the studied area. In this work, we revise and compile anisotropy of magnetic susceptibility (AMS) data carried out on weakly deformed Triassic deposits from several Triassic depocenters; the Cabuérniga (western Basque-Cantabrian basin) and Cameros (Demanda massif) basins, the Central Pyrenees, the Iberian intraplate basin, the Lusitanian basin, the Western Atlasic Triassic basins, the Southern margin of the Iberian massif and the Algarve basin. All of these basins were characterized by continental (Early Triassic) to marine (Middle Triassic) and transitional (Late Triassic) sedimentation for the studied period. Faults show different dominant orientations in the different basins, resulting from the inheritance of major crustal- or lithospheric-scale features: aproximately N-S in the Lusitanian basin, NW-SE in the Iberian basin, WNW-ESE in the Pyrenees and Basque-Cantabrian basin and ENE-WSW in the western Atlasic basins. The AMS data refer to 127 sites in which the bulk susceptibility ranges between 35 and 446 x 10-6 S.I.. Most of the studied sites correspond to red beds (siltstones and shales) in which hematite is the dominant contributor to the magnetic fabric. All magnetic ellipsoids show Kmin axes perpendicular to bedding and Kmax axes of the ellipsoid grouped and within bedding. The results show the importance of a regional WNW-ESE stretching direction that is imposed by the North Atlantic opening. The extensional directions obtained in the western portion of the Iberian peninsula and western Atlasic basins are deviated by the activity of major crustal oblique structures, and that of the eastern half of the Iberian peninsula are also locally deviated to the NE-SW in relation with the activity of previous oblique structures; these were probably also influenced by the westward spreading of the Tethys. This study reinforces the power of AMS analysis in basin analysis and in unraveling the geodynamic evolution of the opening of the Atlantic rift system.