

## Geo-cultural importance of the “System of the Salinelle of Mt. Etna” Geosite (Paternò and Belpasso, eastern Sicily) and future perspectives

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The name of Salinelle indicates natural manifestations of emission of fluids, often but not always with formation of mud volcanoes, that occur near the town of Paternò, on the SW slopes of Mt. Etna volcano. Three sites are marked by these natural phenomena: the Salinelle of Capuchins or of the Stadium (Paternò), the Salinelle of the River (Paternò) and Salinelle of Vallone Salato or of San Biagio (Belpasso). These manifestations are characterized by the emission of natural hypersaline water, generally at room temperature, mud, gas and liquid hydrocarbons.

These sites are peculiar, if not unique. Unlike other mud volcanoes around the world, whose driving gas is mostly methane, the gases from the Salinelle mostly come from a deep magmatic source (close to mantle-type). Magmatic gases, probably composed of high-enthalpy brines carrying a lot of heat, produce hydrothermal conditions in a shallow groundwater system and then mix with crustal gas coming from a hydrocarbons reservoir after intercepting it through leakage along a regional fault system. The resulting fluids emitted at the surface produce unique landforms, with bland relief due to an abundant liquid component with a low clay fraction (other mud volcanoes in Italy and around the world typically emit fluids highly enriched in mud or clay). Because of the large contribution from deep magmatic gases, the output of fluids at the Salinelle is strongly linked with the deep activity of Mt. Etna. Paroxysmal mud eruptions normally precede new cycles of volcanic activity of Etna by a few to several months. These eruptions are often spectacular and release thermalized waters (Temperature up to about 50°C), which makes the Salinelle interesting also for volcanological and geothermal studies. Another peculiar feature of the Salinelle is that the emission of fluids is continuous, though with much lesser intensity, even during periods without paroxysms, in contrast to what happens at other mud-volcano sites.

The site of the Salinelle of Capuchins (set up with D.A. 581/2015) has been recently considered by the regional government of Sicily for an important redevelopment action, in order to open the site to visitors with all the necessary infrastructures for tourist reception, information and guidance through it (“Linee Guida per la redazione del Piano di Gestione dei Geositi: D.A. 367/GAB, 24.10.2019”). The site will also be provided with up-to-date monitoring systems for acquisition of geochemical and geophysical signals. This will give the scientific community an important opportunity for modeling this exceptional natural system and for understanding how it works.