



Characterizing the Eastern Galicia Magnetic Anomaly (NW Spain): Origin of the mineralization and implications on the age of the Central Iberian Arc

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The EGMA (Eastern Galicia Magnetic Anomaly) is the most conspicuous anomaly of the Central Iberian Arc. It coincides with the Lugo-Sanabria extensional dome, a structure developed during the final stages of Variscan deformation in the NW Iberian Massif, where important crustal thickening triggered overheating and extension of the crust. In fact, every extensional dome at the Central Iberian Arc is also coincident with a, less intense but equally important, magnetic anomaly. The bend featured by these anomalies is one of key attributes of the aforementioned arc.

As yet, models of the EGMA, all based on low resolution aeromagnetic data, have not established a relationship between magnetization and tectonics. Ayarza and Martínez Catalán (2007) suggested that the source of the EGMA were syntectonic igneous rocks outcropping at the northern Lugo-Sanabria dome, but did not infer any process as source of the mineralization. A high resolution (2x2 km) magnetic land survey carried out recently at the northern part of the dome has shed some light on this issue.

The new magnetic anomaly map shows that the maxima coincide with identified extensional detachments and not with the center of the dome. These structures are often related to migmatites and inhomogeneous granites produced by crustal melting during the thermal event that triggered the extension. However, detachments also affect metasediments that, in these areas, show high magnetic susceptibilities. 2D models also indicate that the magnetization is concentrated along detachments and AMS studies show a planar anisotropy coincident with that of these extensional structures. Finally, rockmag studies indicate that multi-domain magnetite is the main magnetic mineral. A younger, probably Cretaceous, remanence has been addressed to hematite.

These results constrain the models about the origin of the EGMA and probably that of the rest of anomalies defining the Central Iberian Arc. We suggest they developed during thermal and extensional events (E1 and E2: 330-300 Ma) that followed crustal thickening during the Variscan collision in present NW Iberian Massif. These events developed thermal gneiss domes and extensional detachments where P-T and redox conditions allowed the crystallization of magnetite. If this is the case, the age of the magnetization predates or is contemporaneous with the development of the Central Iberian Arc, whereas non-magnetic late Variscan granites (295 Ma) postdate it.