



Geochemical and stratigraphic analysis of ice from Bortig Ice Cave, Romania

Z. Kern (1,2), M. Molnár (3), I. Fórizs (4), A. Perşoiu (5), B. Nagy (1)

(1) Eötvös Loránd University, Department of Physical Geography, Pázmány Péter str 1/c, 1117 Budapest, Hungary

(2) Eötvös Loránd University, Department of Paleontology, Pázmány Péter str 1/c, 1117 Budapest, Hungary

(3) Institute of Nuclear Research of the Hungarian Academy of Sciences, Bem square 18/c 4026 Debrecen, Hungary

(4) Institute for Geochemical Research, Hungarian Academy of Sciences, Budaörsi str 45, 1112 Budapest, Hungary

(5) "Emil Racoviță" Institute of Speleology, 5 Clinicilor Str, PO Box 58, 400006, Cluj Napoca, Romania

Rock-hosted caves containing perennial ice and snow deposit are peculiar phenomena of mid-latitude, mid-altitude mountainous terrains. They are generally situated in regions where surface mean annual air temperature exceeds 0°C. So ice caves can be regarded as sporadic members of cryosphere in fragile mass and energetic balance with their environment which is highly sensitive to changes in the ambient climate.

Bortig Ice Cave (46.56 N 22.69 E; 1236 m asl.) is the third largest ice cave of Romania. The cave contains 25000 m³ stratified ice. To evaluate the potential of the ice deposit of Bortig Ice Cave for paleoclimatic reconstruction an intensive research program has been launched at 17 September, 2005.

In order to estimate the ice accumulation rate and the stable isotopic feature of the cave ice two drill cores (BA and BB) were extracted from the floor ice and sliced into pieces on the spot on 11-12 December, 2005. BA core was divided into 10 cm long while BB into 2 cm long subsamples.

The stable isotope (δD , $\delta^{18}O$) composition of BA subsamples varied from -68.6 to

-91.2 and from -9.7 to -12.44 per mil for δD and $\delta^{18}O$, respectively.

Results from tritium concentration measurements on BB core suggest that the complete 20th century history of atmospheric HTO is preserved in the ice cores. Both the Northern Hemispheric vertex of 1963 emissions and the preceding minor peak from 1958 are recognisable giving absolutely dated horizons into the sequence. The mean accumulation rate for the 1958-2005 period is 2.27 cm/yr.

Two wood samples were carved from the ice deposit. One from the base part of the central ice body and the other one from a well-stratified ice mound attached to the main ice block. Radiocarbon dates from the two samples yielded 170 ± 50 BP (1650-1960 AD 95.4%) and 1150 ± 60 BP (710-750 AD 3.5 %; 760-1020 AD 91.9%). The relatively young age of the first sample enhances the opinion that the origin of the marginal ice mound could be related to a documented anthropogenic impact on a part of the ice block's rim during the 1900's. The other sample might indicate the approximate age of the cave ice of the Borjig Ice Cave.