gases were extracted from the water samples, measured volumetrically and analyzed by gas chromatography. The DIC was precipitated as barium carbonate and analyzed for both $\delta^{13}C$ and ^{14}C. The DIC had $\delta^{13}C$ values of −3 to −1‰, similar to those observed for carbonates in the tills. If these heavy $\delta^{13}C$ values are used in readily available groundwater dating models without accounting for the effects of microbial methane formation, the resultant calculated age is unrealistically young.

Preliminary results show a positive correlation ($r^2 = 0.91$) between the $\delta^{13}C$ of the DIC and the concentration of methane in the water. With this correlation, a more realistic estimate of the water-rock interaction can be calculated and used for correcting the ^{14}C age of the groundwater.

ISOTOPIC ANALYSIS OF CARBON IN A GEOTHERMAL SYSTEM

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The Surdulica geothermal system in the southeast part of Yugoslavia belongs to the granodiorite aquifer. Geothermal waters are in a range of 60°–130°C, and show bicarbonate sodium content, slightly alkali (pH = 7.0–7.5), mineralized (1.1–1.3 gr/L), with high fluoride and silica concentrations. The carbonate content of water increases with depth to the bottom of the system. Spring waters from altitudes higher than 800 m (top of the system, 1922 m asl) contain HCO_3^- and CO_2 lower than 80 mg/L and 10 mg/L, respectively. During water flow, carbonate content fluctuates from 200 mg/L at the middle elevations (600 m asl) to 500 mg/L in geothermal waters reaching, in some parts of the aquifer, values of 3 g/L for HCO_3^- and 500 mg/L for dissolved CO_2.

According to these data, the isotopic content of total dissolved inorganic carbon (TDIC) also changes. At the surface vegetation cover, $\delta^{13}C$ = −27‰ and ^{14}C content of 120 pMC were recorded. Data on ^{13}C concentration vary from −15‰ in the springs at the middle elevations up to the interval of −5 to 0.5‰ for geothermal waters at the bottom.

In the surface water zone, we discovered infiltration of water at the top of the system (above 1300 m asl) with 30–50 pMC. The hot thermal spring zone in the foothills of the massif (400 m asl) is characterized by tritium-free water with very low ^{14}C content (2–7 pMC). Because of the evident influence of dead carbon, ^{14}C dating of these geothermal waters is difficult. For A_0 = 85 pMC, the ages were estimated in the range of 10,000–28,000 years.

^{14}C MEASUREMENTS ON LAMINATED LAKE SEDIMENTS

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With the development of the AMS technique, ^{14}C measurements on laminated lake sediments became especially interesting because the measurement of milligram-size samples is now possible. The selection of well-defined terrestrial macrofossils (leaves, needles, seeds of trees) from the sediment, excludes "hard water" contamination.

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