



## **Permeability estimates from artificial drawdown and natural refill experiments at Solfatara volcano, Italy**

Heiko Woith (1), Giovanni Chiodini (2), Annarita Mangiacapra (2), and Rongjiang Wang (1)

(1) Deutsches GeoForschungsZentrum GFZ, Potsdam, Germany (heiko.woith@gfz-potsdam.de), (2) INGV Osservatorio Vesuviano, Naples, Italy (chiod@ov.ingv.it)

The hydrothermal system beneath Campi Flegrei is strongly affected by sub-surface processes as manifested by a geothermal “plume” below Solfatara, associated with the formation of mud-pools (Fangaia), fumaroles (Bocca Grande, Pisciarelli), and thermal springs (Agnano). Within the frame of MED-SUV (The MED-SUV project has received funding from the European Union Seventh Framework Programme FP7 under Grant agreement no 308665), pressure transients in the hydrothermal system of Campi Flegrei are being continuously monitored at fumaroles, mudpools, hot springs, and geothermal wells. In total, waterlevel and temperature is recorded at 8 sites across the hydrothermal plume along a profile aligned between Agnano Termal in the East and Fangaia in the West. Autonomous devices are used to record the water level and water temperature at 10 minute intervals.

At Fangaia mudpool water level and water temperature are dominantly controlled by rain water. Thus, the pool is refilled episodically. Contrary, the water level at a well producing hot water (82°C) for the Pisciarelli tennis club drops and recovers at nearly regular intervals. The induced water level changes are of the order of 1-2m and 3-4m in case of the mudpool and the hot-water-well, respectively. At first glance, both monitoring sites might seem to be fully useless to access natural changes in the Campi Flegrei fluid system. At a second thought, both timeseries provide a unique opportunity to monitor potential permeability changes in the aquifer system. A similar approach had been proposed to deduce earthquake-related permeability changes from Earth tide variations. Contrary to the indirect Earth tide approach, we have the chance to estimate the hydraulic aquifer properties from our monitoring data directly, since each time series contains a sequence of discrete hydraulic tests - namely drawdown tests and refill experiments. Although our Cooper-Jacob approach is really crude, we obtained reasonable permeability estimates for both sites. Preliminary permeability timeseries are presented.