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Cosmic-ray burial dating of an Early to Middle Pleistocene hominin site: physical and chemical sample treatment and purity control via ad-hoc mass spectrometry scans

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The assay of in-situ terrestrial cosmogenic nuclides (TCN) ^{10}Be and ^{26}Al is central to a geo-archaeological project aimed at determining the age of cultural Layer VII, representing a possible Early to Middle Pleistocene (Lower Palaeolithic) hominin occupation at Korolevo, Transcarpathia, western Ukraine. The cobbles (quartz, quartzite and sandstone) from the Layer VII, fluvial terrace on the Tisza River excavated in the 1980s and quartz pebbles of modern Tisza riverbed were selected for processing. Sample crushing, magnetic separation, quartz purification and Be and Al extraction were conducted following standard methods and Be and Al isotope ratios were measured on the DREAMS accelerator mass spectrometer (Helmholtz-Zentrum Dresden-Rossendorf). The samples exhibited various levels of weathering, lithology, and mass. To examine potential effects of heterogeneous sample composition or incomplete chemistry on the determination of ^{10}Be and ^{26}Al abundances, ad-hoc mass spectrometry scans were performed following the AMS measurement. Here we summarize the challenges and performance of our methods together with a description of the deficiencies and their impact on the AMS results.

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Primary authors: Dr GARBA, Roman (Nuclear Physics Institute of the CAS); Dr KAMENÍK, Jan (Nuclear Physics Institute of the Czech Academy of Sciences, Husinec-Řež, Czech Republic); Dr STÜBNER, Konstanze (Institute of Ion Beam Physics and Materials Research, Helmholtz-Zentrum Dresden-Rossendorf (HZDR), Germany); Dr LACHNER, Johannes (Institute of Ion Beam Physics and Materials Research, Helmholtz-Zentrum Dresden-Rossendorf (HZDR), Germany); Dr RUGEL, Georg (Institute of Ion Beam Physics and Materials Research, Helmholtz-Zentrum Dresden-Rossendorf (HZDR), Germany); Dr VESELOVSKÝ, František (Czech Geological Survey, Prague, Czech Republic); Dr JANSEN, John (GFÜ Institute of Geophysics, Czech Academy of Sciences, Prague, Czech Republic); Dr USIK, Vitaly (Institute of Archaeology National Academy of Sciences of Ukraine, Kyiv, Ukraine); Prof. KUČERA, Jan (Nuclear Physics Institute of the Czech Academy of Sciences, Husinec-Řež, Czech Republic)

Presenter: Dr GARBA, Roman (Nuclear Physics Institute of the CAS)

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