

Long term variations at Campi Flegrei volcanic system highlighted by the monitoring of the hydrothermal activity

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Long time series of chemical composition of fumaroles and of soil CO₂ flux reveals important variations in the activity of Solfatara fumarolic field, the most important hydrothermal site of Campi Flegrei, during 2000-2008. A continuous increase of the CO₂ concentration and a general decrease trend of the CH₄ concentration, observed since 2000, are interpreted as the consequence of the increment of the relative amount of magmatic fluids, rich in CO₂ and poor in CH₄, hosted by the hydrothermal system. Contemporaneously the H₂O-CO₂-He-N₂ gas system shows remarkable compositional variations in the samples collected after July 2000 with respect to the previous ones, possibly indicating the progressive arrival at the surface of a magmatic component different from that involved in the 1983-84 bradyseism. The change starts concurrently with the long periods seismic events of July 2000 whose main event occurred at a depth of 4 ± 1 km [Saccorotti et al, 2001], a depth compatible with the base of the hydrothermal system. In our opinion, the seismic activity of 2000 was the indicator of the opening along the Pisciarelli faults of an easy pathway for the transfer of gases from a deep zone of magmatic fluids accumulation, probably located in the very hot, plastic domain above the magma chamber, towards the shallower, brittle domain hosting the hydrothermal system. Since 2000 this magmatic gas source is active and causes ground deformations and seismicity. Even though the activity will be most probably limited to the expulsion of large amounts of gases and thermal energy, as observed in other volcanoes and in the past activity of Campi Flegrei, the behaviour of the system in the future is at the moment unpredictable.