

## **Hazardous endogenous gas blowouts in Rome capital city (Italy)**

Carapezza M.L.<sup>1</sup>, Gattuso A.<sup>1</sup>, Pagliuca N.<sup>1</sup>, Ranaldi M.<sup>2-1</sup>, Sortino F.<sup>1</sup>, Tarchini L.<sup>2-1</sup>

<sup>1</sup>Istituto Nazionale di Geofisica e Vulcanologia Roma-1, Rome, Italy,

<sup>2</sup>Dept. Scienze, Università degli Studi Roma Tre, Rome, Italy

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The eastern part of Rome capital city lies at the periphery of Colli Albani quiescent volcano, characterized by the presence on its flanks of gas emissions zones either from cold vents and huge diffuse soil fluxes. CO<sub>2</sub> is the most abundant gas and, rising from depth along extensional faults, it may dissolve and accumulate into shallow aquifers. H<sub>2</sub>S air concentrations may also reach hazardous values. Along the years, these gas emissions have killed animals and also two men. Another hazard is related to the presence of pressurized shallow gas pockets confined beneath an impervious layer that may cause dangerous gas blowouts when reached by wells. The easternmost part of Rome is particularly prone to this hazard as 3 gas blowouts occurred in the last 13 years. The most recent episode occurred on May 2016, by drilling of a water well to a depth of ~50m within the garden of a private house, that produced a jet of gas and water up to 10m. Field analyses showed that gas, made mostly by CO<sub>2</sub> (92 %vol.) with a significant [H<sub>2</sub>S] (3500ppm), was locally creating hazardous concentrations in air both outdoor and indoor. For safety reasons, access was forbidden within a radius of 30m from the well and the 22 families were evacuated from the nearby houses. An urgent remediation intervention by cementation of the well was activated but it took a week to be completed. During this time CO<sub>2</sub> and H<sub>2</sub>S concentration in air was continuously monitored, finding dangerous values both outdoor and in basement spaces. CO<sub>2</sub> soil flux measurements in the garden showed that gas was migrating laterally from the well toward houses within the sandy soil. A few days after well cementation, no anomalous soil flux was furtherly recorded, air returned normal and families were then authorized to return home.