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Continuous radon monitoring during seven years (2011-2017) of volcanic unrest at Campi Flegrei caldera (Southern Italy)

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This is a seven-year study (1/7/2011-31/12/2017) of radon monitoring at two sites of Campi Flegrei caldera (Naples, Southern Italy) that in the last 70 years experienced repeated phases of volcanic unrest. The sites are equipped with devices for radon detection, based on the spectrometry analysis of the α -particles of radon daughters. A hybrid method, as combination of three known methods, is applied for the identification of residuals (anomalies) and trends of the time series of Radon. The results are compared with the following indicators of current caldera unrest: the tremor caused by the major fumarolic vent registered by a seismic station; the cumulative of background seismicity; the maximum vertical deformation acquired by GPS networks during the current phase of uplift; the temperature-pressure of the hydrothermal system estimated based on gas geo-indicators. The comparisons show strong correlation among independent signals and suggest that the extension of the area affected by current Campi Flegrei crisis is larger than the area of seismicity and of intense hydrothermal activity from which the radon stations are 1–4 km away. Hydrothermal alterations, induced by increase of the temperature-pressure of the caldera system, affect significantly the radon emanation power. These results represent an absolute novelty in the study of a such calderic area and mark a significant step forward in the use and interpretation of the radon signal.

Keywords: radon, CO₂, fumarolic tremor, seismicity, time series analysis, volcanic unrest

Biography:

Dr. Fabrizio Ambrosino is a Post-Doc Researcher at Department of Mathematics and Physics - University of Campania "Luigi Vanvitelli" - Caserta, Italy. Master Degree in Mathematics, curriculum Informatics, Second University of studies of Naples S.U.N. European Ph.D. in Mathematics, Physics and Applications – Applied Physics field – at University of Campania "Luigi Vanvitelli", joint with University of Salerno (Fisciano) and Czech Technical University in Prague (CVUT). He is a Member of National Institute of Nuclear Physics (INFN), Naples branch.