Contrasting origin of the magnetic anomalies of the Central-Iberian Arc: role of mantle implication

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Résumé

The Iberian Massif features two oroclines: the tight Ibero-Armorican arc (IAA) and the older and less pronounced Central Iberian Arc (CIA). Both are late Variscan structures that bend the early Variscan folds and thrust faults, as well as the tectonostratigraphic zonation of the Iberian Massif. Also, both arcs are delineated by magnetic anomalies (Fig. 1). Those of the CIA feature low amplitudes/short wavelengths in its external part and long wavelengths/high amplitudes at its core. The origin of the latter has been addressed to extensional tectonics, as anomalies overlap late Variscan extensional domes. Particularly, at the arc's northernmost part, the Eastern Galicia Magnetic Anomaly (EGMA) has been attributed to the stability of magnetic iron oxides at high temperatures and low pressures that prevail in extensional detachments (Ayarza et al., 2021; Durán et al., 2023). However, the source of other anomalies, e.g., the Central System Magnetic Anomaly (CSMA) is under study. Located at the core of the CIA, this anomaly also overlaps the exhumed products of late Variscan extension and melting, but no highly magnetic rocks had been identified so far. Recently, the CSMA has been studied in the Castellanos Antiform an in the nearby Puente del Congosto area. Both locations exhibit structures and lithologies related with late-Variscan extension, such as gneiss domes, migmatites and granitoids. New high resolution magnetic and gravity data indicate that the magnetic anomalies coincide with high Bouguer gravity anomalies. This potential field relationship together with the elevated amount of mafic xenoliths in granitoids suggest that in central Iberia, late Variscan extension might have involved deep levels of the crust and the mantle. Rockmag and paleomagnetic studies on these mafic rocks confirm a moderate magnetic susceptibility but an intense remanence that could produce the CSMA. Accordingly, at the core of the CIA, the simultaneity between arc development and late Variscan extension might have played an important role in the supply of magnetic mantle material.

Mots-Clés: Central Iberian Arc, magnetic anomalies, extensional tectonics, mantle implication

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