ABHANDLUNGEN DER GEOLOGISCHEN BUNDESANSTALT

Abh. Geol. B.-A. | ISSN 0378-0864 | ISBN 978-3-85316-043-5 | Band 62 | S. 201–202 | Wien, August 2008

Veränderter Lebensraum – gestern, heute und morgen

Hauptversammlung der Deutschen Quartärvereinigung e.V. (DEUQUA) in Wien: 31. August – 6. September 2008

Danube Loess Stratigraphy: Serbian Viewpoint

SLOBODAN B. MARKOVIĆ[1)], ULRICH HAMBACH[2)], BJÖRN MACHALETT[3)], THOMAS STEVENS[4)], GEORGE J. KUKLA[5)], IAN J. SMALLEY[6)], ERIC A. OCHES[7)], WILLIAM D. MCCOY[8)], LUDWIG ZÖLLER[2)], BJÖRN BUGGLE[9)], MLADJEN JOVANOVIĆ[1)], KEN O´HARA DHAND[5)], TIVADAR GAUDENYI[1)] & MANFRED FRECHEN[10)]

Serbien
Donaubecken
Löss
Paläoboden
Stratigraphie

Contents

Löss-Stratigraphie im Donauraum: Der serbische Standpunkt

Zusammenfassung

Nach den Pionierarbeiten von KUKLA, FINK, LOŽEK und PECSI zur Stratigraphie der Lößsequenzen im Donauraum wandte sich der Fokus der internationalen Lößforschung den mächtigen Löß-Paläoboden-Abfolgen in China und Zentralasien zu. Neuere Forschungsarbeiten betonen allerdings wieder die Bedeutung der danubischen Lösse, insbesondere der Lößprofile im südlichen Donauraum Südosteuropas (Serbien). Dennoch variieren die lößstratigraphischen Modelle innerhalb Südosteuropas stark und benutzen oft eine komplexe Nomenklatur, was zum Teil mit der historischen Separation einzelner Forschungsgruppen zusammenhängt und zum anderen den unterschiedlich komplett erhaltenen Lößprofilen und ihrem variierenden Aufbau Rechnung trägt. Da die serbischen Lößprofile relativ vollständig erhalten sind und damit kontinuierliche Altersmodelle ermöglichen, besteht die Möglichkeit, auf Basis der Lößsequenzen in Serbien ein einheitliches lößstratigraphisches Modell für das Mittel- und Spätpleistozän im Donauraum zu entwickeln.

Abstract

After KUKLA, FINK, LOŽEK and PECSI had created their classical Danube loess stratigraphic models the focus of loess researchers has shifted to the thick loess-paleosol sequences of China and Central Asia. However, recent research has begun to highlight the significance of Danubian loess sequences, particularly the exposed sequences in the southern Danube basin in Serbia. The stratigraphic models used in the Danube basin vary between countries and often use complex nomenclature. This is in part due to historial separation of research groups and the predominantly incomplete preservation of loess sequences in the region. However, because of the relative completeness of the loess record, and the length of time represented in the sequences, the exposures of loess in Serbia provide the opportunity to develop a unified stratigraphic model for Middle and Late Pleistocene loess in the Danube basin.

[1)] SLOBODAN B. MARKOVIĆ, MLADJEN JOVANOVIĆ, TIVADAR GAUDENYI, University of Novi Sad, Chair of Physical Geography, Faculty of Sciences, Trg Dositeja Obradovića 3, 21000 Novi Sad.
[2)] ULRICH HAMBACH, LUDWIG ZÖLLER, Chair of Geomorphology, University of Bayreuth, 95440 Bayreuth, Germany.
[3)] BJÖRN MACHALETT, University of Bayreuth, Chair of Geomorphology, D 95440 Bayreuth, Germany; University of South Florida, Department of Geology, 4202 E. Fowler Ave. SCA 528, Tampa FL 33620, USA; Leibniz Institute for Applied Geosciences (GGA-Institut), S3 Geochronology and Isotope Hydrology, Stilleweg 2, D 30655 Hannover, Germany.
[4)] THOMAS STEVENS, Kingston University, School of Earth Sciences and Geography, Penrhyn Road, Kingston upon Thames, Surrey KT1 2EE, UK.
[5)] GEORGE J. KUKLA, KEN O´HARA DHAND, Lamont-Doherty Earth Observatory of Columbia University, Rt. 9W, Palisades NY 10964, USA.
[6)] IAN J. SMALLEY, Giotto, Midlands Loess Group, Nottingham Trent University, Nottingham NG1 4BU, UK.
[7)] ERIC A. OCHES, University of South Florida, Department of Geology, 4202 East Fowler Avenue, SCA 528, Tampa, Florida 33620, USA.
[8)] WILLIAM D. MCCOY, University of Massachusetts, Department of Geosciences, Amherst, Massachusetts 01003, USA.
[9)] BJÖRN BUGGLE, Soil Physics Department, University of Bayreuth, Soil Physics Department, D 95440 Bayreuth, Germany.
[10)] MANFRED FRECHEN: Leibniz Institute for Applied Geosciences, Geochronology and Isotope Hydrology, Stilleweg 2, 30655 Hannover, Germany.

1. Introduction

The Danube is an important "loess river" and its basin is a significant and widespread loess region that includes many countries and different recent and palaeoenvironments. Given the large number of classic loess sequences contained in the basin, and the great number of loess scholars who have lived and worked in the region, it is surprising that there are not more basin-wide studies of the Danubian loess (SMALLEY et al., accepted).

The pioneering investigations of the Austrian and Czech sections provided the chronostratigraphic framework for KUKLA's (1975, 1977) celebrated correlations of loess-paleosol sequences and deep-sea sediments. These crucial stratigraphic advances demonstrated the enormous stratigraphic potential and palaeoclimatic significance of the Danubian loess deposits. However, a comprehensive investigation of Danube loess stratigraphy still does not exist.

The aim of this study is to summarize the existing loess stratigraphic models in the Danube area and to underline the importance of a Serbian loess stratigraphic system as an important link between the temporal and spatial stratigraphic models of „classical" central European and Asian loess provinces.

2. Overview of Danube Loess Stratigraphy

Loess-palaeosol sequences in the middle and lower part of the Danube river basin contain the oldest and most complete climatic and environmental records in central and southeastern Europe of the last two million years (e.g. KUKLA, 1977). The Danube loess belt covers about 200,000 km^2 in 11 countries: Germany, Austria, Czech Republic, Slovakia, Hungary, Croatia, Serbia, Romania, Bulgaria, Moldova, and Ukraine. In all these countries, loess-paleosol stratigraphic models have been defined locally, rather than in a basin-wide scheme. The most important sites have been described as Krems, Stanzendorf, Červeny Kopec, Paks, Stari Slankamen, Batajnica, Koriten, Viatovo, Mircea Voda, and Novaya Etuliya. Most of these sections reach into the geomagnetic Matuyama chron. On the basis of magnetostratigraphy, soil stratigraphy, diverse palaeoenvironmental proxies and absolute and relative chronologies, it has been possible to correlate the sites and reconstruct the approximate climatic development of the basin over the late Early, Middle and Late Pleistocene. Major environmental shifts affected the area during the Middle Brunhes, about 450,000 years ago, and in the uppermost Matuyama, about 800,000 years ago. In spite of general stratigraphic similarities, direct interprofile correlations of loesses from the Alps to the Black sea coast and longer distance with the Asian loess-palaeosol sequences are limited because of climatic and environmental differences within the basin, as well as at larger continental scales.

3. Serbian Loess – Stratigraphic Bypass between European and Asian Loess Provinces

Loess stratigraphy is quite uniform in the Vojvodina region, largely because of the predominance of plateau depositional conditions (MARKOVĆ et al., 2006, 2007, 2008), similar to that in the central Chinese loess plateau (e.g. KUKLA, 1987; KUKLA & AN, 1989). MARKOVIČ et al. (2008) designated the units nomenclature following the Chinese loess stratigraphic system (e.g. KUKLA, 1987; KUKLA & AN, 1989) but inserted the prefix "V", referring to the Vojvodina region. Similar loess stratigraphic models recently developed in Bulgaria (JORDANOVA & PETERSEN, 1999; JORDANOVA et al., 2007) and Romania (PANAIOTU et al., 2001). Based on these recent stratigraphic interpretations we suggest that it is possible to assign a basin-wide stratigraphic scheme for Danubian loess deposits.

References

JORDANOVA, D. & PETERSEN, N. (1999): Paleoclimatic record from a loess-soil profile in northeastern Bulgaria II. Correlation with global climatic events during the Pleistocene. – Geophysical Journal International, **138**, 533–540.

JORDANOVA, D., HUS, J. & GEERAERTS, R. (2007): Palaeoclimatic implications of the magnetic record from loess/palaeosol sequence Viatovo (NE Bulgaria). – Geophysical Journal International, **171**, 1036–1047.

KUKLA, G.J. (1975): Loess Stratigraphy of Central Europe. – In: BUTZER, K.W. & ISAAC, L.I. (eds.): After Australopithecines, 99–187, Mouton Publishers, The Hague.

KUKLA, G.J., (1977): Pleistocene land-sea correlations. – Earth Science Review, **13**, 307–374.

KUKLA, G.J. (1987): Loess Stratigraphy in Central China. – Quaternary Science Reviews, **6**, 191–219.

KUKLA, G.J. & AN, Z. (1989): Loess Stratigraphy in Central China. – Palaeogeography, Palaeoclimatology, Palaeoecology, **72**, 203–225.

MARKOVIĆ, S.B., OCHES, E., SÜMEGI, P., JOVANOVIĆ, M. & GAUDENYI, T. (2006): An introduction to the Upper and Middle Pleistocene loess-paleosol sequences of Ruma section (Vojvodina, Yugoslavia). – Quaternary International, **149**, 80–86.

MARKOVIĆ, S.B., OCHES, E.A., MCCOY, W.D., GAUDENYI, T. & FRECHEN, M. (2007): Malacological and sedimentological evidence for "warm" climate from the Irig loess sequence (Vojvodina, Serbia). – Geophysics, Geochemistry and Geosystems, 8, Q09008, doi:10.1029/2006GC001565.

MARKOVIĆ, S.B., BOKHORST, M, VANDENBERGHE, J., OCHES, E.A., ZÖLLER, L., MCCOY, W.D., GAUDENYI, T., JOVANOVIĆ, M., HAMBACH, U. & MACHALETT, B. (2008): Late Pleistocene loess-paleosol sequences in the Vojvodina region, North Serbia. – Journal of Quaternary Science, **23**, 73–84.

PANAIOTU, C.G., PANAIOTU, C.E., GRAMA, A. & NECULA, C. (2001): Paleoclimatic record from a loess-paleosol profile in southeastern Romania. – Physics and Chemistry of the Earth (A), **26**, 893–898.

SMALLEY, I., O'HARA-DHAND, JARY, Z., JEFFERSON, I. & MACHALETT, B. (accepted): Rivers and loess: significance of long river transportation in the complex event-sequence approach to loess deposit formation. – Quaternary International.

Manuskript bei der Schriftleitung eingelangt am 5. Juni 2008