

The age of Lithuanian groundwater oldest in the world! The one of groundwater samples for investigation is taken from production well which belongs to JSC “Geotherma”

Analyses for ^{81}Kr and ^4He isotopes and their noble gases concentrations on groundwater from the deepest aquifer system of the Baltic Artesian Basin (BAB) were performed to determine groundwater ages. It was discovered that the groundwater age on the depths from 0,5 km to 1,1 km fluctuates within 0,319 to 1,157 Ma range. The groundwater age below 2 km depth transcend 1,3 Ma limit on the shore of the Lithuanian sea side. The suchlike old water dated by $^{81}\text{Kr}/\text{Kr}$ method is discovered the first time in the world. The investigation of radio krypton isotope 81 dissolved in the noble gases was accomplished by using highly sensitive laser equipment with magnetic-optic catcher ATTA (atom trap trace analysis). The measurements were performed by Argonne National Laboratory in the USA. Till this discovery the oldest groundwater 1,0 Ma has been found in Nubian aquifer in Egypt. The groundwater found in Guarani aquifer in Brazil also was dated as very old – 0,850 Ma.

The noble gases samples of groundwaters were taken from seven deep wells – from two in Estonia, from two in Latvia and from three in Lithuania accordingly. This international project was coordinated by famous members of laser physics, hydrochemistry and geochemistry. Among well-known professors Werner Aeschbach-Hertig (Environmental Physics Institute at Heidelberg University in Germany), Roland Purtschert (Institute of Physics at Bern University in Switzerland), Zheng-Tian Lu (Argonne National Laboratory in USA) were the Estonian prof. emeritus Rein Vaikmäe (Institute of Geology at Tallinn Technology University) and Lithuanian prof. habil. Dr. Robert Mokrik (Faculty of Chemical and Geosciences at Vilnius University). Investigations will be continued within united project at the Vilnius University (VU) and at the International Atomic Energy Agency (IAEA) in Vienna (Austria). The chromatography and spectrometry, chemical thermodynamics and modelling of filtration of chemical ions in groundwater composition will be performed at the VU cathedral hydro chemical laboratory. The groundwater age using $^4\text{He}/\text{He}$ isotope method once again will be investigated at the Isotopes Hydrology Laboratory (IHL) in International Atomic Energy Agency (IAEA). There are plans in future to continue investigate the groundwater age with the same $^{81}\text{Kr}/\text{Kr}$ isotope method in cooperation with Chinese radio krypton Laboratory at Science and Technology University in Hefei (China).

For more details please refer to the science journal *Geochimica et Cosmochimica Acta*. There is a link to the item: (<http://dx.doi.org/10.1016/j.gca.2017.01.033>).