

## Geothermic coastal springs in Southern Italy

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Carbonate aquifers, located in foreland tectonic settings, could represent important thermal water resources outside the volcanic areas, supplying spas or geothermal installations. Thermal springs constitute the discharge areas of deep marine and continental groundwater flowing within these carbonate aquifers whose hydraulic conductivity and the relevant geothermal fluid migration are strictly controlled by both the discontinuity rock network and the karst processes involving the foreland environment. An example of these springs occurs along the south-easternmost portion of the Apulia region (Southern Italy) where some sulphurous and warm waters (22-33 °C) flow out in partially submerged caves located along the coast, thus supplying the spas of Santa Cesarea Terme (referred as SCT in the following). Some hypotheses about the origin of these warm waters were proposed up to now by previous researches but some uncertainties still exist. For this reason, the SCT area was selected in order to define the conceptual model of the geothermal resources related to the thermal springs and, as a consequence, the origin of the thermal springs. This SCT area is one of the pilot site of the Vigor Project (Evaluation of the geothermal potential of Regions of Convergence), promoted by the Italian Ministry of Economic Development and National Research Council. Geological and hydrogeological surveys, including geo-electrical prospecting, and chemical and isotopic analyses of both groundwater and seawater were carried out. Stable isotopes (e.g.  $\delta^{18}\text{O}$ ,  $\delta\text{D}$ ) were used to define the origin of the thermal waters and the recharge mechanism of the geothermal systems while the radiocarbonate  $^{14}\text{C}$  was determined for estimating the age of the thermal waters.

All the geological, hydrogeological and geochemical data acquired during the project were so analyzed in order to define the conceptual model of the SCT geothermal resource. The thermal waters arise from ancient seawaters infiltrated at great depth within the seabed substratum, located in front of the Santa Cesarea coastal sector. Moreover all the data were examined to improve the knowledge of the groundwater flow system, thus assessing the possibility of using low-temperature geothermal fluids to fulfil the thermal needs of the town of Santa Cesarea Terme.