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An update on advances in paleoscience in the Carpathian-Balkan region

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Central Eastern Europe (CEE) and the Carpathian-Balkan region (CBR) are of particular interest for paleoscientific investigations for several reasons. Firstly, the location at the contact/transition between the smaller landmass of Western Europe, where the climate is largely dictated by North Atlantic air masses, and the large continental mass extending beyond the Carpathian range, which falls under the influence of excessive continental climate, turns the Carpathian and Balkan ranges into a boundary between the two major climatic influences of the European continent. Secondly, the significant elevation range peaking at 2925 m asl favors the capture of regional and continental-scale climatic signals and determines a strong vegetation gradient. Thirdly, the diversity of landforms—including those with glacial, periglacial, or paraglacial origins; underground cavities (caves and shafts; see Fig. 1); lakes; and peatbogs—provide opportunities for paleoclimate and paleoenvironment reconstructions.

Until recently (i.e. before the 2010s), CEE was unrepresented in large data reviews that discussed well-dated, high-resolution investigations of past climate and environmental conditions and studies on human impact on the local and regional environment. However, as new paleoclimatic records are continuously being generated, this area is no longer a blank spot in regional and continental-scale climate reconstructions. The significant advancement of paleoscientific research in this region is ascribed to recent scientific efforts, including five regionally relevant meetings focused on climate changes and paleoclimate reconstructions organized in the past decade in Romania with the continued support of PAGES, and the establishment of a dedicated working group, the Carpathian Climate and Environment Working Group CarpClim (pastglobalchanges.org/science/end-aff/carpclim).

The Carpathian-Balkan Paleoscience Workshop (CBPW) 2021 (pastglobalchanges.org/calendar/26996) was an initiative of the Geoconcept Association of Applied Geography (geoconcept.ro) supported by PAGES and endorsed by the Geography Department of the University of Suceava in Romania and other research and academic institutions and structures. The proceedings of the workshop were held in a traditional Bukovinian village located on a highland plateau (ca. 1250 m asl) in the Northern Romanian Carpathian as a "green scientific event" committed to respecting public health safety requirements and providing support for local communities, while maintaining a low carbon footprint.

CBPW 2021 was designed as an interdisciplinary and multidisciplinary scientific event focusing on novel investigations of climate and environmental changes in the CBR since the Last Glacial Maximum. The contributions approached a diverse range of topics which included, most notably: single and multi-proxy paleoclimate reconstructions based on peatbog and lacustrine sediment archives; reconstructions of characteristics and extents of glaciers and glacial landforms in the Carpathian and Balkan ranges; cave records as indicators of climate variability; vegetation history, past fire regimes and their drivers; dendrochronological investigations; assessments of past and present human impacts and pollution history; studies of geoarchaeology, geohistory and landscape archaeology; land use/landcover changes in relation to climate variability; and modeling techniques for climate and environmental variability. Additionally, CBPW 2021 included a session dedicated to sustainable forest management in the CBR in the context of adaptation to climate change and the necessity for continued provisioning of the forest ecosystem services communities depend upon, which included the topics of forest ecology, science, and management relating to global change (e.g. climate disruption, alteration of disturbance regimes, and increasing pressure for exploitable natural resources).

The workshop was attended by about 50 participants from Romania, Ukraine, the Republic of Moldova, Russia, Hungary, Bulgaria, Czech Republic, Poland, Germany, the Netherlands, Sweden, France, Italy, Spain, the United Kingdom, Ghana, the USA, Brazil, and Colombia. Both the variety of scientific approaches introduced by the researchers and the diversity of the participants in terms of scientific backgrounds and level of research experience (including early-career and senior researchers and academics) were noteworthy. Organizers were fully committed to ensuring that CBPW 2021 offered equitable opportunities for participation in terms of gender, ethnicity, and age to all scientists who were interested in attending.

In the current pandemic context, which has disrupted the social and networking aspects of scientific meetings worldwide, this hybrid event was able to provide a space for sharing knowledge and boosting collaboration for future research, as well as for yielding high quality scientific content suitable for publishing a special volume of a Web of Science journal dedicated to advancing paleoscience in the Carpathian-Balkan region.

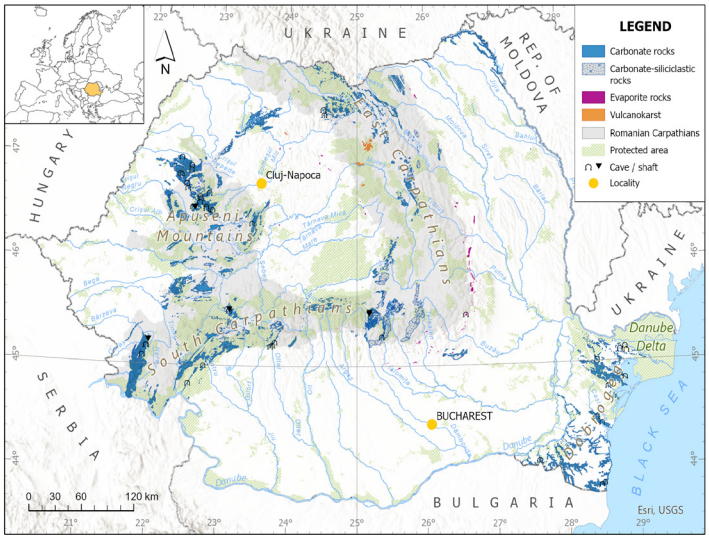

Figure 1: Karst lithology and caves in Romania (Bădescu and Tîrlă 2020). Information about 12,300 caves is archived at the "Emil Racoviță" Speleological Institute in Bucharest, of which only 6816 were included in a printed catalog of caves in Romania. Using data from various publications, 8128 caves are compiled in an online database at speologie.org (Onac and Goran 2019).

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