THE LONGEST HISTORY OF AN ICE CAVE – UNDER URAL?

In the year **2005** an impressive book was published at **Jekaterinburg** by Mining Institute of Ural Branch of Russian Academy of Sciences at Perm – **Kungurskaja ledjanaja peščera: opit rezhimnih nabljudenij (Kungur Ice Cave: Monitoring Experience),** the first Russian monograph dedicated to the detailed scientific research of a cave, as is said in the introduction. It is nice hard bound book of 376 pages, ISBN 5–7691–1567–X.

The editor is well known Russian karstologist and speleologist **V. N. Dubljanskij** who co-ordinated the work of 16 authors. Beside Dubljanskij himself there are other specialists known in West too, O. I. Kadebskaja, V. N. Katajev, N. G. Maksimovič, and B. R. Mavljudov (see his paper in Acta carsologica 35/1), just to cite some examples. The book includes 76 tables, 189 maps, plans, pictures, graphs and photos, among them 18 colour photos and ends by 461 references; with the exception of 16, they are all in Russian language. To emphasize the title of my report - the oldest reference is going back to the year 1730.

The book consists of two parts, the first one presents the region where the cave is situated (northern part of the so called Ufa plateau, outside of the town of Kungur, on the bank of the Silva river, under the »Ice Mountain« hill) and the second part is dedicated exclusively to the cave itself. The entrance to this nearly 6 km long cave lies 115 m above the sea level, but the climate of the region is severe: average winter temperature is –6.3° C, with mean minimum of –40°. The average amount of precipitation is 500 mm (300 – 600) and evapotranspiration is 358 mm. It is self-understanding that the age of rocks of the Perm region is Permian, in this case Lower Permian with prevailing anhydrite and gypsum. The second part - Kungur Ice Cave - has 13 chapters: history of investigation, methodology of data processing, morphology, hydrogeology, hydrochemistry, microclimate, sediments, biology, experiments, changes and modifications, geological history, speleogenesis, and tourist display.

There are over 500 scientific papers and publications related to Kungur Ice Cave. The cave is known for more than 400 years, more than 100 years it is open for tourist visit, and in 2001 federal and local legislation proclaimed "Ice Mountain and Kungur Ice Cave" the "Historical and Natural Complex" extended over 106 ha. When famous Cossack's Hetman Yermak advanced to Siberia he and his men spent the winter of 1578/1579 in Kungur Ice Cave. The first survey dates to 1703, 45 years earlier of Postojnska jama, and during the 18th century the entrance part was gypsum quarry while further inside numerous crosses and icons were placed. In 1948, crystallisation of the ice ceased and that is why Moscow University set up there a field station. In 1949 there were already 30 monitoring points installed. In the period of 50 years the researchers gathered an enormous amount of different data and it is justifiable to talk of a real data bank.

In my opinion the most interesting results are related to the microclimate. The amplitude of the air temperature is between – 9.7° and + 5.1° C, at some points it is permanently under 0°. From 1974 to 1994 the mean temperature in the cave was rising and since that year it is little by little falling. The warm period prolonged from 1 to 8 month per year and the ice is melting more and more. Beside temperature researchers monitored humidity, air currents, air pressure, aerosols, composition of the air, condensation, and evaporation. In the cave different minerals were found and analysed such as gypsum, "gypsum rose", celestine, selenite, cryogene gypsum, mirabilite, calcite, and different crystallisation of ice. Gypsum is much more soluble than limestone and therefore the collapses on the Ice Mountain above the cave are frequent. Thank to great number of different data the scientists were even able to correlate collapsing and lunar phases.

Tourism which started very early, in 1840 there was a professional guide installed, also contributed to the general warming of the cave. In the 30-ies of the last century a new artificial entrance was made to facilitate tourist visits and during the decennials tunnels were dug connecting different parts of the cave. So the microclimate conditions, due mostly to changed aeration, deteriorate

a good deal. In 1957 an electric illumination reached far into the cave, to the Great Lake. In 2001 at the entrances iron grids were installed so that cold air can penetrate in the cave during the winter and helps to cool it.

When leafing through the book I got the impression that this is maybe not just the first book of such kind published in Russia, but that also elsewhere such books are very rare, treating a cave in such details and having so many data and so long observation period. This is not only the description of the Kungur Ice Cave and of the course of events in this ice cave. The book contains many data and conclusions particularly which illustrate and help to understand the evolution of other ice caves. Even more, such a long and detailed series of so many elements can be useful at evaluating long-term changes in the greater space - the global change.

I cannot help to regret that the language barrier still exists (maybe even increases nowadays) and that such an important book has little chance to reach an international significance and wide response in international karstological spheres, as it should deserve. It would be a good opportunity to unite the forces of researchers of different nations, to combine the money of more publishing houses - and publish the book simultaneously in Russian and in English. I warmly recommend to everybody who knows the Russian "azbuka" to glance through the book, and to others interested in ice caves, to look the illustrations. But I cannot recommend buying it for the personal library – edition is limited to 300 copies only.

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