

Luminescence Dating of the Upper Part of the Stari Slankamen Loess Sequence (Vojvodina, Serbia)

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Lumineszenzdatierung
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Lumineszenz-Datierung des oberen Teils der Stari-Slankamen-Löss-Schichtfolge (Vojvodina, Serbien)

Zusammenfassung

Die mittel- und spätpleistozäne Löss-Paläobodenabfolge am Aufschluss Stari Slankamen setzt sich aus sieben Lösslagen und acht zwischengeschalteten Bodenkomplexen zusammen. Um einen zuverlässigen geochronologischen Rahmen für den letztglazialen Zyklus zu etablieren, wurden Lumineszenzdatierungen an 12 Proben aus dem oberen Abschnitt des untersuchten Profils durchgeführt.

Abstract

A detailed Middle and Late Pleistocene loess-palaeosol sequence is exposed at the Stari Slankamen section in the Vojvodina region (Serbia) consisting of seven loess layers intercalated by eight pedocomplexes. In this study we present results of luminescence dating of 12 samples collected from the upper part of the Stari Slankamen loess sequence in order to establish a more reliable chronological framework for this part of the sequence.

1. Introduction

Loess-palaeosol sequences are sensitive indicators of palaeoclimatic conditions and represent a potential archive to understand glacial-interglacial variability registered in long continental records. The sequences in the Vojvodina (Serbia) are among the oldest and most complete loess sequences in Europe and provide important information of local and regional environmental processes and conditions during the Middle and Late Pleistocene (MARKOVIĆ et al., 2006). Reliable numeric age estimates are still lacking for most of the detailed loess successions, and hence, an appropriate interpretation of the terrestrial climate archives as well as the correlation between loess-palaeosol sequences of the Vojvodina region with other European loess records are difficult. Previous studies published luminescence ages obtained from the Stari Slankamen loess site based on thermoluminescence measurements. The

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dates of the described soil F_2 show a close grouping at ~75 ka, the TL dates of the soil F_3 indicate an age of about 125 ka and the soil horizons F_4 and F_5 have been assigned a minimum age of >186 and >315 ka (SINGHVI et al., 1989). According to SINGHVI et al. (1989) the TL dates suggest that the F_3 soil probably represents the last interglacial corresponding to marine oxygen isotope substage 5e, and soil F_2 probably can be correlated with substage 5a.

Since the late 1990s there has been significant development within trapped charge dating including optically stimulated luminescence (OSL) dating and helped to obtain a more accurate time range for the depositional ages of loess sediments.

This study presents the first OSL dating results from the Stari Slankamen loess site.

2. Geological Setting

The Vojvodina region situated in the southeastern part of the Pannonian basin in the area of the confluence of the rivers Danube, Sava and Tisza is rather a lowland area covered by loess and loess-like sediments reaching a thickness of up to 55 m (MILOJKOVIĆ et al., 2007). It is regarded as a key section for understanding and reconstructing the palaeoclimatic and palaeoenvironmental conditions in southeastern Europe particularly with regard to its geographical position between the palaeoenvironments of Europe and Asia and their past atmospheric circulation systems (STENDER et al., 2007). Loess-palaeosol sequences in the Vojvodina region were first described by MARSIGLI (1726), who also gave a first description of the loess-palaeosol sequence at Stari Slankamen (MARKOVIĆ et al., 2004, 2006, 2007).

The loess section of Stari Slankamen is located in the Vojvodina region in the north-eastern part of the Srem Loess Plateau on the right bank of the Danube near by the river mouth of the Tisza into the Danube. The profile exposes an about 45 m thick series of seven loess layers intercalated by eight pedocomplexes.

During the fieldwork samples for luminescence dating were taken at close intervals between the Holocene soil and the first weakly developed pedocomplex (4 samples), above the first strongly developed soil (3 samples) and underneath this soil (3 samples).

3. Measurements

Luminescence dating enables to estimate the age of the last daylight exposure of sediments (AITKEN, 1998). This dating technique has been significantly improved over

recent years and is widely used to establish confident chronologies of loess records. The aim of this investigation is to carry out a more reliable chronological frame for the loess deposits by an OSL dating study. The OSL measurements were carried out on the uppermost twelve samples of the profile assuming a correlation to the penultimate and last interglacial-glacial cycle.

The SAR protocol was conducted on polymineral and quartz fine-grains (4–11 μm) to estimate equivalent dose (D_e). The dose rates for all samples were obtained by high resolution gamma spectrometry. For the polymineral fine-grains, two different techniques, infrared stimulated luminescence (IRSL) in the blue and post-IR OSL signals in the UV using the double SAR technique, have been employed and compared with the quartz results. Investigations related to the saturation of OSL signals, anomalous fading, and the feldspar contribution to the post-IR OSL signals will be presented.

The ongoing research is part of a PhD study in the frame of the "Leibniz Pakt für Forschung und Innovation" at the GGA-Institute in Hannover.

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