



Combined archaeomagnetic and thermoluminescence study of a brick kiln excavated at Fontanetto Po (Vercelli, Northern Italy)

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ABSTRACT

A combined archaeomagnetic and thermoluminescence 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). A total of 23 independent brick samples have been collected, oriented *in situ* with an inclinometer; the use of magnetic and sun compass was not possible due to the existence of metallic tubes beneath the kiln and a plastic cover above it. Standard archaeomagnetic procedures have been used for the determination of the archaeomagnetic inclination and absolute geomagnetic intensity. Stepwise thermal demagnetization shows a very stable characteristic remanent magnetization and 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 performed using the classical Thellier method as modified by Coe, with regular partial thermoremanent magnetization (pTRM) checks. The cooling rate and remanence anisotropy effects upon thermoremanent magnetization (TRM) have been investigated in all the specimens. A total of 19 archaeointensity determinations (at specimen level) that correspond to linear NRM–TRM plots were used for the calculation of the site mean archaeointensity that is $46.4 \pm 2.9 \mu\text{T}$. Archaeomagnetic dating results show two possible dating intervals for the last 1000 years, calculated at 95% confidence interval: a first one from 1511 to 1614 AD, and a second one from 1768 to 1872 AD. Thermoluminescence (TL) study has been also performed on two brick samples from the kiln's internal wall, using conventional laboratory procedures. According to the thermoluminescence results the kiln's last usage lies between 1796 and 1914 AD. This age is in good agreement with the second dating interval obtained by the archaeomagnetic analysis. The combined archaeomagnetic and thermoluminescence results suggest that the last firing of the kiln could have occurred between the end of the 18th century and the beginning of 20th century.

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1. Introduction

Dating of archaeological material is a key issue in the archaeological research as it can significantly contribute to determine the age and duration of the human occupation of a site and define the chronology of cultural and economic development of a certain area. A wide variety of established and newly developed archaeometric techniques can offer valuable dating tools and in some cases different techniques can be applied to the same artefacts. Archaeomagnetic and thermoluminescence dating methods can, under