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The Muti Coffari mine: natural and anthropogenic hazard in evaporitic area (Sicily)

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In Sicily the Karst areas are diffused on almost all the territory. The more diffused karst rocks are the carbonatic rocks and in particular the limestones, but the karst phenomenon can be manifested also in evaporitic rocks and in particular in chalks and the salts.

The karst areas in limestone complexes, are almost uniformly distribuited on all the territory and in particular in the Iblei mounts, the Madonie, mounts of Palermo and mounts of Trapani. Instead of the karst areas in evaporitic complexes are diffused above all in Caltanissetta and Agrigento area.

In the southern side of Sicily there is a thick formation of evaporitic rocks, deposited during the salinity crisis in Sicily, happened in the Mediterranean sea in upper Miocene.

This rocks are interested of phenomena of dissolution caused by meteoric and stratum waters. In the territories where are made extractive activities of potassium and/or sodium salts (KCl, NaCl) have been generated from the geomorphologic evolutions of the territory, tied to formation of sinks and falls of the vaults of the underground cavities that produced chasms in the topographic surface (sinkholes). In the area of the ex- salt mine (NaCl) “Muti-Coffari”, in Cammarata (Agrigento) common, have been verified numerous sinkholes created from the landslide of the vaults of the tunnels.

The salt deposit is constituted from an asymmetrical fold with direction SW-NE and immersion SE, with maximum power of 100 m. The cultivation method was cultivation with pillars. In this way were obtained overlapping galleries and rooms supported

from salts pillars.

The infiltration of waters in the subsoil has produced salts dissolution operating a fall of the voults and a weakening of the pillars of the tunnels.

The incessant action of waters in the mine has determined the fall of the vaults of the tunnels, interesting the topographical surface and generating sinkholes. The most important sink has originated from the fall of the vault of level 0 of the mine (the nearest to topographical surface) that involved also the below levels 1 and 2. The fall of the vaults of the tunnel has originated sinkhole that involved a volume of material of 8000 m3 and created a sink deep 30 m. Actually the sinkhole is filled up with the land that slowly continues to slide down from the near versant. Other small sinkholes are created in other areas over the mine.

There are complex landslides that created numerous depressions. In considered areas there are a lot of smalls lakes generated from the formation of small sinkholes, that they have been completely filled from argillaceous lands presents in the territory.

The meteoric waters that continue to enter from the sinks in surface, store in the underground cavities, where they continue their incessant action of dissolution of salts. In the periods of greater rainfall the waters present inside of mine, that are infiltrated from the sinkholes, increase their level until exiting from the old income, flows in Platani river by a small affluent. The entire ecosystem of the Platani is modified, generating a great negative impact.

Actually the evolution of the phenomenon is being studied analyzing the natural and anthropic causes that determine the sinkholes risk, for being able to take part with naturalistic methods to safeguard of the Platani ecosystem (chemical pollution) and of the evolution geomorphologic area.

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