

OPTIMISATION OF SOLUTION MINING: GEOPHYSICAL EXPLORATION BY RADAR WIRELINE SERVICE

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Abstract

The radar method (GPR) is well known from surface applications, e.g. measuring ice thicknesses of glaciers or even ground inspections prior to trenchless laying of pipes and cables. For the GPR exploration out of a borehole the transmitting and receiving antennas are mounted inside a borehole tool with lengths between 15 m and 35 m, depending on the used frequency and the spread geometry. Applying both electrical dipole and magnetic loop antennas the direction of recorded signals reflected at inhomogeneities can be calculated. Thus, a 3D view of reflectors around the borehole can be produced, that helps to improve the understanding of the general structural style of the salt dome.

The main geological goal of borehole radar measurements is to identify boundaries between different material properties prevailing, for instance, in rock salt, such as layers of potassium, anhydrite, etc. or along salt dome boundaries. Last but not least also neighbouring boreholes and caverns become visible which are used for calibration and for the detection of reflectors in the salt formation.

In this presentation the borehole radar equipment and method is introduced. Outstanding field cases are presented which demonstrate the high improvement of the geological data base for the further exploration and exploitation of salt domes. An additional important topic is the demonstration of the possibilities and limitations of radar measurements in the full 3D space.

Key words: Cavern design, GPR (Ground Penetrating Radar), Geophysics, Borehole