Forecasting and managing eruption hazard during a long-lasting unrest in an area quiescent for centuries: a lesson from Campi Flegrei caldera (Italy)

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Campi Flegrei is a densely populated collapse caldera located in Southern Italy, partly including the city of Naples; the last eruption dates back 1538 (VEI=3). This area gave rise to a caldera forming eruption 15.000 years ago (Neapolitan Yellow Tuff, VEI=6) and is thought to have generated the most explosive eruption ever occurred in Europe at our knowledge: the Campanian Ignimbrite, 39.000 y BP (VEI=7). After more than 400 years of subsidence since the 1538 eruption, fast and strong uplift episodes, lasting 2-3 years each one, started in 1950 and occurred again in 1969 and 1982. The maximum total uplift cumulated by such unrest episodes was more than 4 meters at the center of the town of Pozzuoli (60.000 inhabitants); uplift was accompained by seismicity (much more intense in 1983-1984, when 40.000 people were evacuated from Pozzuoli) and geochemical anomalies in fumaroles. After about 20 years of subsidence, recovering about 0.8 m, uplift started again, at a lower rate (more than one order of magnitude slower), and is still going on. The on-going uplift, different from the episodes observed before for its lower rate and different geochemical anomalies, raised high concern for a possible eruptive evolution of the unrest. This work wants to show the main problems in forecasting and managing such crisis, occurring in a densely populated area, in which the details of the volcano behaviour and the eruption hazard are largely unknown, and must be understood by the on-going research. In the present case, indeed, understanding of the volcano structure and behaviour must be acquired while the unrest is in progress, such a needing clearly contrasting with usual times for scientific hypotheses to be validated and becoming reliable. I will then present here the state of the art about the possible interpretations of the last unrest, highlighting the needing for a very multidisciplinary attitude to extract information from a large variety of data, and to fastly and reliably integrate such data into an interpretative model useful also for Civil Protection management of the crisis.