DIFFERENTIATED KARST SPRING BEHAVIOR UNDER CHANGING HYDROLOGICAL CONDITIONS IN THE CANSIGLIO-CAVALLO AREA (ITALIAN ALPS)

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The Cansiglio-Cavallo plateau is a limestone massif shared between the Italian regions of Veneto and Friuli-Venezia Giulia (northeastern Italy). A high density of dolines characterizes the area and groundwater circulation is known to occur through very deep karst conduits. Three main springs (Molinetto, Santissima and Gorgazzo) located along a 4 km front on the southeastern margin of the massif are the main outlets of this karst aquifer, discharging a global mean annual flow rate higher than 10 m^3/s and giving origin to the Livenza river. Despite several previous studies and tracing experiments (e.g. Cucchi et al., 1999; Grillo et al. 2011; Vincenzi et al., 2011), the hydrogeology of this karst aquifer is still poorly known.
Geological, hydrodynamic and hydrochemical investigations were carried out in the area since spring 2015, in order to enhance our knowledge on this important aquifer. These included: 1) a lineament analysis to infer the most likely groundwater flow directions inside the massif, 2) groundwater sampling in caves and springs for the analysis of major ions, rare earth elements and stable isotopic signature of water ($\delta^{18}O$, $\delta^{2}H$), 3) continuous monitoring of water levels, EC, T at the three main springs, 4) discrete monitoring of flow rates at the three main springs for the construction of h/Q rating curves, 5) a cave-to-spring multitracer test using three different fluorescent tracers.
The hydrogeological study allowed to: 1) gather new detailed information on the geological and tectonic structure of the plateau; 2) calculate a water budget for the entire karst area based on all available hydrological data; 4) highlight the discharging behavior of the system with respect to different recharge conditions; 5) better define the recharge areas of the three springs and the effective groundwater flow velocities in different sectors of the massif.
The three springs, that apparently drain the same karst aquifer, show different patterns of behavior with respect to changing discharge conditions. In particular, the aquifer behaves as a

partially independent drainage system during low flow conditions, when the chemistry of the three main springs is clearly differentiated. The behavior becomes the one typical of interconnected systems during floods, when the groundwater discharging at the three springs shows very similar characteristics. These results suggest the occurrence of different recharge areas for the three main springs that are mostly independent during low flow conditions and drain the same reservoir during floods.

References

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