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ABSTRACT BOOK

Quaternary stratigraphy, paleoenvironments, and human settlements

Organizing and Scientific Committee

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Extreme fluvial aggradation in the lower Pleistocene Dniester terraces (Ukraine): evidence for catastrophic palaeofloods in Eastern Europe

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New exposures of high above-floodplain terraces have been discovered in the canyon section of the Middle Dniester Valley, near the villages of Bridok and Neporotove (Chernivtsi region, Ukraine). The channel-facies alluvium in these sequences reaches an anomalous thickness for the region, exceeding 20 m. The terraces are markedly inset and represent the first nested strath-fill terraces incised into the bedrock valley walls of the Dniester Canyon, with an unusually thick alluvial fill.

The alluvial unit of the Bridok I section has a tripartite architecture (Fig. 1). Unit I shows subhorizontal stratification. Unit II comprises well-washed gravel-pebble material with gently inclined cross-stratification. Unit III contains large, poorly rounded boulders and angular blocks (dripstones) of Palaeozoic sandstones and argillite up to 1 m in diameter. The overlying cover deposits at Bridok I are not preserved in situ but can be partially traced in two palaeo-landslide bodies exposed on both sides of the quarry. At least five fossil-soil units occur within the landslide mass (Unit IV, Fig. 1) (Ridush & Popiuk, 2015).

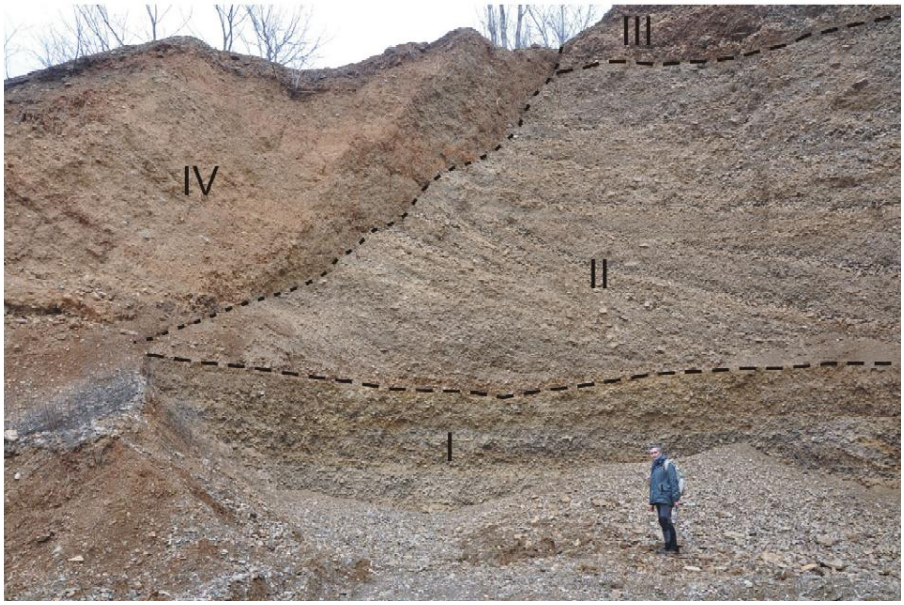

Fig. 1. Gravel beds in the section Bridok I. I - the lower bed with sub horizontal bedding; II - the middle bed of low-angle cross-bedding; III - the upper bed of the prevalence of macro-fragmental material and drop-stones; IV - palaeolandslide complex with paleosols.

The Neporotove alluvial sequence also has a tripartite structure, comprising two gravel-pebble units separated by a 5–30-cm-thick layer of light-yellow, thinly laminated silty loam (Unit II, Fig. 2). Locally, this layer is underlain by yellow fine-grained sand lenses 0.5–1.5 m thick (Ridush & Popiuk, 2015; Bondar et al., 2019).

In both exposures, the alluvial deposits are capped by a strongly carbonate-enriched (calcareous) illuvial horizon and a brownish-red automorphic fossil soil of the Martonosha Stage (mr_1), intensely deformed by deep frost wedges and desiccation cracks (Unit IV, Fig. 2) (Ridush & Popiuk, 2015; Bondar et al., 2019).

This unusually thick (>20 m) alluvial succession formed through an exceptionally high sediment influx during phases of catastrophic fluvial aggradation. Deposition alternated between high-energy channel flow and extreme flood discharge under a periglacial hydrological regime. Numerous large, angular blocks (dropstones) in the upper alluvial units indicate transport by river ice during severe palaeofloods. Unlike the stratotypic "Tiraspol gravel" of the Kolkotova Terrace, the Bridok and Neporotove sequences lack vertebrate fossil remains, suggesting colder climatic conditions in the Middle Dniester region during clastic deposition.

Based on hypsometric characteristics and the stratigraphic position of the overlying units, these deposits correspond to the 8th terrace above the floodplain in the regional scheme by M. Veklych (1982) and assigns with the Shyrokyne–Pryazovya Stage of the Lower Pleistocene (~1.3–0.9 Ma). The Matuyama age of the deposits wasn't strongly supported by palaeomagnetic data from the Neporotove section, where the alluvial loam interbeds showed stable reverse polarity. However, we suggest it could fit within the Jaramillo Reversal (Bondar et al., 2019).

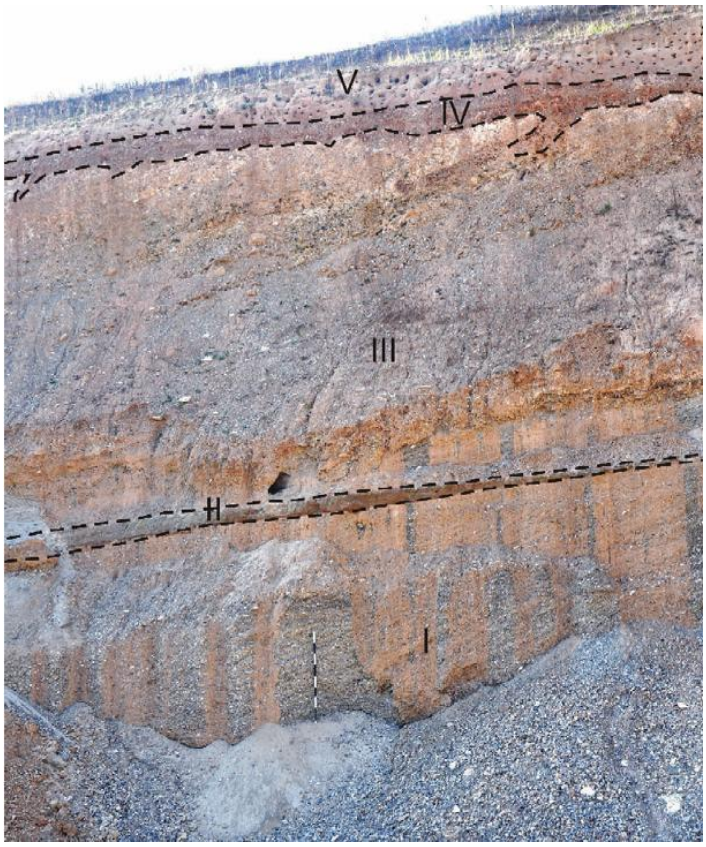

Fig. 2. Gravel-pebble alluvium at the Neporotove outcrop. I – Unit I, the lower gravel-pebble bed of low-angle cross bedding; II – Unit II, the loam layer, light yellow, laminated; III – Unit III, the upper gravel-pebble bed of low-angle cross-bedding, with domination of macro-fragmental material and drop-stones at the roof of the bed; IV – dark-red sandy-gravel, V – Unit V subaerial loess deposits of unknown age (Ridush, Popiuk, 2015; Bondar et al., 2019). The scale stick on the photo is 2 m long.

References

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