

AGU Joint assembly, Montreal, Canada, 3-7 May 2015, GP24A-0181

Improving our knowledge of the geomagnetic field intensity in South America: New Archaeointensity Data from Potsherds coming from three Archaeological Sites in Ecuador.

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Archaeomagnetic data from the south hemisphere is still very scarce and most of the global geomagnetic field models suffer from this lack of data as well as from their uneven geographical distribution. In this study we present new archaeointensity data from three archaeological sites in Ecuador (South America). Potsherd fragments come from the archaeological excavations of Atuntaqui, Otavalo Mounds and La Chimba, dated at 571 BP, 651-622 BP and 2586-2120 BP respectively, based on available radiocarbon dating. Successful archaeointensity data have been obtained from thirty five potsherds using the Thellier-Coe protocol. Rock magnetic experiments including low-field versus temperature (k-T) plots, Isothermal Remanent Magnetization (IRM) acquisition curves, as well as hysteresis loops and back-fields, have been performed in order to characterize the magnetic behavior of the samples and determine their main magnetic carriers. The Curie temperatures indicate the presence of at least two magnetic mineral phases (i.e. 220-255°C and 560-590°C), with predominant Curie temperatures typical of magnetite. The results of the magnetic grain size analyses suggest the presence of particles in the Pseudo-Single Domain (PSD) range, according to the distribution on the modified Day et al. diagram (Dunlop 2002 a and b) for magnetite. The successful absolute palaeointensity determinations yielded archaeointensity values of $43.9 \pm 1.4 \mu\text{T}$ for Atuntaqui, $37.6 \pm 0.8 \mu\text{T}$ for Otavalo Mound 3 (upper charcoal lens, ca 622 years old BP), $29.6 \pm 1.1 \mu\text{T}$ for Otavalo Mound 3 (lower charcoal lens, 651 years old BP) and $38.0 \pm 3.1 \mu\text{T}$ for La Chimba. The new results are in good correlation with archaeomagnetic data from the Palpa area in South Peru, located within a 900 km radius around the Ecuadorian sites in question. These data are the first archaeointensity results from Ecuador for the last 1500 years and aim to enrich our knowledge of the geomagnetic field intensity variations in the south hemisphere, together with previously published data from South America.