

Archaeomagnetic evidence of temporal diachronies in Middle-Palaeolithic palimpsests. A case study from El Salt (SE Spain)

Ángela Herrejón Lagunilla (1), Ángel Carrancho (2), Juan José Villalaín (1), Carolina Mallol (3,4), Cristo Manuel Hernández (3), and Bertila Galván (3)

(1) Departamento de Física, Universidad de Burgos, Burgos, Spain (aherrejon@ubu.es), (2) Departamento de Historia, Geografía y Comunicación, Universidad de Burgos, Burgos, Spain, (3) U.D.I. de Prehistoria, Arqueología e Historia Antigua, Universidad de La Laguna, La Laguna, Spain, (4) Instituto Universitario de Bio-Organica Antonio González, La Laguna, Spain

Archaeomagnetism is a very useful tool to the study of Palaeolithic palimpsests and this line of research is almost unexplored. Middle Palaeolithic palimpsests (ca. 250 – 40 ky BP) as El Salt site (Alcoy, Spain) contain a big amount of hearths with thousands of lithic and faunal remains associated to them. Most of these hearths and associated materials are so densely overlapped that individualization of human occupations discerning temporal differences is virtually impossible. Archaeomagnetism can be very helpful to that aim. In this work the goal of archaeomagnetic study is not to obtain a dating since no palaeosecular variation (PSV) curve for that age is available, but to identify diachronies between hearths exposed on the same palaeosurface. It is archaeologically relevant as that information cannot be often easily determined. For this purpose, an archaeomagnetic study has been carried out on some hearths from El Salt unit X (ca. 50-55 ky BP).

Assuming that each hearth recorded the Earth's magnetic field (EMF) direction during the last cooling by means of a thermoremanence (TRM), here is proposed a hypothesis to temporally dissect palimpsests: if the mean directions obtained from two (or more) hearths are statistically distinguishable, directional differences can be interpreted in terms of the PSV of EMF, being therefore diachronic.

The mean archaeomagnetic direction from each hearth was calculated. Statistical tests were performed in order to evaluate if the means are distinguishable. In case of distinguishable means, the angle among directions was calculated. Assuming that the features of the EMF during the Middle Palaeolithic were similar to those during Holocene times, the geomagnetic field model SHA.DIF.14K (Pavón-Carrasco et al. 2014) was used to interpret these angle deviations in temporal terms. Series of angles between successive directions of the EMF separated by intervals of 50/100/200/400/800 years for the last 5000 years were calculated from the model. The angle between the distinguishable mean archaeomagnetic directions was compared with maximum angles from these series. If the angle between archaeomagnetic directions is higher than the maximum angle from one of those series of successive directions separated by certain ages, it can be assumed that the studied hearths should have been fired with a minimum temporal difference of that time span.

The overall interpretation is based not only in archaeomagnetic data but in other techniques such as soil micromorphology, FTIR, organic chemistry, lithic and faunal refitting, etc. In addition, experimental hearths under controlled conditions were performed and analyzed using different techniques including archaeomagnetism in order to study how reliably the EMF direction is recorded under different taphonomical conditions. The experimental data support the hypothesis that hearths are reliable recorders of the EMF direction, both in cave and open-air conditions.