



MAGNETIC MINERALOGY AND MAGNETIC FABRICS OF THE REMAGNETIZED MIDDLE-ORDOVICIAN LIMESTONES OF THE PONÓN TREHUÉ FORMATION (SAN RAFAEL BLOCK, WESTERN ARGENTINA)

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ABSTRACT

Detailed rock-magnetic studies of the geological units from the Argentine Precordillera and the San Rafael Block are still needed to better characterize the Sanrafaelic remagnetization event that took place in the Late Palaeozoic. In this work we present the first results on the magnetic mineralogy and magnetic fabrics of the Ordovician limestones from the Ponón Trehué Formation (Mendoza province, Argentina).

Keywords: Remagnetized limestones, Rock magnetic properties, Sanrafaelic remagnetization, San Rafael Block, Mendoza province

RESUMEN

Estudios detallados de las propiedades magnéticas de las unidades geológicas de la Precordillera Argentina y del Bloque de San Rafael son aún necesarios para caracterizar con mayor profundidad el evento de remagnetización sanrafaélica ocurrido durante el Paleozoico tardío. En este trabajo presentamos los primeros resultados sobre la mineralogía y la fábrica magnética de las calizas ordovícicas de la Formación Ponón Trehué (provincia de Mendoza, Argentina).

Palabras clave: Carbonatos remagnetizados, Propiedades magnéticas de rocas, Remagnetización Sanrafaélica, Bloque San Rafael, Provincia de Mendoza

Introduction

There is large evidence that numerous Paleozoic sedimentary rocks from the Argentine Precordillera and neighbouring provinces were affected by a regional remagnetizing event associated to the Sanrafaelic deformational phase during Permian (Rapalini and Tarling, 1993). The palaeomagnetic pole positions from the Hoyada Verde, Alcaparrosa, La Flecha, San Juan, La Silla and Ponón Trehué Formations are all examples that confirm that many units were remagnetized during the Late Palaeozoic (Vilas and Valencio, 1978; Rapalini and Tarling, 1993; Truco and Rapalini, 1996; Rapalini *et al.*, 2000; Rapalini and Astini, 2005). Rapalini and Astini (2005) proposed that there was a temporal-spatial migration of the remagnetizing front in which the geological units in the Western Precordillera were affected during the Early Permian while those in the Eastern Precordillera were remagnetized during the Late Permian, as a consequence of eastward migration of fluids expelled from the orogenic area (Rapalini and Astini, 2005). A lithological control in the process was also supported (*e.g.* the red beds of the Cambrian Cerro Totorá Formation, in the northern areas of the Precordillera, presents a primary magnetization, Rapalini and Astini, 1998). A better comprehension of the chemical and physical processes that took place during the Sanrafaelic Orogeny and its associated remagnetization need detailed rock magnetic studies which are yet scarce (see review in Font *et al.*, 2012).



In this work we report the first results of a rock-magnetic study on the samples of the Middle-Ordovician limestones from the Ponón Trehué Formation which carry a syn-tectonic magnetization as determined by the palaeomagnetic research of Truco and Rapalini (1996).

Methodology and results

We analyzed specimens from the previous work of Truco and Rapalini (1996) who collected oriented cores from six sites on opposite limbs of a tight anticline (35.17°S, 68.30°W) plunging less than 15° towards Az. 150°. Thermal demagnetization of triaxial IRM was performed in the soft (<0.1 T), medium (0.1-0.4 T) and hard (0.4-2.3T) coercivity fractions (Fig.1). The specimens showed that goethite dominates the magnetic

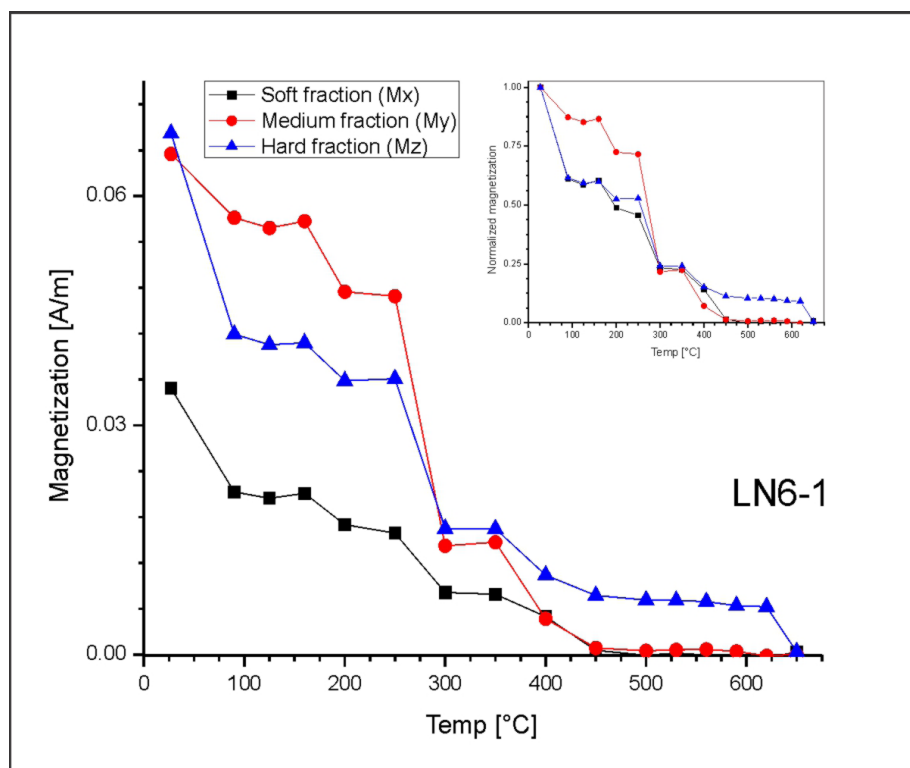


Figure 1. Demagnetization of triorthogonal IRM (Lowrie, 1990) of a specimen from site LN6. Inset: normalized plot.

mineralogy, with minor but appreciable contributions of pyrrhotite and magnetite. Haematite is also present but very subordinate. Considering the unblocking temperatures (250-550°C) of the characteristic remanence and its coercivity range (30-50 mT) the Sanrafaelic remagnetization in this unit is likely carried both by pyrrhotite and magnetite. The magnetic fabrics of these rocks were studied by means of the low-field anisotropy of magnetic susceptibility (AMS) as well as the anisotropy of anhysteretic magnetic remanence (AARM; $H_{dc}=50\mu\text{T}$, $H_{ac}=100\text{mT}$). We found that both the susceptibility and the remanence fabrics are consistent, both in the directions of the ellipsoid principal axes as well as in the ellipsoidal shape. The magnetic lineation is subparallel to the fold axis confirming that the origin of the fabric, and likely the magnetic mineralogy (magnetite plus pyrrhotite), is of tectonic origin and associated to the fold development (Fig. 2). Further rock-magnetic studies of these remagnetized carbonates are under way.

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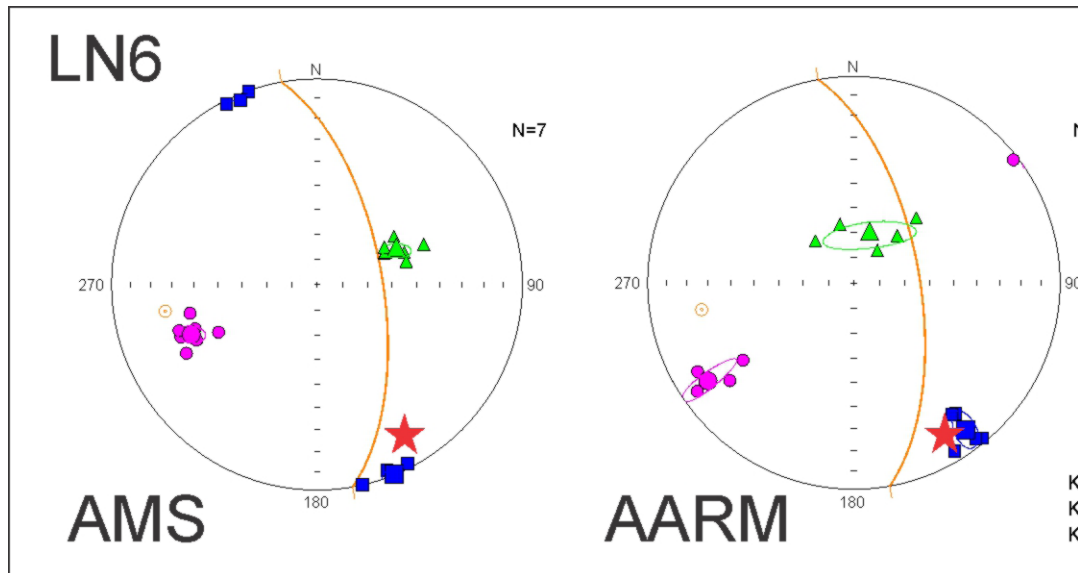
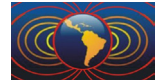


Figure 2. AMS and AARM plots in equal-area projections (lower hemisphere) for site LN6 in the geographic coordinate system. Maximum, intermediate and minimum principal directions of the anisotropy of susceptibility and of the magnetic remanence ellipsoids are indicated by square, triangle and circle symbols, respectively. The ellipses correspond to 95% confidence regions of the mean axes (Jelínek, 1978). The star points out the direction of the fold axis.

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