Archaeomagnetic dating in Italy: An example of a baked clay kiln excavated at Santhià, Northern Italy

Tema E. ([a]), Ferrara E. ([b]), Panero E. ([c]) & Giachino S. ([b])

([a]) Dipartimento di Scienze della Terra, Università degli studi di Torino, Italy
([b]) Istituto Nazionale di Ricerca Metrologica, Torino, Italy
([c]) Musei Reali Torino, Area Patrimonio - Curatore Archeologia e Numismatica, Torino, Italy

evdokia.tema@unito.it

We present the results of a detailed archaeomagnetic investigation of a baked clay kiln excavated at Santhià (via Castelnuovo, Cascina Madonna), Northern Italy (Fig. 1). During the archaeological excavation, carried out by the Soprintendenza Archeologica del Piemonte, a total of 25 brick samples were collected for archaeomagnetic analysis. All of them come from the combustion chamber of the kiln and were oriented *in situ* with a magnetic compass and an inclinometer. Magnetic mineralogy experiments were carried out to determine the main magnetic carrier of the samples and to check their thermal stability. Such measurements suggest the presence of a low coercivity mineral, most probably magnetite. Standard thermal demagnetization procedures were applied to isolate the direction of the Characteristic Remanent Magnetization (ChRM) acquired by the baked clay during the kiln's last firing. The obtained results show a single-component, very stable and well defined remanent magnetization. The mean ChRM direction, calculated based on a Fisherian distribution, is: D= 10.9˚, I= 63.8˚, alpha-95= 2.1˚, k= 267. The mean declination and inclination values obtained were used for the archaeomagnetic dating of the kiln, after comparison with the reference secular variation curves calculated from the SCHA.DIF.3K European geomagnetic field model (Pavón-Carrasco et al., 2009). The reference curves have been directly calculated at the geographic coordinates of Santhià and have been used for the calculation of probability density functions separately for declination and inclination. The final dating of the kiln is obtained after the combination of the separate density functions, suggesting that the kiln was abandoned around 1543 ± 52 AD, at 95 % of probability. This age is in very good agreement with the archaeological evidence available for the site as well as with the independent dating information based on thermoluminescence analysis performed on the same kiln (TecnART). These results show the high potential of archaeomagnetic dating of baked clay archaeological structures in Italy, mainly for the last three millennia for which a detailed reference secular variation curve is available.

Fig. 1 Photo of the studied kiln excavated at Santhià

References

Pavón-Carrasco F. J., Osete M.L., Torta J.M., Gaya-Piqué L.R. A regional archaeomagnetic model for Europe for the last 3000 years, SCHA.DIF.3K: applications to archaeomagnetic dating. Geochem. Geophys. Geosyst., 10 (3), Q03013, (2009) doi:10.1029/2008GC002244.