

Use of water resources in mountain. The case study of the Montellina Spring

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The Montellina Spring (370 m a.s.l.) represents an example of groundwater resource in mountain region. It is a significant source of drinking water located in the right side of the Dora Baltea Valley (Northwestern Italy), SW of Quincinetto town. This spring shows a morphological location along a ridge, 400 m from the Renanchio Torrent in the lower sector of the slope.

The spring was investigated using various methodologies as geological survey, supported by photo interpretation, structural reconstruction, NaCl and fluorescent tracer tests, discharge measurements. This multidisciplinary approach, necessary due to the complex geological setting, is required for the importance of the Montellina Spring. It is interesting in the hydrogeological context of Western Alps for its high discharge, relatively constant over time (average 150 l/s), and for its location outside a fluvial incision and suspended about 40 m above the Dora Baltea valley floor (Lasagna et al. 2013).

According to the geological setting, the hydrogeological reconstruction of the area suggests that the large amount of groundwater in the basin is essentially favoured by a highly fractured bedrock, covered by wide and thick bodies of glacial and gravitational sediments. The emergence of the water along the slope, in the Montellina Spring, is essentially due to a change of permeability between the deep bedrock and the shallow bedrock and/or surficial sediments. The deep bedrock, showing closed fractures and/or fractures filled by glacial deposits, is slightly permeable. The shallow bedrock, strongly loosened as result of gravitational phenomena, and the local gravitational sediments are, on the contrary, highly permeable.

The concentration of water at the spring is due to several reasons. a) The spring is immediately downward a detachment niche, dipping towards the spring, that essentially drains the water connected to the change of permeability in the bedrock. b) It is along an important fracture, that carries a part of the losses of the Renanchio Torrent. c) Finally, it is favored by the visible and buried morphology. Although it is located along a ridge, the spring occurs in a small depression between a moraine and a landslide body. It also can be favored by the likely concave trend of buried base of the landslide.

At last, tracer tests of the Renanchio Torrent water with fluorescent tracer are performed, with a continuous monitoring in the Montellina Spring. The surveys permit to verify and quantify the spring and torrent hydrogeological relationship, suggesting that only a small fraction of stream losses feeds the spring.

Lasagna M., De Luca D.A., Clemente P., Dino G.A., Forno M.G., Gattiglio M., Gianotti F. 2013. Valutazione dell'apporto idrico alla Sorgente Montellina da parte del Torrente Renanchio (Quincinetto, Torino). *Acque Sotterranee - Italian Journal of Groundwater*, 131(2), 75-85.