

Editorial

Quaternary Loess Deposition and Climate Change in Europe—Recent Progress

Dávid Molnár 

Department of Geology and Paleontology, University of Szeged, H-6722 Szeged, Hungary; molnard@geo.u-szeged.hu

The current climate changes are not unique in Earth's history. Over millions of years, countless climate changes have taken place, and one of the best-investigated is the study of glacial and interglacial cycles and stadial and interstadial cycles in the Pleistocene. Numerous marine records demonstrate these rapid changes, but thus far, land records that can be interpreted globally have not been established.

The main objective of the “Quaternary Loess Deposition and Climate Change” Special Issue was to present the climate changes that can be reconstructed in the immediate vicinity of the studied sites by examining the Quaternary terrestrial records. The studies were based on different approaches. Five manuscripts have been submitted for the Special Issue, covering a wide range of aspects of Quaternary studies, from the luminescence-based chronology of Quaternary loess-paleosol deposits to paleomagnetic and sedimentological studies, and of complex environmental and paleoclimatological studies of Holocene sediment deposits and archaeological sites.

In “Luminescence Sensitivity of Rhine Valley Loess: Indicators of Source Variability?”, Fitzsimmons et al. [1] investigated a 25 m drill core and a nearby 6 m loess-paleosol section from Schwalbenberg, Germany, a site along the Rhine River, and correlated the sensitivity of quartz/feldspar in variable grain size sediments by luminescence dating. Based on the results, it was concluded that the clay content and the Si/Al element ratio are the most important factors affecting the sensitivity of the dating methods. In addition, the role of derived sediment grains from older rocks was highlighted.

Hlavatskyi and Bakhmutov [2] present the 25 m-thick Dolynske loess-paleosol complex in SW Ukraine, where paleomagnetic and rock magnetic studies have been carried out in their work entitled, “Early–Middle Pleistocene Magnetostratigraphic and Rock Magnetic Records of the Dolynske Section (Lower Danube, Ukraine) and Their Application to the Correlation of Loess–Palaeosol Sequences in Eastern and South-Eastern Europe”. The aim of the investigations, in addition to the integration of the section into the regional stratigraphic system, was the reconstruction of the local palaeoenvironmental and palaeoclimatological settings of the Early and Middle Pleistocene. After comparing several regional and other European reference sections, the authors concluded that the Brunhes–Matuyama Boundary and the S7 (MIS 19) paleosol which represents it are of particular importance for the chronostratigraphic classification of the Eastern European loess-paleosol sections.

In the work of Makó et al. [3], “Selected Grain-Size and Geochemical Analyses of the Loess-Paleosol Sequence of Pécel (Northern Hungary): An Attempt to Determine Sediment Accumulation Conditions and the Source Area Location”, the authors present preliminary sedimentological and geochemical investigations of the ca. 19 m-thick loess-paleosol complex of Pécel, Northern Hungary. The study aimed to present the sedimentary-geochemical characterization of a section with a significant thickness that has not yet been explored. The study revealed that the section may have been an area of intense sediment accumulation, as the samples analyzed contained remarkable amounts of very fine sand. Furthermore, the authors point to a significant variation in the geochemical element content



Citation: Molnár, D. Quaternary Loess Deposition and Climate Change in Europe—Recent Progress. *Quaternary* **2022**, *5*, 40. <https://doi.org/10.3390/quat5040040>

Received: 13 September 2022

Accepted: 23 September 2022

Published: 25 September 2022

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2022 by the author. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

in the lower half of the section, suggesting that the material in the section originates from at least two different, variable source areas.

Tapody et al. [4] present a complex environmental, chronological, and geoarchaeological study of the 560 cm drill core of the Round Lake peat bog in Romania in their work entitled, “Sedimentological-Geochemical Data Based Reconstruction of Climate Changes and Human Impacts from the Peat Sequence of Round Lake in the Western Foothill Area of the Eastern Carpathians, Romania.” The study aimed to distinguish paleoecological and hydrological changes and cycles, detect human intervention, and make regional comparisons of the results with other sites of similar age. The results concluded that the sediment, accumulated over a period of about 7500 years, can be considered sedimentologically homogeneous, except for human disturbance horizons. The environmental-historical studies have identified no less than 12 human disturbance horizons, which fit well with the trend of similar regional deposits.

Cseh et al. [5] aimed to investigate the environmental history and geoarchaeology of a 490 cm-high anthropogenic mound (Császárné Mound—kurgan) in southern Hungary in their work entitled, “Geoarchaeological Analyses of a Late-Copper-Age Kurgan on the Great Hungarian Plain”. In the course of the investigation, they attempted to reveal the sedimentological conditions in the construction of the kurgan and the paleoenvironmental conditions during that time. The results suggest that the construction of the kurgan dates back to the Late Copper Age and the Early Bronze Age, which correlates well with the age of other kurgan sites in the region. The construction of the kurgan was carried out on the local chernozem soil, and the paleoenvironmental study has also shown the impact of the kurgan as a higher ground surface on the environment and the soil.

The diversity of the published works shows how much information we could learn from the terrestrial records, and moreover, the variety of approaches by which we can access this information. It is hoped that the papers published in this Special Issue will show that the information of terrestrial sites can be used scientifically just as well as that of marine sites, and perhaps, even more widely.

Funding: This research received no external funding.

Acknowledgments: The editor would like to thank the authors of the Special Issue for their work and added value. He also thanks the editorial board of *Quaternary* for making this Special Issue possible.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Fitzsimmons, K.E.; Perić, Z.; Nowatzki, M.; Lindauer, S.; Vinnepand, M.; Prud'homme, C.; Dave, A.K.; Vött, A.; Fischer, P. Luminescence Sensitivity of Rhine Valley Loess: Indicators of Source Variability? *Quaternary* **2022**, *5*, 1. [[CrossRef](#)]
2. Hlavatskyi, D.; Bakhmutov, V. Early–Middle Pleistocene Magnetostratigraphic and Rock Magnetic Records of the Dolynske Section (Lower Danube, Ukraine) and Their Application to the Correlation of Loess–Palaeosol Sequences in Eastern and South-Eastern Europe. *Quaternary* **2021**, *4*, 43. [[CrossRef](#)]
3. Makó, L.; Molnár, D.; Runa, B.; Bozsó, G.; Cseh, P.; Nagy, B.; Sümegi, P. Selected Grain-Size and Geochemical Analyses of the Loess-Paleosol Sequence of Pécel (Northern Hungary): An Attempt to Determine Sediment Accumulation Conditions and the Source Area Location. *Quaternary* **2021**, *4*, 17. [[CrossRef](#)]
4. Tapody, R.O.; Sümegi, P.; Molnár, D.; Karlik, M.; Töröcsik, T.; Cseh, P.; Makó, L. Sedimentological-Geochemical Data Based Reconstruction of Climate Changes and Human Impacts from the Peat Sequence of Round Lake in the Western Foothill Area of the Eastern Carpathians, Romania. *Quaternary* **2021**, *4*, 18. [[CrossRef](#)]
5. Cseh, P.; Molnár, D.; Makó, L.; Sümegi, P. Geoarchaeological Analyses of a Late-Copper-Age Kurgan on the Great Hungarian Plain. *Quaternary* **2022**, *5*, 20. [[CrossRef](#)]