



## Limestone as an archaeomagnetic geomagnetic field recorder.

Souad Ech-Chakrouni, Jozef Hus, Simo Spassov, and Raoul Geeraerts

Centre de Physique du Globe de l'IRM, Dourbes (Viroinval), Belgium, (sechchak@oma.be)

Archaeomagnetism is mainly based on the examination of burnt and fired clays discovered in archaeological sites, but rarely of burnt rocks. As burnt stones are commonly found during excavations (especially when rocks are outcropping at or close to the sites), their potential as geomagnetic field recorders was examined and in the present case in particular of burnt limestone.

The presence of quicklime kilns in archaeological sites in Europe is not exceptional as lime was used in construction materials such as cement, mortar and plaster since the roman period and also as a fertiliser since medieval times. These kilns are often difficult to date because of the absence of artefacts. Archaeomagnetic results are presented from three quicklime kilns of different age, the walls of which were made of limestone blocks. In the three cases, the fidelity of the geomagnetic field record is high with a high precision factor  $K$  and high confidence (low  $\alpha_{95}$ ) and the kilns could be dated, based on the variation of the field direction in the past. As the examined sites are relatively close to Paris, we referred to the standard secular variation curves of France (Gallet et al., 2002) and the software Rendate (Lanos, 2004) to date the last firing of the kilns.

The composition and nature (domain state) of the remanence carriers in the burnt limestone was determined by rock magnetic analysis (hysteresis parameters, anisotropy and thermomagnetic properties) and the suitability of limestone for field intensity determinations examined. The magnetic properties are highly variable between the samples and between the kilns because of different origins of the limestone used and concentration changes of the magnetic mineral content. A few directional outliers correspond to samples with a negative bulk magnetic susceptibility or a weak bulk but very high frequency dependent magnetic susceptibility.