Gorbunova K. A., Maximovich N. G. Formation of sulfate-calcic waters in Kungur Cave massif // Cave and Karst Science: Abstract. – 1994. – Vol. 21. – № 1. – P. 12.

FORMATION OF SULPHATE-CALCIC WATERS IN KUNGUR CAVE MASSIF

K.A. Gorbunova and N.G. Maximovich, Perm University, Perm, Russia.

Caves are useful environments for investigating hydrochemical processes which take place in the Earth’s crust. Since 1992, Perm University together with Kungur Station of the Ural Branch of RAS have been undertaking a complex investigation of the Kungur ice cave according to the program 'Universiries of Russia'. The 5.6km long cave was formed in gypsum and anhydrite, interbedded with thin limestone and dolomite of Lower Permian Kungur stage. It is one of the most visited tourist caves in Russia.

The chemical composition of water in the cave massif is mainly a result of gypsum and anhydrite dissolution. The degree of water metamorphisation is indicated by its "sulphateness", that is by the ratio of sulphate ion content to hydrocarbonate ion content. Weakly mineralised waters recharging the cave massif have low sulphateness ratios: 0.5-1.6 snow, 0.5 river water. The sulphateness of atmospheric ice crystals in the cave is 0.6-0.7. In spite of similar sulphate- calcite composition and high mineralisation (1-2 g/1), water and ice in the cave have different sulphateness ratios: 10-21 percolation water, 11-16 karstwater, 3-9 underground lakes and streams, 26-38 old ice, 9-10 young ice. Percolation waters, and karst water formed in rock fractures (i.e. in a closed system) show higher sulphateness ratios compared to open reservoirs. In the latter case, water interacts with bottomset beds. Old ice is notable for the highest sulphateness ratios, caused by "freezing out" of calcium carbonate. Sulphateness is a genetic feature that indicates the sources and centres of karst water recharge, and conditions of their formation. The influence of anthropogenic factors causes the increased mineralisation of atmospheric precipitation input to the cave area, the appearance of nitrites and nitrates in karst water, and changes in cave microclimate and the degree of glaciation.