

## **Archaeomagnetic study of a brick kiln excavated at Fontanetto Po (Vercelli, Northern Italy)**

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A complete archaeomagnetic study was carried out as part of a rescue archaeological excavation on a kiln discovered during the installation of methane gas pipelines beneath a rice field, along the southern border of Fontanetto Po village (Vercelli province, Italy). Hierarchical sampling process has been followed collecting 23 independent brick samples oriented *in situ* with an inclinometer; the use of magnetic compass was not possible due to the existence of the metallic methane pipelines already situated at a depth of around one meter below the structure while the wooden and plastic protection coverage mounted to protect the kiln from adverse weather conditions made impossible the use of sun compass. Standard archaeomagnetic procedures have been used for the determination of the archaeomagnetic inclination and absolute geomagnetic intensity. Isothermal remanent magnetization (IRM) experiments pointed to Ti-magnetite as the main magnetic carrier in most of the samples; high coercivity mineral, most probably Ti-poor (titano) hematite, is also present in some cases. Stepwise thermal and AF demagnetization shows a stable characteristic remanent magnetization (ChRM) and no or negligible secondary magnetization (probably of viscous origin) components. The calculated mean inclination of the 23 samples is  $I = 65.3^\circ$  with  $\alpha_{95} = 2.4^\circ$  and  $k = 156$ . Archaeointensity experiments have been done on 22 specimens obtained from 15

independent bricks. The classical Thellier method as modified by Coe with regular partial thermoremanent magnetization (pTRM) checks has been used. The cooling rate and remanence anisotropy effects upon thermoremanent magnetization (TRM) have been investigated in all the specimens. A total of 15 archaeointensity determinations (at specimen level) that correspond to linear NRM-TRM plots and satisfy several acceptance criteria were used for the calculation of the site mean archaeointensity that is  $45.9 \pm 2.6 \mu\text{T}$ . The archaeomagnetic age has been obtained after comparison of the kiln's archaeomagnetic parameters with the inclination and intensity reference curves produced by the SHA.DIF.3K European regional geomagnetic field model. Two possible dating intervals result for the last 1000 years calculated at 95 % confidence interval: a first one from 1515 to 1606 AD, and a second one from 1768 to 1872 AD. According to thermoluminescence (TL) dating results available from two bricks of the same kiln, the second dating interval seems more probable and suggest that the last firing of the kiln could have occurred as late as the 19<sup>th</sup> century AD.