



## **Geochemical clues on the origin of the current accelerating deformation of Campi Flegrei caldera**

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An accelerating process of ground deformation is currently affecting the Campi Flegrei caldera. The deformation pattern is here explained with the overlapping of two processes: short time pulses that are caused by injection of magmatic fluids into the hydrothermal system, and a longer time process of heating of the rock. The short pulses were highlighted by comparing fumarolic compositions and ground deformations. The two independent data sets show the same sequence of anomalous peaks with a delay of  $\sim 200$  days of the geochemical signal with respect to the geodetic signal. This correspondence strongly support the occurrence of episodes of magmatic fluid injection into the hydrothermal system feeding the fumaroles of Solfatara. Seismic swarms, whose frequency is increasing in the time, accompanies each of this episode. The heating of the hydrothermal system, which parallels the long-period accelerating curve, is inferred by temperature–pressure gas geoindicators. Referring to a recent interpretation that relates variations in the fumarolic inert gas species to open system magma degassing, we infer that the heating is caused by an enrichment in water of the magmatic fluids, in addition to an increment in their flux and an increased frequency of the degassing events. A physical numerical model of the injection of magmatic fluids into the hydrothermal system nicely reproduces many of the observed data including the thermal evolution independently inferred from the fumarolic composition.