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Evidences at Pisciarelli fumaroles (Campi Flegrei) by geochemical and geophysical monitoring

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The Pisciarelli area (Campi Flegrei, Southern Italy) is characterised by a fumarole field, which is affected by near-surface secondary processes of seasonal character that seem to mask the deeper signals related to the temperature-pressure changes occurring in the hydrothermal system. Starting from 2003, the Pisciarelli field has experienced an evident increase of activity, which has been marked by a sequence of temperature peaks of the fumaroles above the average background temperature of 95°C, each lasting up to half a year until early 2011, and exceptionally about one year, from mid-2011 to mid-2012, the last recorded peak. Furthermore, a nearly linear trend of the peak temperatures, from about 97° C up to around 112°C, has been recorded from 2003 up to date. The increase of activity has also been marked by the opening of new vigorous vents and degassing pools, also accompanied by intense local seismic activity. Continuous monitoring of such phenomena is on-going, by permanent networks for seismic, ground deformation and geochemical measurements. Geophysical surveys have so far allowed a quite good knowledge of the subsurface structure of the system. An innovative methodology for continuous and in situ gas sampling of fumarolic and soil diffusive emissions has also been applied to the geothermal and volcanic area of Pisciarelli. The high sampling density and numerous species detected (a.u.m. 1-100) allowing a good statistic record and the reconstruction of the gas composition evolution of the investigated area. The equipment used for on-line monitoring consists of a Quadrupole Mass Spectrometer. We obtained geochemical composition trends from the Pisciarelli degassing field as well as the main relationships of good tracer of magmatic fluids injection such us CO_2/CH4 and H2S/CO_2. In order to evaluate the fluids dynamics in the shallow hydrothermal systems and to interpret the eventual periodicity of the geochemical time series recorded, we perform a series of DC electrical tomography at fixed period of time. Both the repeated ERT imaging and continuous geochemical monitoring should allow us to identify the different sources such as the meteoric component, a short time component (daily) and the eventual evolution of the deep fluids.