

12 HUNGARY: NAGY-TOHONYA SPRING

12.1 Overview

The Nagy-Tohonya catchment belongs to the Aggtelek karst region. The Aggtelek Karst is the Hungarian part of the Gömör–Tornai Karst unit, which is divided into two parts: Slovakian and Hungarian. The site extends within the Borsod-Abaúj-Zemplén county in Hungary and the Rožňava county and the Košice county on the Slovakian side. Usually the Hungarian part is mentioned as “the Aggtelek Karst”. The two sides are similar in their geological, hydrogeological and geographical characteristics. It is considered to be one of the most important transboundary groundwater bodies located between Hungary and Slovakia. The Aggtelek Karst includes the Aggtelek Mountains and the Alsó-hegy, known as Lower Hill. Together these represent the Hungarian part of the Gömör–Tornai Karst. The Slovakian part of the Gömör–Tornai karst is the South-Slovak Karst. The geographic position of the Aggtelek Karst is indicated in *Figure 49*.

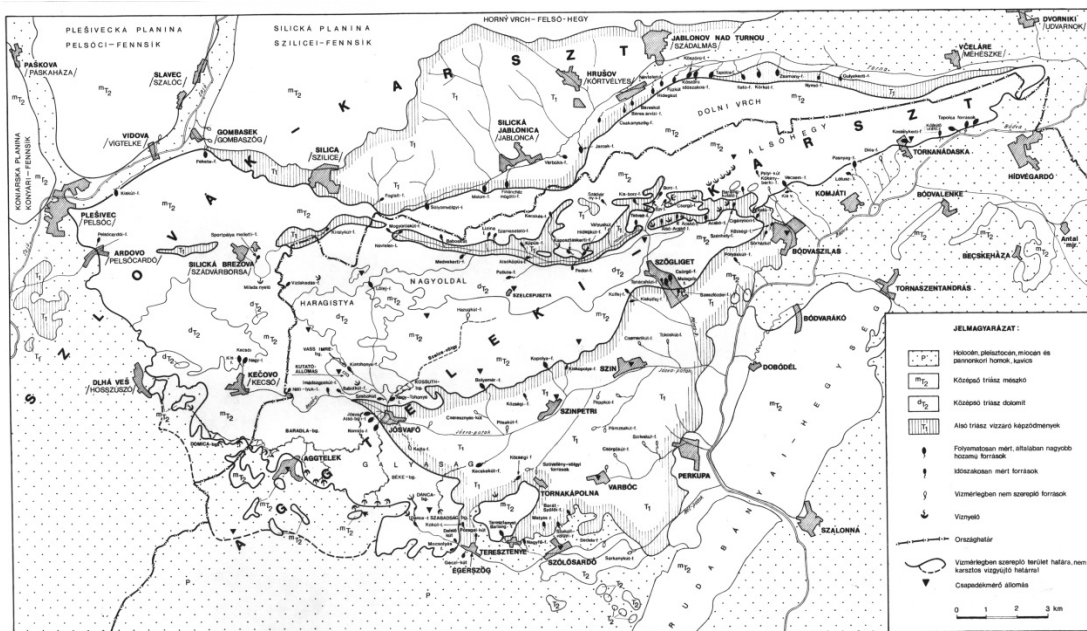


Figure 49 : The Aggtelek Karst (Maucha et al. 2000)

12.2 Geology

The Aggtelek Hills cover an area of 202 km². They are situated in the Northern part of Hungary, being in contact with the South-Slovak Karst through the state border. The area belongs to the Southern Limestone Range of the Carpathians.

The Hungarian side consists of East-West orientated limestone plateaus, with an elevation of 400-600 metres above sea level. Between them deep valleys are incised, to an elevation of 200-260 metres. On the other side of the state border the highest plateaus of the Slovak Karst have an elevation up to 800 metres, and toward the North the mountain range is even higher.

The main mass of the mountains comprises sedimentary rocks of Triassic age. The Lower-Triassic layers are mainly aquicludes: clay-slates and sandstones, covering an area of 62 km². Above them the Middle- and Upper-Triassic sediments consist of well karstified limestones and dolomites with a surface area of 105 km². Miocene age sand and gravel layers can be found in a much smaller extent in the southern part of the area (Maucha et al. 2000). The Pliocene sediments (clay, sand, gravel) cover a larger area, approximately 35 km². The Pleistocene is represented by the 0.2–1.0 m thick clayey soil on the top of the plateaus. In the valleys the Holocene alluvium consists of gravel and sand.

The Aggtelek Hills can be described by assuming the existence of overthrust folds. Four different overfields can be distinguished. The plateaus are situated above pseudo synclines, where they remained untouched between the uplifted tectonic zones, which brought the Lower-Triassic layers to the surface. In some places outcrops of Permian layers can be observed below the Lower-Triassic sediments. Figure 50 shows the geological structure of the Aggtelek Karst.

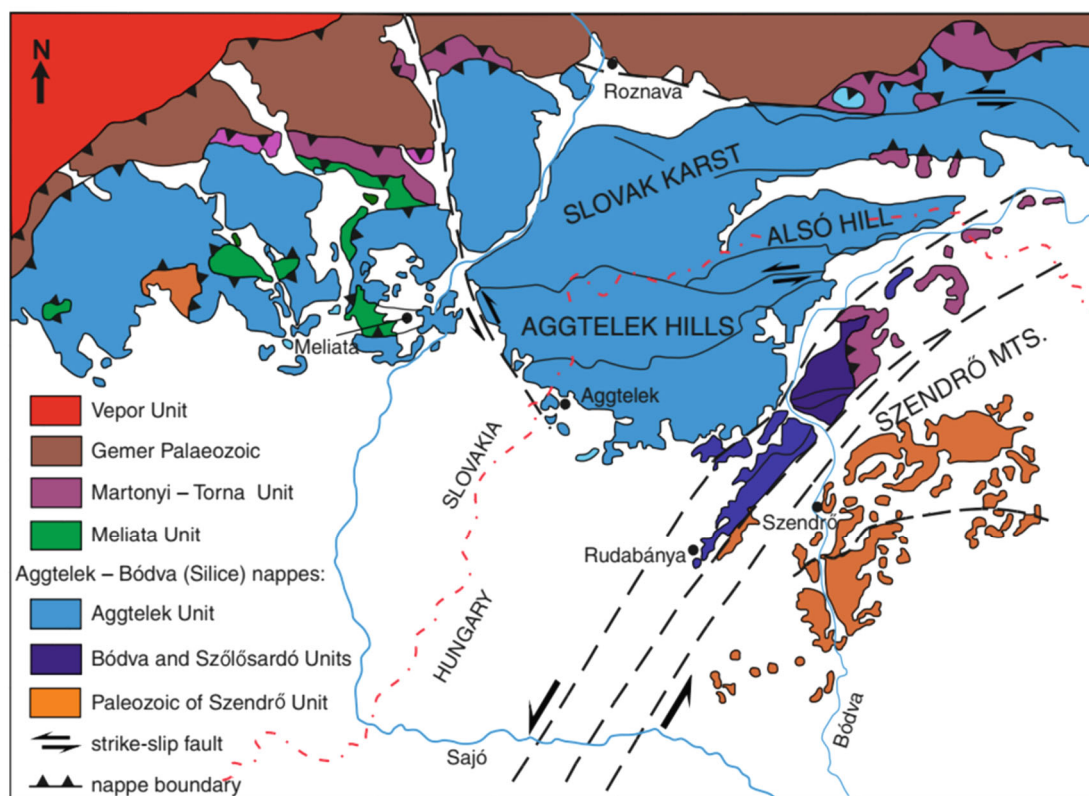


Figure 50: Geology of the Aggtelek Karst

12.3 Climate

The Aggtelek Karst area is situated in the continental climate region. According to the meteorological surveys carried out in the last 35 years the average temperature is 8.8 °C. The average annual temperature varies between 8.5°C and 9.1°C. The hottest month is July with an average monthly temperature of 19.2°C, the coldest is January (-2.8°C). The daily recorded temperature ranged from +28.4 °C to -18.9 °C during the study period, between 1958 and 2008.

The mean annual precipitation is 620 mm according to the Hungarian Meteorological Service. The driest period of the year is in the first three months (January, February and March), the average monthly precipitation is around 30 mm during this period. The rest of the year is wetter, especially during the summer period. The maximum amount of precipitation is in June and July, when the precipitation exceeds 80 mm.

12.4 Hydrogeology

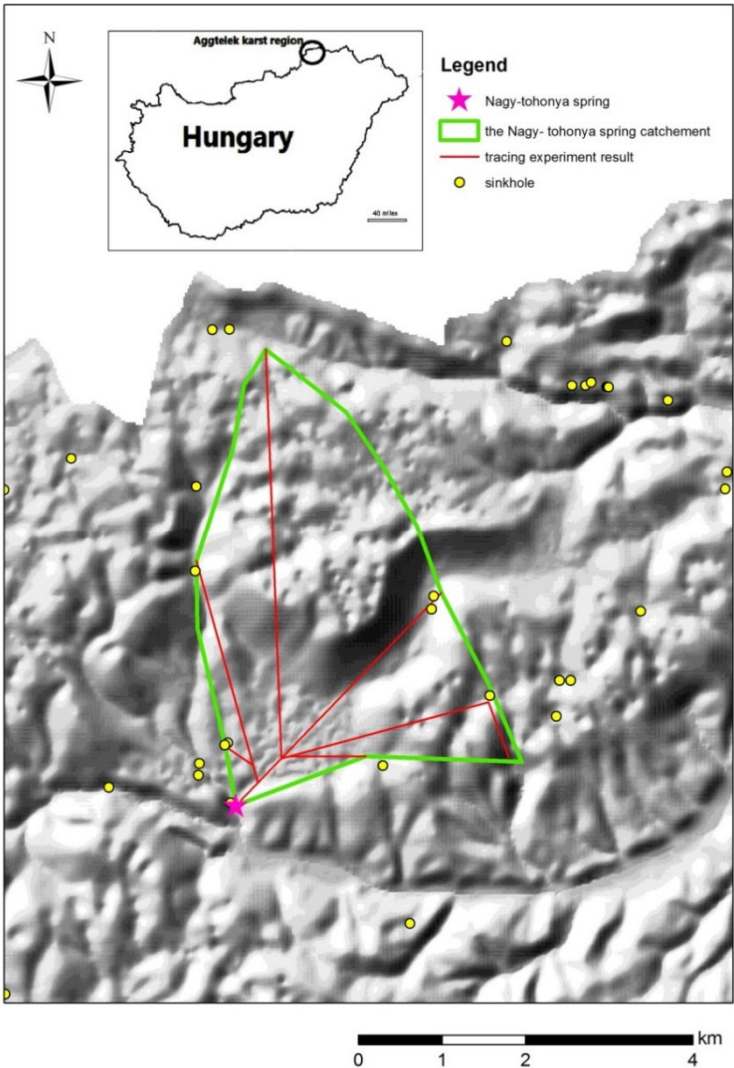
Much of the precipitation is infiltrated on the doline-covered plateaus and transported to the springs by the network of the fracture-system. In the Southern part of the region, where non-karstic (impermeable) areas occur in the spring catchment areas (e.g. Jósza and Komlós springs), small, intermittent water-courses, developed from surface runoff, feed the springs through well-developed swallow-holes. Most important springs of the piedmont have some thermal component. The thickness of the carboniferous layers is at least 1000 metres, and so deeper heated water also supplies the springs.

The dissolution residuum of the Middle- and Upper-Triassic limestones in the Aggtelek Karst is relatively small, a few percent, so they can be classified as highly soluble rocks. Every 10 000 m³ of water flowing out from the springs contains the equivalent of approximately 1 m³ of solid rock. As a result, all the larger springs are fed by caves. The distribution of cave passage directions proves that, beside the main E-W directed structural lines, the secondary fracture-system (with a 45 degree of inclination to the main system) also has a role in conducting groundwater to the springs. There are more than 50 springs across the whole karst area (involving the Hungarian and Slovakian regions).

12.5 Data available for the project

Nagy-Tohonya spring			
Data type	Time step	Monitoring period	Time period
Discharge	1 day	30 years	1964-1993
Electrical conductivity	1 week	30 years	1964-1993
Temperature	1 week	30 years	1964-1993

12.6 Summary

Pilot name	Nagy-Tohonya Spring		
Country	Hungary	EU-region	Mountain areas
Area (km ²)	12,5	Lithology	Limestones
Short description: The Nagy-Tohonya spring catchment belongs to the Aggtelek Karst area in North-Eastern Hungary. The aquifer comprises Triassic Limestones. The catchment area is around 12.5 km ² . The spring discharge varies between 0.1 and 1.14 m ³ /s.			
Monitored objects	Spring		
Monitored data	Discharge, temperature, EC		
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12.7 References

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