TEMPERATURE DISTRIBUTION AND HOMOEOTHERMIC SURFACE DEPTH IN THE SHALLOW AQUIFER OF TURIN AND ITS HINTERLAND (NW ITALY)

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378 - TEMPERATURE DISTRIBUTION AND HOMOEOTHERMIC SURFACE DEPTH IN THE SHALLOW AQUIFER OF TURIN AND ITS HINTERLAND (NW ITALY)

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We propose a statistical method to study the temperature distribution in the shallow aquifer of Turin area and its hinterland.

The temperature data were collected in piezometers by probing sensor with ±0.1 degree Celsius sensibility. These piezometers are developed in the shallow aquifer, consisting of Quaternary fluvial deposits (gravel and sandy texture) of the Northern Piedmont Plain sector.

All thermal profiles show a common trend characterized by variations of temperature that decrease with depth until reaching a substantial thermal stability (homoeothermic surface). The temperature fluctuation are linked to seasonal air condition while, for depth greater than 30 meters from ground level the temperature values tend to stabilize during the year, independently of the outside air condition.

The aim of the statistical analysis is: a) to study the temperature distribution in the first meters of the shallow aquifer; b) to establish the depth value where seasonal fluctuation became negligible (homoeothermic surface depth). The analysis allowed us to evaluate an analytical solution of the equation describing the seasonal temperature fluctuation and then determine the presence of the "homoeothermic surface", its depth range and the average value of the temperature with its associated uncertainty.

The developed methodology allow us to determine the statistical probability of finding a given underground temperature both in the first several meters of the shallow aquifer and near the "homoeothermic surface" with a chosen confidence interval. This average value corresponds to the asymptotic behavior of the damped oscillations connected to seasonal temperature fluctuations found in the subsurface.

The results of this research can be applied to the exploitation of low enthalpy geothermal resources, in which it's important to know the temperature distribution and to estimate its value at the depth of interest with the aim of designing GWHP systems.