



Magnetic record of the isotope stage 3 in the Carpathian Mountains (Romania)

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Previous rockmagnetic studies on the loess deposits from the Danube Plain, the Black Sea shore and the East Carpathians have shown that inside the first loess layer below the recent soil there is an incipient soil, corresponding to isotope stage 3, characterized by enhanced magnetic susceptibility with respect to loess. Maximum magnetic susceptibility of this incipient soil range from 30 to 50 x 10⁻⁸ m³kg⁻¹ and the loess has only 20 x 10⁻⁸ m³kg⁻¹. Most of sections show only a single peak of magnetic susceptibility, but the section from the East Carpathians have two distinct peaks suggesting the presence of two warm phase during isotope stage 3. In this study we report the results obtained from a cave situated in the western part of the Southern Carpathians. The cave is famous by the discovery of the oldest modern human of the European continent (c.a. 35000 years BP) and a rich deposit of cave bear bones. The cave was used by bears for 4000 years around 43000 years BP (Quilés et al., in press). We have sampled an 11 m long section in the cave sediments. The section is composed mainly by clay, silt and two layers with coarser sediments. The upper age of the sediment is constrained by the age of a stalagmite taken from the surface of the clay deposit. Two exploratory ²³⁰Th dates were performed by alpha-spectrometry at the U-series laboratory, University of Bergen, Norway. The two ages are (16.4 ± 1.3) ka and (16.0 ± 1.7) ka. The age of middle part of the section is constrained by the presence of bear bones only in one of the coarse layers. Concentration dependent parameters (magnetic susceptibility, anhysteretic and isothermal remanent magnetizations) show little variation on the first 2.3 m. The rest of the section is characterized by three peaks of these parameters. In the peaks, magnetic susceptibility values reach 20 to 30

$\times 10^{-8} \text{ m}^3\text{kg}^{-1}$. Concentration independent parameters (frequency dependence, the ratio $\text{IRM}(-0.3\text{T})/\text{IRM}(2\text{T})$) show that the section is dominated by high coercivity minerals, but it is a clear increase of magnetite content in peaks of the magnetic susceptibility. Following the interpretation of magnetic susceptibility variations in cave sediments of Ellwood et al. (2001), we have identified three warm periods inside isotope stage 3 when the magnetic signal is enhanced due to magnetically enriched soil washed, and entrapped inside the cave. The results correlate well with the response of Central European vegetation to rapid climate change during isotope stage 3 which shows three interstades with favorable climatic conditions separated by two cold stadial (Müller et al., 2003). The upper part of the section dominated by high coercivity minerals and with little variation of magnetic susceptibility was deposited during the Late Glacial Maximum.