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Concept and implementation of seismic monitoring in salt and potash cavern fields

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Concept and implementation of seismic monitoring in salt and potash cavern fields

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Abstract:

When working in subsurface operations, e.g. in underground mining or in cavern fields, the safety of the working environment, i.e. the subsurface rock mass, has the highest priority. As the geomechanical parameters change with every intervention, the reactions of the bedrock must be monitored and, if necessary, linked to alarms for short-term reactions. One component of this surveillance is seismic monitoring. This technique provides the option of monitoring the 3D rock mass remotely over time, hence 4D. For meaningful and successful monitoring of the seismicity of a cavern field, the monitoring objectives must first be defined.

The release of seismic energy is always the result of a geomechanical/geotechnical process. The seismic events can result from the storage level in the cavern, from the over-burden (the protective layer) or from fault activation nearby due to stress redistribution. We will show examples of how the sensitivity and localisation accuracy of the monitoring system changes for different sensor setups. Each seismic monitoring network is an individually customised tool that develops its full information value best in conjunction with other monitoring systems.

Key words: seismic monitoring, microseismic monitoring, salt caverns, cavern stability, safety, monitoring technology