

Pilot Study of Determining the Impact of Surface Subsidence at The Intersection of Cave Mining with the Surface Using an Electrical Impedance Tomography

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Abstract : Cave mining is a bulk underground mining method, which allows large low-grade deposits to be mined underground. This method involves undermining the orebody to make it collapse under its own weight into a series of chambers from which the ore extracted. It is a useful technique to extend the life of large deposits previously mined by open pits, and it is a method increasingly proposed for new mines around the world. We plan to conduct a feasibility study using Electrical impedance tomography (EIT) technology to show how much subsidence there is at the intersection with the cave mining surface. EIT is an imaging technique which uses electrical measurements at electrodes attached on the body surface to yield a cross-sectional image of conductivity changes within the object. EIT has been developed in several different applications areas as a simpler, cheaper alternative to many other imaging methods. A low frequency current is injected between pairs of electrodes while voltage measurements are collected at all other electrode pairs. In the difference EIT, images are reconstructed of the change in conductivity distribution (σ) between the acquisition of the two sets of measurements. Image reconstruction in EIT requires the solution of an ill-conditioned nonlinear inverse problem on noisy data, typically requiring make simpler assumptions or regularization. It is noted that the ratio of current to voltage represents a complex value according to Ohm's law, and that it is theoretically possible to re-express EIT. The results of the experiment were presented on the simulation, and it was concluded that it is possible to conduct further real experiments. Drill a certain number of holes in the top wall of the cave to attach the electrodes, flow a current through them, and measure and acquire the potential through these electrodes. Appropriate values should be selected depending on the distance between the holes, the frequency and duration of the measurements, the surface characteristics and the size of the study area using an EIT device.

Keywords : impedance tomography, cave mining, soil, EIT device

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