



Hydrology of the karst spring Jadro (Croatia)

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Due to very special and complex underground and surface karst forms there are very different cases of karst springs. Karst surface and underground morphology controls water pathways within the karst massif feeding the karst springs. The estimation of the extreme discharges (minimum and maximum) from the karst springs is a challenge due to large heterogeneities in geometric and hydraulic parameters of the vadose (especially epikarst part) and phreatic zone. Due to this reason hydrologic characteristic of karst springs, especially values of their minimum and maximum discharges can be very different in comparison with the same characteristics of no-karst springs. The determination of the catchment boundaries and the catchment area of any spring is the starting point in its hydrological analyses and one of the essential data which serve as a basis for its water management. In karst landscapes this is a difficult task, which very often remains unsolved. Detailed hydrological analyses of the karst spring Jadro (Croatia) is given in the paper. The Jadro Spring is important since it has supplied the town of Split with water since Roman times. It is located at an elevation of 35 m above sea level. The catchment is located in the central part of the bare Dinaric karst. It is mainly formed of carbonate rocks and partly of impermeable flysch. Carbonate layers differ in age, lithologic composition bedding and in structural-tectonic position. Using composite transfer functions the catchment area is estimated to cover 450 km², while using Turc method catchment area is determined to cover 527 km². It is obvious that the precise catchment area and boundaries of the Jadro Spring are not known till now despite of many different investigations. Because of the vicinity of the Adriatic Sea, warm wet masses and orography intensive convective precipitation of short duration occurs very often over the Jadro Spring catchment. The average annual spring discharge for the 1995-2009 period is 9.85 m³/s. The minimum measured discharge is 3.72 m³/s. The maximum measured discharge of 70.1 m³/s is very low for a catchment area larger than 450 km² and intensive precipitation. This fact identifies the Jadro Spring as a karst spring with limited discharge capacity. There are some evidences (tracing tests) that exists underground connection between the neighbouring Cetina River and the Jadro Spring. Conceptual model of the Jadro Spring functioning is given.