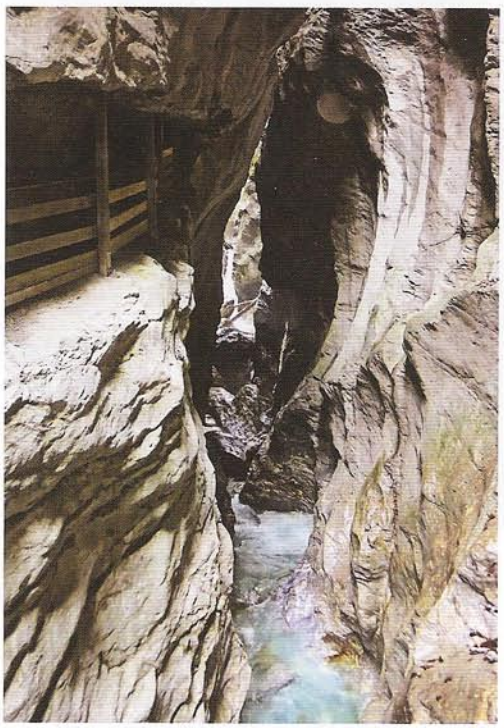
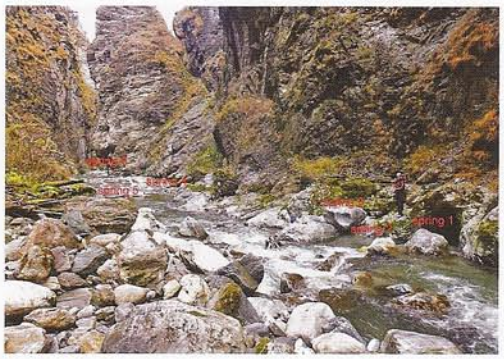
Ore of the Alps UNESCO Global Geopark, Austria

LIECHTENSTEINKLAMM Deep Gorge and Mystic Springs



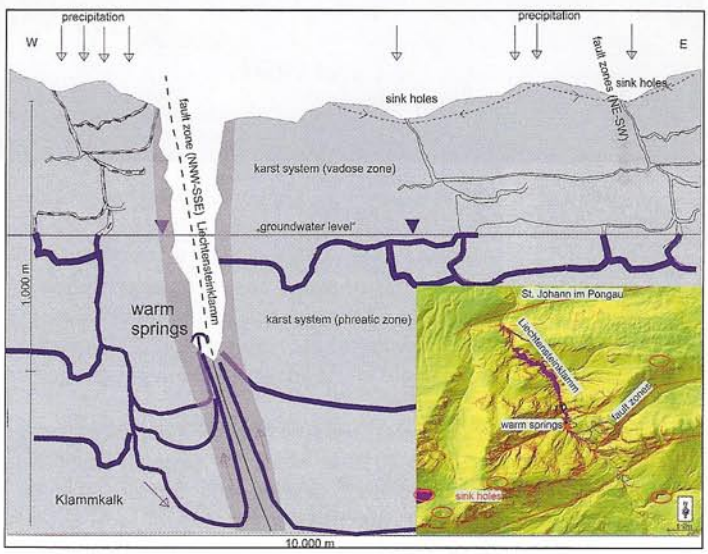
The steep sided narrow walls of the Liechtensteinklamm

(Photo. M. Häupl).



Locations of warm springs in the Liechtensteinklamm

(Photo. D. Strick).



The conceptual hydrogeological model of the warm water system emerging in the Liechtensteinklamm proposed by Sylke Hilberg.

The Liechtensteinklamm (Liechtenstein Gorge), situated 5 km south of St. Johann i. Pongau, is one of the most impressive Geosites (No. 120) in the UNESCO Global Geopark "Ore of the Alps". The Großarl Creek has eroded an approximately 3000 metres long gorge bounded by 300 m high steep and massive walls. The narrowest distance between the walls is only two metres! This unique natural sight was opened to the public for the first time in 1875. The donations for the construction of the gorge trail were provided by the Prince of Liechtenstein. The gorge can be visited today on a spectacular 1000 m trail with boardwalks and bridges and is one of the most popular natural attractions in the Salzburg area, with more than 150,000 visitors per year.

The Liechtensteinklamm was formed by the Großarl Creek, which eroded the karstified limestones of the so called "Klammkalkzone" in the northern frame of the Penninic Tauern Window. Historic reports beginning in the late 17th century describe springs, emerging at the bottom of the gorge, with an abnormally high temperature of nearly 15 °C and a positive influence on human health. Over three centuries numerous attempts to tap the springs for commercial use failed because of the exposed location of the springs, the steep slopes of the gorge and the associated danger of rock falls, avalanches and floods. A hydrogeological connection between thermal springs in Bad Gastein (ca. 25 km SW) was assumed for nearly 300 years but never proved.

Existing data about the springs (from historical reports and recent research) formed the basis for hydrogeological investigations conducted during 2015. The results showed that the location of the springs is associated with WSW-ENE striking fault systems which intersect the N-S-striking Liechtensteinklamm. A comparison of the water quality of the springs with those of the Bad Gastein springs and other thermal springs in the Salzach Valley reveals similarities and differences in water chemistry and thus provides no clear evidence for or against a hydrogeological connection. The mean residence time of the water in the ground water body was determined from the concentration of the radioactive hydrogen isotope Tritium. The study revealed that the spring water requires approximately 12 years from the time of percolation to discharge. The recharge area lies at a topographic level of 1,500 m asl and is restricted to sinkholes. The mean water temperature is evidence for a circulation depth of at least 200 m below the streambed of the Liechtensteinklamm. There is obviously no direct hydraulic connectivity to other known thermal springs or wells in the region. The conceptual hydrogeological model in this account illustrates the proposed subterranean flow paths of the warm and "healthy" water in the Liechtensteinklamm from sink to source.

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