



## **Electromagnetic geophysical observation with controlled source**

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In the paper the new theoretical and methodical approaches are examined for detailed investigations of the structure and state of the geological medium, and its behavior as a dynamic system in reaction to external man-made influences. To solve this problem it is necessary to use geophysical methods that have sufficient resolution and that are built on more complicated models than layered or layered-block models. One of these methods is the electromagnetic induction frequency-geometrical method with controlled sources. Here we consider new approaches using this method for monitoring rock shock media by means of natural experiments and interpretation of the practical results. That method can be used by oil production in mines, where the same events of non stability can occur.

The key ideas of twenty first century geophysics from the point of view of geologist academician A.N. Dmitrievskiy [Dmitrievskiy, 2009] are as follows.

“The geophysics of the twenty first century is an understanding that the Earth is a self-developing, self-supporting geo-cybernetic system, in which the role of the driving mechanism is played by the field gradients; the evolution of geological processes is a continuous chain of transformations and the interaction of geophysical fields in the litho- hydro- and atmosphere.

The use of geophysical principles of a hierarchical quantum of geophysical space, non-linear effects, and the effects of reradiating geophysical fields will allow the creation of a new geophysics.

The research, in which earlier only pure geophysical processes and technologies were considered, nowadays tends to include into consideration geophysical-chemical processes and technologies. This transformation will allow us to solve the problems of forecasting geo-objects and geo-processes in previously unavailable geological-technological conditions.”

The results obtained allow us to make the following conclusions, according to the key ideas of academician A.N. Dmitrievskiy: the rock massif is a multi-ranked hierarchical structure. Research of the massif state dynamics, its structure and the effects of self-organization in it can be provided by geophysical methods, which are built upon the model of such medium. The use of the planchet multi-level induction electromagnetic method with a controlled source of excitation and a corresponding method of processing and interpretation has allowed us to reveal the disintegration zones which are indicators of massif stability and understand the causes of low productivity of oil recovery from boreholes.