Chronology and inorganic geochemistry of four sediment sequences from the Retezat Mts, South Carpathians (Romania)

Katalin Hubay[1*], Mihály Molnár[1], Ildikó Orbán[2], Mihály Braun[1] and Enikő Magyari[3]

[1] Hertelendi Laboratory of Environmental Studies, Atomki, 4026 Debrecen, Bem tér 18/c, Hungary, hubaykatalin@gmail.com

[2] University of Bergen, Department of Biology, 5020 Bergen, P.O. Box 7803, Norway

[3] MTA-MTM-ELTE Research group for Paleontology, 1117 Budapest, Pázmány Péter sétány 1/c., Hungary

In the frame of PROLONG (*Providing long environmental records of Late Quaternary climatic oscillations in the Retezat Mountains*) project lake sediment records were studied to reconstruct climate changes in the Southern Carpathians. During 2007 and 2008 summer long sediment cores were obtained from four glacial lakes (Lia, Bukura, Gales and Brazi) in the Retezat Mts (Southern Carpathians, Romania). Here we report the chronology and inorganic geochemistry from these lakes.

The chronologies were build based on radiocarbon dating. Preferably terrestrial plant macrofossils were selected for dating, while in several cases aquatic animal remains (Cladoceran eggs), bulk sediment or different size fractions of wet sieved sediment samples were dated. Samples were measured with EnvironMICADAS AMS and its gas ion source in the Hertelendi Laboratory of Environmental Studies (Debrecen, Hungary). Age-depth models were developed using both Bayesian modelling with the BACON software and smooth spline curve fitting with the CLAM software. Bayesian models were used to identify outlier ^{14}C dates. As smooth spline models follow better the frequent deposition time changes of the lake sediments were used to model sediment accumulation age-depth relations.

Major and trace elements were analysed on bulk sediment samples. Sediment organic matter was determined by loss-on-ignition method. Total element concentrations were measured using an Inductive Couple Plasma Optical Emission Spectrometer (ICP-OES) and Microwave Plasma Atomic Emission Spectrometer (MP-AES). Concentration of major elements was calculated in oxide forms (Al_2O_3, SiO_2, TiO_2, CaO, MgO, K_2O, Na_2O, Fe_2O_3, MnO and SO_3). Multivariate statistical analyses (PCA, LDA) and cluster analysis were performed on geochemical records.

Sediments represent the Lateglacial and Early Holocene period. Sediment accumulation in the early- and mid-Holocene largely depended on slope stability, vegetation cover in case of the high altitude deep lakes, while the lower altitude shallow lakes showed fast sediment accumulation. Sediments deposited during the cold and warm period showed significantly different chemical compositions. We infer that sediment major element geochemistry of these mountain lakes mainly reflect changes in the terrestrial ecosystems and show distinct responses to major climatic oscillations within the Holocene.