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PROPERTIES OF THE UPPER PART OF THE LAST GLACIAL LOESS-PALAEOSOL SEQUENCE AT SAVUDRIJA (ISTRIA, CROATIA)

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As part of the investigations carried out under the bilateral Croatian-German project NALPS (North Adriatic Loess-Paleosol Sequences), the 7.5 m thick loess-paleosol sequence was investigated with a modern soil on top, overlying the Cretaceous limestone at Savudrija. Within the 7.5 m thick profile, a total of 17 samples (Figure 1) were taken and subjected to various analyses in order to determine the provenance of the modern soil/palaeosol parent material and to reconstruct the conditions of its paleopedological evolution.

The subject of this study was the upper part of the 7.5 m thick profile, consisting of modern soil on the top of the loess-paleosol sequence (between 0 and 205 cm). Six horizons were recognized within the studied sequence, arranged from top to bottom: AB-B-BC-CB-2BC-2C. Laboratory work included chemical analyses, particle size analyses, analyses of iron and manganese oxides and hydroxides soluble in dithionite citrate bicarbonate and oxalate, detailed physical and chemical analysis of the palaeosols (including measurements of CEC and base saturation), mineral composition analysis (using the XRD method), quartz optically stimulated luminescence (OSL) dating and micromorphological analysis of thin sections.

This study showed that the uppermost part of the sequence studied was represented by presumably polygenetic soil developed on loess (AB-B-BC-CB) underlain by brown palaeosol developed on older loess (2BC-2C). Based on the Sm/Nd and La/Ce geochemical ratios (Sheldon & Tabor, 2009), it was also determined that the loess parent material examined in this study has the same provenance as the materials examined in Baniček (2016) and Durn et al. (2018a, b).

XRD analysis revealed that all soil samples contain a significant amount of quartz, plagioclase, alkali feldspar, illitic material, kaolinite, chlorite, 14 Å minerals (vermiculite and/or smectite), mostly irregular mixed-layer clay minerals, goethite and amorphous components, whose content increases with depth. The micromorphological investigations have shown a significant proportion of rhizoconcretions, iron-manganese concretions and clay coatings, indicating significant illuviation in the horizons of the uppermost part of the Savudrija pedosediment complex. Based on quartz OSL dating, the age of the studied soil horizon CB is 9 ± 0.8 ka and of soil horizon 2C is 20.9 ± 2.1 ka (Zhang et al., 2018).

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Figure 1: A photo of the profile through pedosedimentary complex in Savudrija, with demonstrated sampling locations (left) and the part of the pedosedimentary complex that was investigated in Hećej (2017) (right)

REFERENCES:

- Baniček, I., 2016. Mineraloške, geokemijske, pedofizikalne i mikromorfološke značajke paleotla smještenog na dnu lespaleotlo sekvence na Savudriji, Istra. [Mineralogical, geochemical, pedophysical and micromorphological properties of paleosol developed on the bottom of loess-paleosol sequence in Savudrija, Istria] – Unpublished MSc Thesis, Faculty of Mining, Geology and Petroleum Engineering, University of Zagreb, pp. 107.
- Durn, G., Wacha, L., Bartolin, M., Rolf, C., Frechen, M., Tsukamoto, S., Tadej, N., Husnjak, S., Li, Y., Rubinić, V., 2018a. Provenance and formation of the red palaeosol and lithified terra rossa-like infillings on the Island of Susak: A high-resolution and chronological approach, *Quaternary International* 494, 105-129, <https://doi.org/10.1016/j.quaint.2017.11.040>.
- Durn, G., Rubinić, V., Wacha, L., Patekar, M., Frechen, M., Tsukamoto, S., Tadej, N., Husnjak, S., 2018b. Polygenetic soil formation on Late Glacial Loess on the Susak Island reflects paleo-environmental changes in the Northern Adriatic area, *Quaternary International* 494, 236-247, <https://doi.org/10.1016/j.quaint.2017.06.072>.
- Hećej, N., 2017. Mineraloške, geokemijske, pedofizikalne i mikromorfološke značajke poligenetskog tla smještenog u vršnom dijelu les-paleotlo sekvencije na Savudriji, u Istri. [Mineralogical, geochemical, pedophysical and micromorphological properties of paleosol developed on the top of loess-paleosol sequence in Savudrija, Istria] – Unpublished MSc Thesis, Faculty of Mining, Geology and Petroleum Engineering, University of Zagreb, pp. 134.
- Sheldon, N.D., Tabor, N.J., 2009. Quantitative paleoenvironmental and paleoclimatic reconstruction using paleosols. – Elsevier, 1–52, <https://doi.org/10.1016/j.earscirev.2009.03.004>.
- Zhang, J., Rolf, C., Wacha, L., Tsukamoto, S., Durn, G., Frechen, M., 2018. Luminescence dating and palaeomagnetic age constraint of a last glacial loess-palaeosol sequence from Istria, Croatia, *Quaternary International* 494, 19-33, <https://doi.org/10.1016/j.quaint.2018.05.045>.