



Discharge behaviour of the Blautopf spring and Gallusquelle spring (Swabian Alb / Germany) – relative importance of the fissured matrix and the karst conduit system

T. Geyer (1), M. Selg (2), T. Gudera (3), and M. Sauter (1)

(1) Georg-August-Universität Göttingen, Geowissenschaftliches Zentrum Göttingen, Applied Geology, Göttingen, Germany (tgeyer@gwdg.de, 49 551 399379), (2) Regierungspräsidium Freiburg, Abt. 9 Landesamt für Geologie, Rohstoffe und Bergbau, Freiburg, Germany, (3) LUBW Landesanstalt für Umwelt, Messungen und Naturschutz Baden-Württemberg, Karlsruhe, Germany

This study shows the importance of catchment delineation for characterization of karst systems and interpretation of spring discharge curves for the well investigated karst springs Blautopf and Gallusquelle. The catchment areas of both springs belong to the deep karst of the Swabian Alb (Germany) and are characterized by carbonate series of the Upper Jurassic. However, the discharge behaviours of the springs differ considerably from one another. The baseflow of the Blautopf spring is significantly higher than that of the Gallusquelle spring. The scaling of the discharge with the catchment area shows that the reason therefore is the larger catchment area of the Blautopf spring. This conclusion is supported by the estimated baseflow recession coefficients, which are similar for both springs. It means that the hydraulic properties of the main aquifer storage, i.e. fissured matrix blocks, are in the same parameter range. However, the Blautopf spring displays a much higher variability of spring discharge than the Gallusquelle spring. This can be attributed to different degrees of karstification of both catchment areas. The ratio between maximum and minimum daily spring discharge is $32 \text{ cbm/s} : 0,25 \text{ cbm/s} \approx 130$ for the Blautopf catchment and $2,7 \text{ cbm/s} : 0,04 \text{ cbm/s} \approx 67$ for the Gallusquelle catchment during the period 1958-2009. In the Blautopf catchment a large scale water filled cave system is reported from speological investigations. In contrast, the Gallusquelle conduit system is not accessible. The evaluation of artificial tracer tests show that the water filled conduit volume in the Gallusquelle catchment is only a fraction of the Blautopf catchment. Normalized to the catchment area, the portion of the conduit system of the Blautopf is approximately twice as large as that of the Gallusquelle. It reveals the importance of the conduit system for groundwater flow in the investigated systems.