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The geothermal potential of Campanian volcanoes: evaluation and opportunities.

Carlino Stefano, Somma Renato, De Natale Giuseppe, and Troise Claudia
INGV Sezione di Napoli, Naples, Italy (renato.somma@ov.ingv.it, ++39 081 6108521)

Since 1939 several drillings, finalized to geothermal energy exploitation, have been performed in the volcanic district of Campania region (Campi Flegrei, Ischia and Vesuvius), by SAFEN Company and subsequently, until 1985, by an AGIP-ENEL joint venture. The attention to the geothermal energy exploration in Southern Italy was drawn by either the consolidate energy production of Larderello geothermal field (Tuscany) and by the oil crisis during the mid seventies. Drillings results were particularly interesting at Campi Flegrei and Ischia, where the high temperature ($> 150^{\circ}\text{C}$) recorded at shallow depth (500 to 2000 m) and the occurrence of vigorous hot hydrothermal circulation, highlighted the possibility of geothermal exploitation also in the high enthalpy range. The project was abandoned at the middle of 1980's, mainly due to the sudden decrease of oil price and to the nuclear choice of the Italian Government, suddenly stopped in 1986 after Chernobyl disaster. Nowadays, the advancements in geothermal exploitation technologies, the high costs of fossile fuels and the increasing value of sustainable and clean energy sources make geothermal energy in these areas largely appealing.

The data obtained by drillings (down to 3 km of depth) and investigation between 1939 and 1985 allowed us to asses, by using the volume method, the geothermal resource for Campi Flegrei and Ischia, which correspond to a potential energy of about 6 and 11 GWy respectively. Such high values, together with the nowadays green energy policies, point out the invaluable interest of geothermal assessment and exploitation in Campanian volcanic district. Recently, an important project (Campi Flegrei Deep Drilling Project, CFDDP) approved by the International Continental Drilling Program started, aimed to the understanding of the Campi Flegrei caldera dynamics and the precise evaluation of the geothermal resource. The project will consist, mainly, of two drillings located in the eastern sector of the caldera, the first (pilot hole) reaching 500 m of depth and the second up to 3.5 km deep. The CFDDP will greatly improve both scientific information of the eruptive history of the Campi Flegrei caldera, and knowledge of related geothermal systems for the whole depth extension of aquifers. Thus, the project will represent a new starting point for the exploitation of geothermal resources in Southern Italy, where many areas are characterised by the presence of deep to shallow magma bodies, associated with large geothermal resources.