Geophysical Research Abstracts,
Vol. 11, EGU2009-4031, 2009
EGU General Assembly 2009

The effect of remnant magnetization in the Eastern Galicia Magnetic Anomaly: constraints on the source of the remanence and implications for the geological model

P. Ayarza (1), J.R. Martínez Catalán (1), F. Alvarez Lobato (1), J.J. Villalaín (2), and R. Reguilón (1)

(1) Salamanca University, Geology, Salamanca, Spain (puy@usal.es; jrmc@usal.es; fernando@usal.es; rosalon@usal.es; +34-923-294488), (2) Burgos University, Physics Department, Paleomagnetic Research Group, Burgos 09008, Spain (villa@ubu.es; +34-947-258978)

The Eastern Galicia Magnetic Anomaly (EGMA) spans over an area of Ĩ0000 km2 and with a maximum of 190 nT, is one of the highest amplitude magnetic anomalies of the Iberian Peninsula. From a geological point of view, it occupies the centre of the Lugo-Sanabria Gneiss Dome, an antiformal structure developed during the Late Carboniferous extension that affected the Variscan fold and thrust belt of NW Iberia.

The EGMA reaches its maximum values along the Viveiro Fault, a normal fault located at the western boundary of the Lugo-Sanabria Dome, coinciding with a relative low of the Bouguer gravity anomaly. Magnetite-bearing migmatites and inhomogeneous granites outcropping in the northern part of the gneiss dome seem to be the main source of the anomaly. Magnetite grains are heterogeneously distributed, can reach up to 1 cm, and may appear also in the metamorphic country rocks, paragneisses and quartzites, adjacent to the granitoids. These findings led Ayarza and Martínez Catalán (2007) to conclude that the EGMA is caused by the products of partial melting formed during the late Variscan extensional collapse. 2D gravity and magnetic modelling allowed them to interpret the EGMA as the magnetic response of a N-S to NW-SE elongated body, 200 km long and roughly 90 km wide, lens-shaped in cross section and up to 10 km thick, formed by migmatites, inhomogeneous granites and their country rocks, and located at depths between 0 and 20 km.

The size of the magnetite grains suggested that magnetic remanence was unlikely and modelling was carried out assuming that the magnetic response of this lens-shaped body was mostly induced by the present-day magnetic field. However, recent NRM and demagnetization studies on a variety of samples have shown that remanence is common and even might get to be important, with Königsberger ratios (Qn) normally below 0.5 but exceptionally exceeding 1. Remanence is mostly produced by high coercitivity minerals (>120 mT) and seem to be post-Variscan in age. Its contribution to the present day EGMA is important, although apparently subordinated to that induced by the present Earth magnetic field, according to the Qn values and also to the heterogeneity of the NRM orientation. Remodelling of this outstanding anomaly and the study of its remanence, may place new constraints in the knowledge of the evolution of this area.

Ayarza, P., and Martínez Catalán, J.R., 2007. Potential field constraints on the deep structure of the Lugo gneiss dome (NW Spain). Tectonophysics, 439, 67-87.