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# CONTRIBUTION TO STRUCTURAL INTERPRETATION IN THE STUDY OF RADIOACTIVE MINERALIZATIONS BY 3D PROCESSING OF VERTICAL ELECTROSOUNDINGS AND ELECTRICAL RESISTIVITY TOMOGRAPHY

**MIHAI MAFTEIU** and CONSTANTIN RAZVAN NEACSU
National Uranium Company, Magurele Branch, 54 Atomistilor St. PO Box MG-25, 76911 Bucharest 5, Romania.
E-mail:nana@fz.ro

The interpretation of geophysical information in geological terms in the prospecting of rare metals and radioactive ores was more synthetic than analytical until a few years ago, due to the immediate economic considerations, but also for scientific reasons.

The deciphering of hidden mineralized structures that are costly to monitor by the traditional (radiometric, mining, and drilling) means can be connected to the construction of an interpretive model derived from the analytical processing of radiometric and, particularly non - radiometric geophysical data obtained at a much greater prospective depth.

The non-destructive method - vertical electrosounding in direct current may provide an unexpected 3D geoelectrical image of the lower half-space, considering the petrophysical parameters of the mineralized body in sharp contrast with the host environment.

In a case study we have processed several maps (horizontal pseudosections) outlining apparent resistivity at different levels, in parallel with scanning apparent resistivity strips (electrical resistivity tomography) on the surface, the gallery level and 40 m under this one (the 3D images).

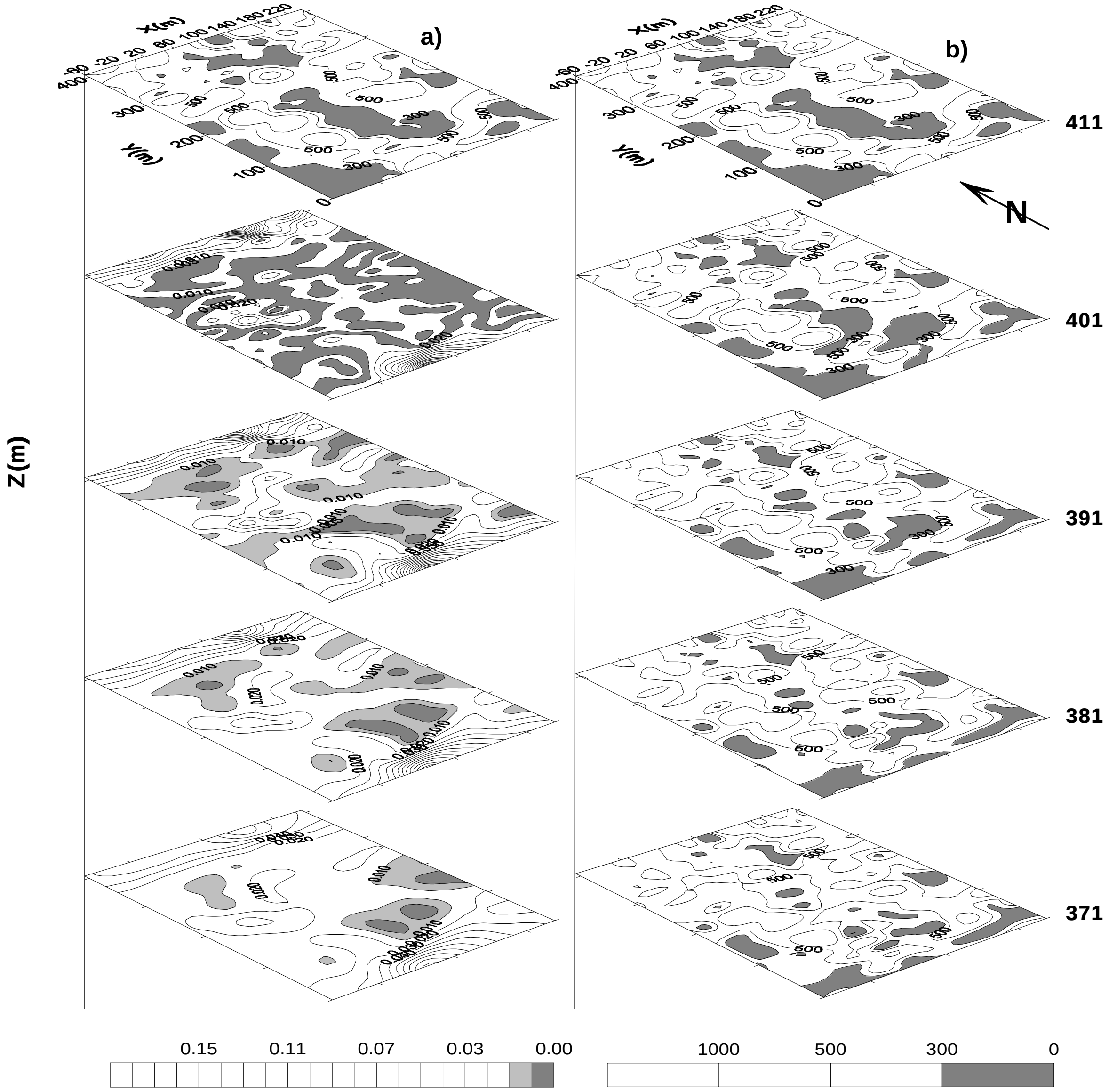
Our main aim is to expand the investigative depth of electrical methods, by means of a real model interpretation (controlled by mining and drilling works) after obtaining a reconstructed image from induced electric charges due to a series of active sources geoelectric surveying distributed over buried resistivity discontinuities. The probabilistic information, as a result of a mathematical processing of apparent resistivity data is independent from the geometry of buried structures. Starting from a 3D geoelectrical, multiprismatic and conductive model, we test the resolution of the tomographic method.

*The geological premises* are represented by a mineralized body, in paragenesis with the metalic sulphides to be found in the brecified area, with a milonitic matrix associated with carbonates, partially oxidized, resulting from a dynamic metamorphism in crystalline schists of a base nature, metagabroes. Mineralization is tectonically controlled by the fracture lines, developed both vertically and directionally (major NNE - SSV fracture, broken off from the new NE - SV system). We are currently working on a 520 m directional gallery and 10 drillings have been performed at a depth of 650 m to intercept mineralizations in the 130-200 m range in the gallery and in the 260-300 m range under this.

The geophysical premises are represented by the petrophysical contrast between the 100-300 ohm-m, principal mineralized body and the basic host rock with resistivities in the range of 500-1000 ohm-m. On a 400x300 area we have built a 20x30 m VES network with a 400 m emission line (Schlumberger array towards N-S direction). The primary interpretation material was a series of apparent resistivity pseudosections (7 levels spread every 10 m between the 431 and 371 m levels, where 411 is the gallery level) and it offers a suggestive sequential image of the principal conductive body (placed between $50<x<150$ m and $50<y<200$ m).

The extension of the 3D interpretive model controlled at gallery level is completed by the processing of resistivity data by tomography at the same levels, starting from level 411 to 371 m. The synthetic tomographic image is a suggestive view of the petrophysical contrasts.

The figure represents a new approach - the total gradient by Y applied on tomographic maps, the way to ensure a more clear geological image. The top sections are the apparent resistivity pseudosections from VES at 411m level (depth of investigation is assumed as AB/3 m). a) The remaining depth slices show the resulting tomographic total gradient sections of the COP function by Y. b) The corresponding VES slices at the same levels.



**Electric charge occurrence probability total gradient maps scale 1:7000**

**Apparent resistivity maps (VES) scale 1:7000**

## References

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