Color-based stratigraphy of loess – application for paleoenvironmental reconstructions from Krems-Wachtberg (MIS3/2)

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Loess-paleosol sequences (LPS) provide essential information on the paleoenvironmental context of archeological sites preserved therein. These terrestrial records form in the complex interplay of sedimentation, pedogenesis, and in many cases slope processes. Detailed stratigraphic descriptions of LPS are a prerequisite to reconstruct past environments from down-profile parameter variations, often simply referred to as proxies (e.g. [bio-]geochemical, magnetic, granulometric, colorimetric). The classification of LPS units usually depends on the conceptual background of the researcher and there exist no standardized stratigraphic terms, which hampers profile comparison, interpretation, and communication.

In the field, colors are the most obvious features of LPS, which suggests their use for stratigraphy. Spectrophotometers quantify color changes objectively and are non-destructive as well as inexpensive. Sprafke (2016) uses quantified color variations to support field documentations, in order to create robust stratigraphic units labelled with pedological designations. This color-based stratigraphy is explicitly descriptive, whereas paleoenvironmental inferences built up on the genetic interpretation of the LPS, which integrates all field and laboratory data.

This approach is applied to the 8 m thick and relatively weakly differentiated LPS Krems-Wachtberg, Lower Austria that formed during 40-20 ka. Infant burials from the main find horizon dating to c. 31 ka make this Late Paleolithic (Gravettien) site unique and well-known. The new color-based stratigraphy uses detailed field documentation and quantitative color data from samples taken in 2.5 cm resolution. The genetic interpretation of all units, supported by published geochronological datasets and further data (partly unpublished) lead to semi-quantitative paleoenvironmental reconstructions and correlations to Central European and Northern hemispheric / global records. The main climatic events of the MIS 3/2 transition recorded in the Greenland ice core records and in the

reference LPS Nussloch are visible in the LPS Krems-Wachtberg, but partly reflect different local effects.

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Reference

Sprafke, T., 2016: Löss in Niederösterreich - Archiv quartärer Klima- und Landschaftsveränderungen. Würzburg University Press, Würzburg, 272 pp.