



Integrating geomorphology, geophysics, sedimentology and geochronology – a multi-proxy geoarcheological investigation at the Early Upper Paleolithic site of Crvenka-At, Vršac (Serbia)

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The dispersal of Anatomically Modern Humans (AMH) into Central and Western Europe prior to 40 ka postulates migration routes from Eastern and Southeastern Europe towards the West either following the Danube upstream or north of the Carpathian and Alpine mountains. For the “Danube Corridor Hypothesis” the Middle Danube Basin (MDB) is an important link on the Danube route explaining AMH movement into Europe (Conard and Bolus, 2003). The paleoenvironmental and archeological archives in the MDB are in the focus of recent studies. Most geoarcheological studies focus on geomorphologically elevated positions at the foothills of the mountain ranges or within caves or rock-shelters in even higher altitudes (Hauck et al., 2017). However, there are also some isolated find-spots in the lowlands of the basin, such as the Aurignacian site Crvenka-At in the Serbian Banat. The reinvestigated site contains Aurignacian artifacts within sandy and partially gravely deposits covered by silty sediments. Two profiles were investigated to compare the lateral differences and cross-check the geochronological data. Electrical Resistivity Tomography (ERT) was conducted to detect stratigraphical differences within the near-surface quaternary deposits and to map the underlying bedrock topography. Furthermore, grain size analysis and luminescence dating (pIRIR) were undertaken to understand the timing and characteristics of the deposits. Our results confirm previous investigations that suggested a multiple-occupation Aurignacian and date the site with an age between ~41–34 ka ago. This age range concurs with other Aurignacian findings in the Banat, e.g. the earliest securely dated AMH remains in Europe from the Pestera cu Oase (Trinkhaus et al., 2003). ERT results show that findings occur on top of a unit of higher resistivities correlating to coarser-grained deposits. A clearly defined lower and upper boundary of this unit suggests an interpretation as terrace-like structure, which is incised into the underlying strata and overlain by finer-grained deposits. Thus, possible geomorphological processes forming the find-bearing stratigraphical unit require further discussion. Overall, results suggest an exploitation of a wider range of ecological and topographic settings by AMH than previously thought. Additionally, our findings encourage a more intensive exploration of the lowland areas of the Middle Danube catchment in order to better understand the early settlement of AMH in Europe.

Conard, N. J. and Bolus, M. (2003). Radiocarbon dating the appearance of modern humans and timing of cultural innovations in Europe: new results and new challenges. *Journal of human Evolution* 44 (3), pages 331–371.

Hauck et al. (2017). The Aurignacian way of life: Contextualizing early modern human adaptation in the Carpathian Basin. *Quaternary International*. Doi: 10.1016/j.quaint.2017.10.020

Trinkaus et al. (2003). An early modern human from the Pestera cu Oase, Romania. *PNAS* 100 (20), pages 11231–11236. doi: 10.1073/pnas.2035108100.