

EGU22-3551

<https://doi.org/10.5194/egusphere-egu22-3551>

EGU General Assembly 2022

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



Application examples of underground muography

Gergely Surányi¹, Gergő Hamar², Gábor Nyitrai², and Ádám Gera²

¹ELKH-ELTE Geological, Geophysical and Space Sciences Research Group, Budapest, Hungary (surda007@gmail.com)

²Wigner RCP, Budapest, Hungary

Muography (or muon tomography) is one of the most effective methods for locating unknown density inhomogeneities, (eg. ore bodies or voids) underground. The geometric conditions have limitations, but otherwise there is no any other competing geophysical method, either the resolution or the simplicity is considered.

In the last years thanks to the continuous R&D in Wigner Research Centre for Physics, Budapest, we have been provided low-cost, portable muon detectors as well as newly-developed data processing methods. We have several ongoing natural and artificial cavity exploration projects and density inhomogeneity location projects for mining applications.

Here we present case studies carried on in Hungarian underground sites, where we could find unknown cavities and verify the method by locating known artificial shafts and adits with high precision. We have achieved that if the characteristic size of the void is only 2-3% of the rock thickness between the detector and the surface, the cavity location is feasible. To reach these unknown voids and density anomalies is in progress either by conventional caving exploration techniques or by drilling.

Further measurements are ongoing by the new upgraded detectors. By decreasing the gas consumption and supporting the electric power by solar cells, we are able to measure even at remote locations without the need of any direct access for several months duration.