

EGU2020-13121

<https://doi.org/10.5194/egusphere-egu2020-13121>

EGU General Assembly 2020

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



Exploring geophysical properties of Sn-Cu-Pb-Zn deposits at depth using ROBOMINERS' mid-perception capability.

Giorgia Stasi^{1,2}, Christian Burllet^{1,2}, Frederic Nguyen², and Yves Vanbrabant¹

¹Geological Survey of Belgium - RBINS, Brussels, Belgium (gstasi@naturalsciences.be)

²University of Liège, Belgium

The Horizon 2020 ROBOMINERS project (Grant No. 820971) is developing a modular robot miner prototype following a bio-inspired design, capable of operating, navigating and performing selective mining in a flooded underground environment.

The project has been set up with the long-term strategic objective to facilitate EU access to mineral raw materials – including those that are considered as strategic or critical for the energy transition - from domestic resources and decreasing thus the European import dependency. The use of the robot miner will especially be relevant for mineral deposits that are small or difficult to access.

Conventional DC resistivity and IP methods for geophysical exploration are well reported in the literature, however, in the framework of ROBOMINERS we want to develop a new approach for DC resistivity and IP that use the deposit itself as a probe for the diffusion of the signal.

Ideally the electrode will be positioned at the end of the robot legs (in contact with the terrain) and the source on the drilling head. This set up will allow to move the source and electrode in preferential position in order to cover the biggest surface possible, and to maximize resistivity measurements avoiding the lack of resolution due to the positioning of electrodes on grounds surface or distant borehole.

In addition to resistivity measurement we are considering an additional technique, namely the Terahertz spectroscopy. The concept for the THz scanning spectroscopy is to use the body of the robot to arrange at 360° the THz detectors and install on the robot's front the THz source (positioned on a mobile arm or on the drilling head). This technique will allow to scan the mine's wall and produce a first model of the deposit section. This model will then help for the positioning of the DC/IP source. THz spectroscopy can be applied for the screening of the wall in case it is covered in drilling mud, where regular multispectral camera might not work. As this technique is highly affected by the presence of water is not yet defined its precise field of applicability that will need to be outlined within the project framework.

For our scope we are going to consider (narrow-) vein type and stratiform deposits; those kinds of deposits that could have formerly been explored but their exploitation was considered as uneconomic due to the small size of the deposits or their difficulty of access. More specifically we

are going to investigate and review the geophysical properties of tin-lead-zinc wolframite vein type deposit for DC resistivity and IP technique and Terahertz spectroscopy.

2.11.0.0