NEW EVIDENCE OF A WIDESPREAD PERMIAN REMAGNETIZING EVENT IN THE CENTRAL ANDEAN ZONE OF ARGENTINA

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INTRODUCTION

The pre-Andean tectonic evolution of the western continental margin of southern South America involves the possible accretion and displacement of mobile terranes during Late Proterozoic and Paleozoic times (e.g. Ramos, 1988). In particular, the Cambrian-Ordovician carbonate platform of the Argentine Precordillera, and its southward continuation in the San Rafael Block, has been proposed of being a Laurentian terrane that was accreted to Gondwana in the Early Paleozoic (e.g. Astini et al, 1995). However, up to date no paleomagnetic data has been obtained from rocks of that age from this region to test this proposal. Evidence of an important Permian remagnetizing event in Precordillera was firstly presented by Rapalini and Tarling (1993). This remagnetization has so far precluded from obtaining primary remanence directions from Cambrian-Ordovician limestones in this region. In order to constrain the paleogeographic evolution of this terrane in the Early Paleozoic a paleomagnetic study was carried out on the Middle Ordovician carbonatic rocks of the Ponón Trehué Fm. exposed in the San Rafael Block (western Argentina, Fig.2a). A complementary paleomagnetic study was also done on the Late Carboniferous clastic sediments of the El Imperial Formation, also exposed in the area. The results of this study show that both units carry an old characteristic magnetization that was acquired during the folding of the rocks in Early Permian times caused by the San Rafaelic tectonic event.

RESULTS AND INTERPRETATION

Six and seven sampling sites (thirty eight and forty-four samples) were located on the Ponón Trehue and El imperial Formations respectively. The former was sampled on opposite limbs of a tight anticline, while the latter was sampled on two different sections separated around 5 km. One of these sections (sites PJ6 and PJ7) was overturned. Standard paleomagnetic demagnetization of all samples was done with either AF or thermal procedures. While the former was efficient only in four sites of the Ponón Trehué Fm., the latter was the most effective in isolating the magnetic components in all other sites. Figure 1 shows typical magnetic behaviour of samples from the Ponón Trehué Fm. (Fi.1a, 1b) and El Imperial Fm. (Fig.1c). In both cases most samples were carrier of two consistent magnetic components that were defined by principal component analyses (Kirshvink, 1980). One directed up and north (component A), coincident with the present dipole direction, was deleted in most cases at temperatures around 150 to 300° C (Fig.1b, 1c). This suggests a viscous and/or a chemical recent secondary magnetization. A second magnetic component (B) directed down and south was isolated between 300 and 550° C in the Ordovician limestones, suggesting magnetite as the main ferromagnetic carrier. A similar component was defined in the Carboniferous sandstones between 400 and 690° C, suggesting hematite as the carrier of the remanence. Mean sites direction were computed for component B (Table 1). Only mean site direction from PJ-3 was ruled out due to a high α95, all others showing very good within site consistency of directions (α95<15°). Application of stepwise structural correction and McFadden's (1990) fold test indicated that the remanence was acquired during deformation of the rocks. Maxima of Fisher's k parameter were attained for 21% (Ponón Trehue Fm.) and 38% (El Imperial Fm.) of structural corrections. In both cases the fold test was significant at a 99% confidence level.

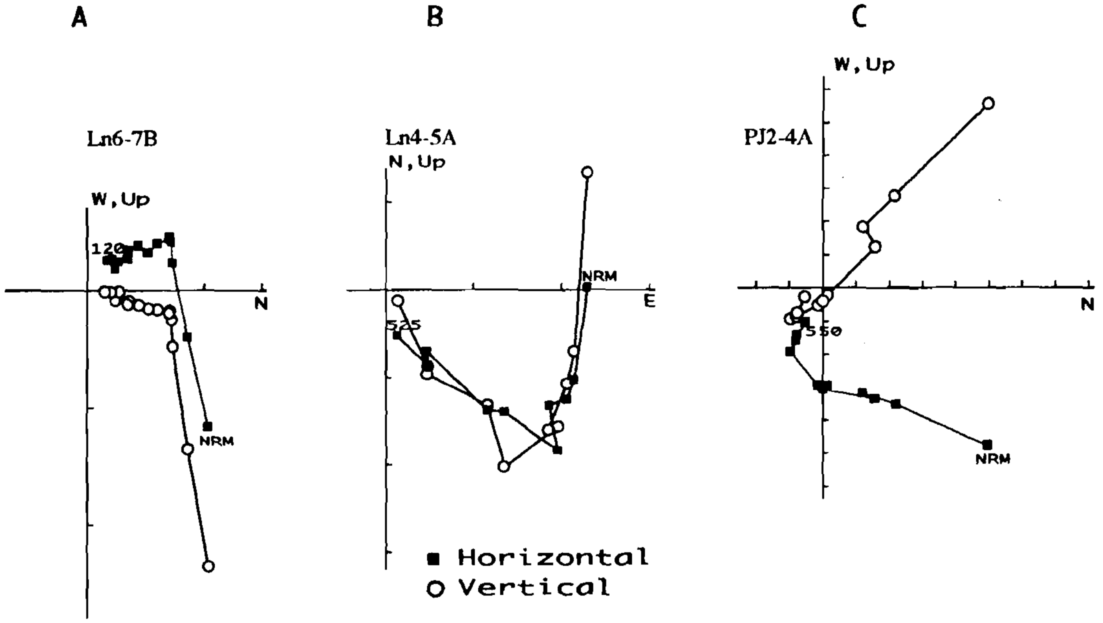

Fig.1. Representative magnetic behaviour of samples from the Ponón Trehué (A, B) and El Imperial (C) Formations

Two paleomagnetic poles were computed from the partially corrected mean remanence directions, PN: 25.0°E 53.4°S α95: 8.8°, EI: 0.8°E 48.6°S α95: 19.6° (Fig.2b). The position of these poles is close to other late Carboniferous and early Permian poles from South America. This is consistent with the Early Permian age of the San Rafaelic tectonic phase that affected the western margin of southern South America in the late Early Permian (280-272 Ma, LLambías & Sato, 1995). Late Permian volcanics in the study area are not affected by this deformation. It is remarkable the coincidence of PN and EI poles with other remagnetized poles from the Argentine Precordillera (e.g. the Hoyada Verde HV, the Alcaparrosa AL and the San Juan limestones SJ poles, see Fig.2). The latter were assigned to a remagnetizing event affecting the Central and Western Precordillera during Early Permian times and linked to the San Rafaelic tectonic phase. The new results suggests that the region affected by this remagnetizing event also comprises the San Rafaelic Block, several hundred km. south of Precordillera. Detailed rock magnetic studies of these units should shed light on the mechanisms of this regional remagnetizing events.

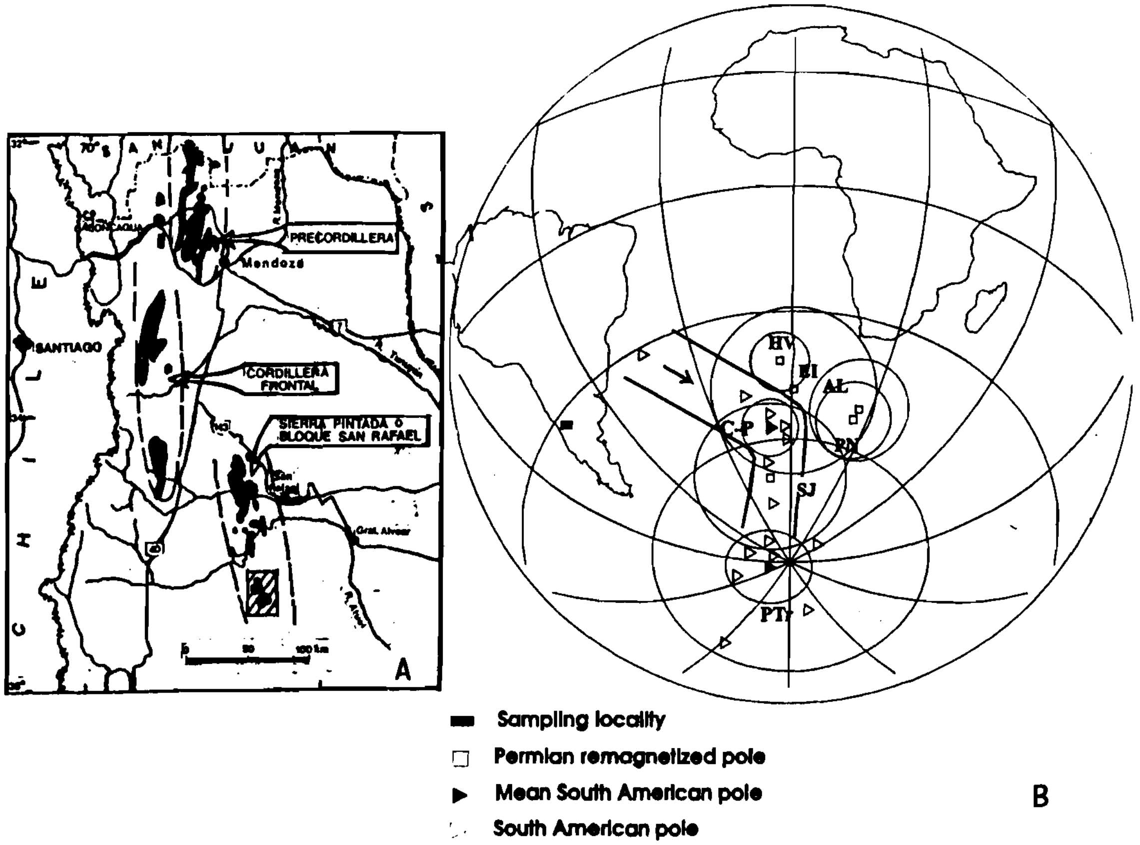

Fig.2a. Location map of the studied area (shaded rectangle). In black, outcrops of Early Paleozoic rocks (simplified from Cuerda et al, 1993). **2b.** Late Paleozoic apparent polar wander path for South America and distribution of remagnetized poles from Precordillera and San Rafael Block (squares). C-P and PTr: Late Carboniferous - Early Permian and Late Permian - Early Triassic mean poles for South America (Rapalini et al, 1993).

FORMATION	SITE	N	REMANENCE (in situ)				STRUCT. CORRECT.		REM. (full corrected)	
			Dec. (°)	Inc. (°)	A95 (°)	K	Strike	Dip	Dec. (°)	Inc. (°)
Ponon Trehue F.	Ln-1	6	124.8	28.2	10.0	45.8	182	71	205.2	58.6
	Ln-2	3	116.8	41.5	12.2	101.8	182	71	234.2	59.12
	Ln-3	5	139.2	31.7	5.2	216.5	182	71	208.3	45.8
	Ln-4	6	128.0	36.0	4.6	207.7	182	71	217.8	54.1
	Ln-5	6	150.5	46.9	9.5	50.0	350	64	120.4	6.6
	Ln-6	5	162.4	40.3	15.8	24.2	350	64	130.3	11.1
Mean sites (in situ)		6	136.5	39.2	12.5	29.9				
Mean sites (100 % correct.)		6	174.6	49.6	40.4	3.7				
Mean sites (21 % correct.)		6	139.2	44.0	7.9	72				
El Imperial F.	Pj-1	5	114.8	34.1	14.0	30.7	155	81	191.6	37.9
	Pj-2	5	118.7	26.3	8.0	91.6	155	81	181.1	59.1
	Pj-3	3	127.7	28.6	30.4	17.5	*			
	Pj-4	4	115.6	32.3	5.4	286.5	155	81	189.2	37.8
	Pj-5	4	113.3	32.0	9.7	90.4	155	81	189.5	39.8
	Pj-6	4	236.6	62.8	12.1	58.8	337	111	71.7	5.7
	Pj-7	5	222.7	64.1	11.8	42.9	337	111	77.3	2.8
Mean sites (in situ)		6	130.5	50.7	33.6	4.9				
Mean sites (100 % correct.)		6	150.5	41.2	54.7	2.5				
Mean sites (38 % correct.)		6	130.0	56.0	14.8	21.4				

Table 1. Paleomagnetic data of the Ponón Trehué and El Imperial Formations.

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