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A fundamental and interdisciplinary approach to investigate abrupt climate change enables us to obtain valuable data and interpret the dynamics of these changes. These data and their interpretation can form the basis for both comparing paleoclimate changes with modern ones and predicting the dynamics of these changes in the future. These insights can make it easier for humankind to adapt to changes that will affect all aspects of life on Earth. Because of the fast and unquestionable climate change and threats that have emerged, geologists have been trying, based on records in Quaternary sediments, to identify the process of change.

The exploration is focused on loess/paleosol sequences and the Đurđevac Sands in the Pannonian area (continental climate) and fluvioglacial sediments in the foothills of the Velebit Mt. and lake sediments from Lake Vrgorac in the Dinaric area (Mediterranean climate).

Firstly, explorations of loess-paleosol sequences revealed the existence of 14 cumulic horizons, which evolved just above well-developed paleosols. They represent paleoclimate archives of the dynamics of 14 climate changes. The research is focused on analyzing cumulic horizons in NE Croatia, providing detailed descriptions of transitions from the warm to the glacial period in the Late Pleistocene. Next, the investigation of paleosols and geomorphological/sedimentological features in the dunes of the Đurđevac Sands may help to determine the nature of the Pleistocene-Holocene transition in this area, as well as potential Holocene climate-related paleoenvironmental changes. Those terrestrial archives in the south of the Carpathian Basin provide insight into the magnitude, timing, and spatial variability of climate changes.

In addition, fluvioglacial sediment successions in the foothill of the Velebit Mt. are crucial for describing abrupt climate change during the Late Pleistocene, as it will reveal the magnitude, timing, and spatial variability of climatic transitions and correlate them with transitions in a continental climate as based on the other archives outlined above. Finally, the depositional environments and sediment facies found in Vrgoračko polje are considered to represent a typical Quaternary lacustrine sedimentation pattern for other Dinaric karst fields in a Mediterranean climate. The dynamics of all mentioned facies transitions in all proposed sections are a consequence of past climate change.

The specific geological and pedological diversity, geographical position, geomorphology and climate diversity of Croatia enable the parallel high-resolution study of the development of abrupt climate changes at locations only 300 km apart. This research will improve our understanding of the spatial extent and differences in occurrence of paleoclimatic events in the Pannonian and Dinaric areas. That will yield insight into eolian-fluvioglacial-lacustrine teleconnections in SE Europe. In turn, this forms the basis for suprarregional correlations with the European Sand Belt (NW Europe) and the Adriatic Sea.

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