

New Rock Magnetic and Paleomagnetic Information Obtained for southern Patagonia (Argentina)

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Abstract: A composite record composed of three sediment cores collected from the centre of Laguna Potrok Aike (51°58'S, 70°23'W; 113 m a.s.l.) are used to obtain a continuous and well-dated record of paleomagnetic and paleoenvironmental changes for the last ca. 50,000 years. The coring activities were carried out in 2008 in the framework of the ICDP-project PASADO. The core sections are 74.67 m, 64.25 m and 62.09 m long and correspond to holes A, B and C, respectively. The cores were cut into 1-2 m segments, split into halve and stored at 4° C. After sedimentological description, one half of each core was subsampled for rock and paleomagnetic studies at regular intervals using cubic plastic boxes with a volume of 2x2x2 cm³. In order to characterise these lake sediments, the following measurements were performed: (1) intensity and directions (declination, inclination) of natural remanent magnetisation (NRM) using a 2G high-resolution cryogenic magnetometer with RF SQUID sensors. Stability of the magnetisation was analyzed by alternating-field (AF) demagnetisation. The directions of the stable remanent magnetisation were determined by vector analysis of the demagnetisation results; (2) low-field susceptibility (specific, X and volumetric, k), using a Kappa bridge KLY-2 (Agico) with an operating frequency of 920 Hz, and a magnetic induction of 0.4 mT; (3) isothermal remanent magnetisation (IRM) acquisition in fields up to 0.7 T using a 2G high-resolution cryogenic magnetometer with RF SQUID sensors; (4) anhysteretic remanent magnetisation (ARM_{100mT}) using a 2G high-resolution cryogenic magnetometer with RF SQUID sensors, in a peak 100 mT AF and 0.1 mT bias field. For a set of pilot samples hysteresis properties (such as saturation magnetisation M_S, saturation remanence M_{RS}, coercivity H_C, coercivity of remanence H_{CR} and high-field susceptibility (k_h)) using a MicroMag™ Model 2900

(AGM) Alternating Gradient Magnetometer. The ratios ARM/k, SIRM/ARM and B_{CR} (remanent coercitive field), k_{anh} and the S_{ratio} were calculated.

Most of the samples show no systematic change in the direction of their remanent magnetisation during AF demagnetisation; few of them have a viscous magnetisation, which could easily be removed by AF demagnetisation at about 10 mT. Rock magnetic properties document that main carriers of magnetisation are ferrimagnetic minerals, predominantly pseudo single domain magnetite. NRM as well as declination and inclination logs of the characteristic remanent magnetisation were obtained for all samples as a function of a preliminary age/depth model. Comparison between inclination and declination records of Laguna Potrok Aike and results obtained in earlier studies carried out at the same site by Gogorza et al. (2012) and Lisé-Pronovost et al. (2013) and at lakes Escondido (Gogorza et al., 2002), Moreno (Gogorza et al., 2000) and El Trébol (Irurzun et al., 2006), were performed and show similarities although some discrepancies in the amplitude and age of the features are obvious. Despite this, the inclination and declination records at these sites, which are located more than 1000 km apart, can be correlated between them and with other records from the same lake.

Keywords: Paleomagnetism, Rock Magnetism, Laguna Potrok Aike, PASADO, ICDP

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