



Linking glacial deposits and lake sediments for paleoclimate studies in the Northern Romanian Carpathians

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Timing and extent of glaciations in the Carpathian mountains are still controversially discussed, mostly due to the lack of well dated geomorphological and geochronological studies. We present the preliminary results of geomorphological and sedimentological analyses of glacial and lacustrine deposits in Bistricioara Valley located in the Rodna Mountains (Northern Romanian Carpathians). Most of the glacial deposits in the Romanian Carpathians, such as moraines, typically occur above 1600 m a.s.l. marking the maximum lowering of past glaciations. Most of the glacial lakes occur between 1800 and 2000 m a.s.l. Field surveys included mapping of moraines and erratic boulders using detailed topographical maps and aerial photos. A Digital Elevation Model (DEM) was derived using GIS (ArcMap 10.1) from 1:25000 topographic maps, which was further completed by field survey data. The resulting geomorphological map shows a series of moraines, which indicate the occurrence of several glacial phases in the study area.

Sediment samples were collected from a peat bog (1630 m a.s.l.) dammed by a large lateral moraine within Bistricioara Mare, one of the largest glacial cirques in the Romanian Carpathians. A Russian corer was used to extract the sediment profile from the peat bog (approx. 5 m long sediment core). A X-ray computed tomography (CT) system was employed for the study of sedimentary and deformation structures and X-ray fluorescence spectroscopy (XRF) for multi-element analysis at high resolution. Glacial deposits from the lateral moraine in front of the peat bog were also sampled, as well as from the frontal moraines, upstream and downstream of the peat bog. This set of samples from multiple archives allows to link and merge the chronologies and the paleoenvironmental records of glacial deposits and lake sediments. Moreover, we employed cosmogenic nuclide dating for the reconstruction of glacial stages and their paleoclimatic implications during deglaciation in this area of Rodna Massif.

The lake sediment succession showed an evolution from a basal glacially-influenced lacustrine environment to a shallow lake and eventually to a peat bog. The 5 m-long sediment core allows a good temporal resolution to document environmental and palaeoclimatic changes in the region since deglaciation. The lithostratigraphic profile exhibits several abrupt changes. The transitions from the clastic-rich lowest 30 cm of the profile to the overlying units reflects a change in the detritic input that is mostly related to initial proximity to a glacial source. The overlying sections are mostly characterized by differences in the amount of organic matter, which are in turn related to the climate variability. Anthropogenic influences cannot be discarded and will be further investigated