

Isotopic investigations of the Macva hydrogeothermal system

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The object of our investigation was to determine the origin and the movement of the groundwater in the hydrogeothermal system of Macva situated on the southern margin of the Pannonian Basin. There is a typical continental climate with an average annual temperature and precipitation of 11°C and 872 mm, respectively, during the period 1965 – 1997. Caprock over the reservoir are Neogene sediments while the reservoir rocks are highly karstified Triassic limestones. Thermal waters are supplied from the limestone and dolomite reservoir and discharge from the boreholes (depths between 270 and 1345 m) with a flow rate of 0.3 to 61 l/s and a wide temperature range between 26 and 78°C. They are of Na-HCO₃ type in the pH range from 7.8 to 6.8. Some boreholes expell moderate gas with a pressure of 1.0 – 2.7 bar and a smell of H₂S.

To localize the recharge area the isotope compositions of oxygen and hydrogen of precipitation, river and thermal waters were determined. Samples have been collected since 1998. The $\delta^2\text{H}$ and $\delta^{18}\text{O}$ values in precipitation fit the "meteoric water line" (MWL) of $\delta^2\text{H} = 8.2 \times \delta^{18}\text{O} + 10$ ($n = 12$, $r = 0.996$). The delta values of the thermal water range from -13.83 to -10.75‰ for $\delta^{18}\text{O}$ and from -101.4 to -77.8‰ for $\delta^2\text{H}$. As these values also cluster around the MWL the meteoric origin of the thermal water is confirmed. The ^3H values of precipitation ranges from 12.7 to 123 TU in 1998 and those of the thermal water between 5.9 and 67 TU. For the identification of the proportion of young groundwater in the thermal water we need a lower detection limit for tritium measurements.