

ANALYSIS OF RECHARGE PROCESSES IN KARST SYSTEMS

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The recharge processes have been evaluated for several main karst massifs of southern Italy, Mt. Terminio, Mt. Cervialto and Matese massifs, characterized by wide endorheic areas. This paper highlights the contribute to springs discharge of open areas, closed areas and total catchment area of these massifs.

In order to estimate the recharge of these massifs, the model proposed by Fiorillo et al. (2015) has been used.

The annual means recharge has been estimated by GIS tools, from regression of annual mean values of different ground-elevated rain gauges and thermometers.

The recharge has been distinguished for endorheic areas and the other areas of springs catchment, and the ratio between the output spring and input rainfall has been also estimated (recharge coefficient).

The annual recharge has been used to calibrate a daily scale model, which allows to estimate the amount of effective rainfall, which is retained as soil moisture; the amount reaching the water table (recharge s.s.) and the amount of rainfall which develops the runoff and leaves the catchment.

All these amount vary through the hydrological year, in function of soil moisture deficit and daily rainfall intensity.

When soil moisture reaches the field capacity, daily rainfall exceeding a specific threshold values (for Cervialto, Termnio, and Matese Massifs), develops runoff; the runoff amount increases during wet year and reduces during dry years, highlighting the important role of the endorheic areas mainly during wet years.

Cervialto massif can be considered as a pure climate controlled aquifer, Terminio massif is moderately conditioned by groundwater abstraction and Matese massif is strongly conditioned by hydroelectrical exploitation.

The model provided in this paper allows to define the recharge conditions through the hydrological year representing then a useful tool for water management.

References

Fiorillo F., Pagnozzi M., Ventafridda G. (2015) “A model to simulate recharge processes of karst massifs”; *Hydrological Processes* 29, 2301–2314.

Fiorillo F., Pagnozzi M. (2015) - Recharge process of Matese karst massif (southern Italy); *Environmental Earth Sciences* 74, 7557–7570.

