

Land deformation monitoring in the Ocnele Mari salt mining area using VHR TSX data

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In Romania there are several inactive or abandoned mine sites which can create a significant impact on the environment, affecting the use of local surface and groundwater. The environmental impacts that can occur at an abandoned mine site can be divided into several categories, amongst which: metal contamination of ground/ surface water and sediments, air emission and deposition, erosion, physical impacts (slope failure, structural stability of tailings impoundments, ground subsidence, unsafe structure, mine openings).

There is an important concern from the scientific community and the private actors at international level on monitoring the disused mines included in the touristic circuits as well as the operational mines that due to the functional processes of extraction and storage of sterile material pollute the environment. The Ocnele Mari salt mine is one of disused mines affected by subsidence phenomena as a result of pillars dissolution by uncontrolled leaching processes that led to the formation of a huge cavern of up 10.5 ha on horizontal direction and its volume of 2.5 million m³ of brine.

In the Ocnele Mari site many collapses took place over the time since 1968 when the first sign of surface damage occurred. In 2001 the field around of the S377 well collapsed and the brine was discharged at a rate of 17m³/s in rural areas, devastating human settlements and polluting the Sarat River. In 2005 the field around of the S365 well also was collapsed as a result of the crash of the banks cavern so that the brine was discharged at a rate of 24m³/s over dam safety because the retention basin could not take the entire quantity of brine.

The object of the present study is to investigate the land deformation in the Ocnele Mari salt mining area by using radar interferometry. The subsidence monitoring can be made either from leveling measurements on probes or by using radar satellite data with InSAR, DInSAR or PSInSAR techniques. The main goal is to assess how feasible are these techniques for a given area with natural landscape based on the efficient planning of acquisition of long SAR image time series and their processing. Systematic monitoring of the Ocnele Mari area using radar acquisitions acquired from one year time span provides a significant improvement of the knowledge on the spatial distribution of subsidence as well as subsidence rate and its temporal fluctuations.