



## **Campi Flegrei Deep Drilling Project and geothermal activities in Campania Region (Southern Italy)**

Giuseppe De Natale, Claudia Troise, Antonio Troiano, Maria Giulia Di Giuseppe, Angela Mormone, Stefano Carlino, Renato Somma, Anna Tramelli, Enrico Vertechi, Agata Sangianantoni, and Monica Piochi

Osservatorio Vesuviano-INGV, Naples, Italy

The Campanian volcanic area has a huge geothermal potential (Carlino et al., 2012), similar to the Larderello-Radicondoli-Amiata region, in Tuscany (Italy), which has been the first site in the World exploited for electric production. Recently, the Campi Flegrei Deep Drilling Project (CFDDP), sponsored by ICDP and devoted to understand and mitigate the extreme volcanic risk in the area, has also risen new interest for geothermal exploration in several areas of Italy. Following the new Italian regulations which favour and incentivise innovative pilot power plants with zero emission, several geothermal projects have started in the Campania Region, characterized by strict cooperation among large to small industries, Universities and public Research Centers. INGV department of Naples (Osservatorio Vesuviano) has the technical/scientific leadership of such initiatives. Most of such projects are coordinated in the framework of the Regional District for Energy, in which a large part is represented by geothermal resource. Leading geothermal projects in the area include 'FORIO' pilot plant project, aimed to build two small (5 MWe each one) power plants in the Ischia island and two projects aimed to build pilot power plants in the Agnano-Fuorigrotta area in the city of Naples, at the easternmost part of Campi Flegrei caldera. One of the Campi Flegrei projects, 'SCARFOGLIO', is aimed to build a 5 MWe geothermal power plant in the Agnano area, whereas the 'START' project has the goal to build a tri-generation power plant in the Fuorigrotta area, fed mainly by geothermal source improved by solar thermodynamic and bio-mass. Meanwhile such projects enter the field work operational phase, the pilot hole drilling of the CFDDP project, recently completed, represents an important experience for several operational aspects, which should constitute an example to be followed by the next geothermal activities in the area. It has been furthermore a source of valuable data for geothermal characterization of the Agnano-Fuorigrotta area, despite its mainly volcanological goals. In particular, the drilling site was equipped with dense and multidisciplinary continuous monitoring systems, an example to follow anyway to assure the minimum impact on such densely urbanised areas. Furthermore, innovative leak-off experiments mainly aimed to permeability and strength/stress measurements have been developed and tested. Such tests show permeability values before water injection between 10-14 and 10-15 mD and, moreover, put in evidence a significant local increase of permeability obtained at the end of the injection experiment.