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New archaeointensity results from Italian kilns and archaeomagnetic dating based on the full geomagnetic field vector.

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Archaeomagnetic dating is based on the comparison of the geomagnetic field vector registered on baked archaeological material during their last firing and the reference secular variation curves that describe the changes of the geomagnetic field in the past at a certain region. However, in most of the up to now published studies, only two of the geomagnetic field elements (declination and inclination) are used. In this study we present the archaeomagnetic dating results of three Italian kilns based on the full geomagnetic field vector (declination, inclination and intensity). The three kilns (Ascoli Satriano, Vagnari and Fontanetto Po kiln) have been studied for archaeointensity determination using the Thellier modified by Coe method. Rock magnetic studies identify magnetite and Ti-magnetite as the main magnetic minerals, with some minor hematite only in few cases. Magnetic susceptibility versus temperature shows a good thermal stability of the samples. The intensity results have been corrected for anisotropy of the thermoremanent magnetization and cooling rate effects. The archaeodirections of the Ascoli Satriano and Vagnari kilns have previously studied and published by Tema et al., 2006. For the Fontanetto Po kiln only the archaeomagnetic inclination has been defined because the presence of methane metallic tubes in a depth around 1 m below the kiln, and the bad weather conditions during sampling, prevented the use of magnetic compass and the sun orientation of the samples, respectively (Tema et al., 2010). The directional results of the three kilns together with the new intensity determinations have been used for comparison with the reference secular variation curves. The archaeomagnetic ages of the kilns have been obtained using the Matlab Tool developed for archaeomagnetic dating by Pavón-Carrasco et al., 2011 and the reference secular variation curves calculated directly at the sampling sites by the SCHA.DIF.3K regional geomagnetic field model. The final dating intervals have been calculated after combination of temporal probability density functions of the three geomagnetic field elements, with only exception the Fontanetto Po kiln for which only

inclination and intensity values were available. The ages obtained are in good agreement with the archaeological evidence of the sites and suggest that, when it is possible, the full geomagnetic field vector must be used for archaeomagnetic dating.

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