Surveying abandoned mine shafts with Remote Radio Transmitter EM methods and Selfpotential

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Abandoned near subsurface mining constructions from the 19th and early 20th century in urbanized areas placed upon former ore mines near the city of Aachen (Germany), as well as in many other regions of the world, provide hazardous risks concerning possible collapses. In many cases, the exact locations of such constructions are not known anymore.

For instance, to map covered shafts of one meter diameter on large survey areas, high resolution methods with rapid measurement progress are necessary. Enhanced developments of the traditional Very Low Frequency (VLF) technique such as VLF-gradient and Radiomagnetotellurics (RMT) fulfill these requirements.

Continuous ground-contactless VLF-gradient survey quickly provides maps indicating the lateral electric resistivity heterogeneity distribution. Inversions of RMT data provide 2D-resistivity-depth sections and also the interpretation of Self-Potential data gives information about the nature of the VLF-gradient anomalies. The successful combination of the three methods for detecting mineshafts near to the city if Aachen is presented for both an electromagnetic undisturbed and noisy location.