

Isotope Hydrological Study of the Pasnyag Karstic Spring

Mihály Molnár, László Palcsu, István Futó, Zsuzsanna Szántó, László Rinyu

Institute of Nuclear Research of the Hungarian Academy of Sciences (INR/HAS), Laboratory of Environmental Studies, H-4026 Debrecen, Bem tér 18/c., Hungary,

e-mail: mmol@atomki.hu

The water of the Pasnyag spring of the Aggtelek karst system in Hungary is applied as drinking water. Subsequent upon the local hydrogeological conditions probably in that water fresh and old ground water components are mixed in certain ratio. The objective of this work was to determine the mixing ratio of the waters of different origin. Water sampling was carried out from the spring and a nearby monitoring well.

Helium content and isotope ratio, tritium concentration (by ^3He ingrowth method), radiocarbon content of dissolved inorganic carbon (DIC), and δD , $\delta^{13}\text{C}$, $\delta^{18}\text{O}$ isotope ratios were measured from the water samples.

On the basis of isotope measurements the water of the spring and the observed nearby monitoring well are composed of fresh and old components in different ratios. The fresh component is dominant in the Pasnyag spring. The tritium and radiocarbon concentration of this water shows that it is fresh, young water coming directly from the karstic system, with only small amount of DIC from the limestone. The low tritium and radiocarbon content of the F1 monitoring well (nearby the Pasnyag spring) proved that this well contains high amount of old water. The higher helium content and the higher radiogenic ^4He ratio of the water also indicate subthermal origin in this case.