Salt mining subsidence and its effects in urban areas

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Buildings and other engineered structures developed near salt mining facilities are frequently exposed to a high risk associated to the ground surface deformation. The deformation usually occurs in the form of subsidence, which is triggered by large underground voids created either by dry mining, or by intensive brine extraction.

Despite the numerous cases having involved catastrophic ground failure followed by accidents during active mining or after the salt mines abandonment, there are still congested areas where locals are living under the menace of the salt-exploitation-induced hazards: ground surface compaction or collapse, yielding slopes, the formation of deep and unstable saline lakes, flooding, soil and groundwater pollution with brines and light non-aqueous solutions.

Since plans for the remediation and rehabilitation of large unstable and deep-seated underground voids are often considered unaffordable, the last line of defense consists in having updated risk analysis maps and providing the area with the adequate equipment for monitoring all factors which can impact the fragile environment (natural and induced seismicity, flooding, landslides and risk of explosion), as well as for detecting subtle changes in the underground conditions (mining-induced seismicity, the extent of the underground cavities due to dissolution or roof collapse, changes of the brine salinity).

Therefore, the aim of the paper is to provide a compressive list of the geological hazards triggered by the salt exploitation, focusing on urban areas affected by historical or present-day salt mining activities, using data provided from field observations, seismological monitoring or geophysical measurements.

Keywords: Salt mining, Subsidence, Underground voids, Mining voids