Geophysical Research Abstracts
Vol. 12, EGU2010-2654, 2010
EGU General Assembly 2010

A Warning System For Catastrophic Man-made Hazards Using Electromagnetic Induction Monitoring Verified In Rock Burst Massif

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By providing mining works in high stressed rock massif the man-made seismicity become evident, therefore the problem of its forecasting and prevention attracts much attention in all countries with developed mining industry. The near-term forecasting plays a significant role, but till now the developing of a method which allows to define quantitative criterions for the warning system is a large problem as in mining and in seismology [1]. Using the idea of physical mesomechanics, which includes the synergetic approach for analyzing the state changing of rock massif of different matter content, that problem can be solved by monitoring methods, which can research a medium with hierarchic structure. [2-3]. The medium changing, which lead to near-term precursors of dynamical events can be explained in a frame of a conception of self organized criticality [4-5], for which the main factors are heterogeneity and nonlinearity.

In the frame of the Siberian Mining Institute a new direction of massive state research develops, which is named as nonlinear geomechanics [6]. But in our opinion we can achieve more success using together geomechanical and geophysical methods, which are based on a medium model as a model of a stratified block structure with hierarchic inclusions. More over if we are interested also in the evolution of that structure we are needed to use complex geophysical methods, which have sufficient resolution of revealing of the origin and decay of the self organized structures [3].

For the first time by using the planshet electromagnetic method, which was elaborated in the Institute of geophysics UD RAS we could in the frame of natural investigations realize the idea of revealing of disintegration zones in the rock massif and organize the monitoring of their morphology [7-8]. That method covers to geophysical methods of non destroying control. It differs from other tomography methods by a system of observation and methods of processing and interpretation, which are based on the conception of three staged interpretation [9].

In the paper [10] had been described the natural results, which had been achieved by revealing the self organization phenomenon in the rock massive by man-caused influence and the method of defining criterions of stability state on the base of our classification method. Those results had been received during some cycles of electromagnetic monitoring in the Tashtagol mine. The research had been provided on the depths 540-750m for revealing the morphology of the disintegration zones in the around the hole area of the rock massive, which was influenced by intense natural and man-caused stress field.

In the paper [11] we had described the results of using complex seismic and electromagnetic active and passive monitoring for forecasting destroying dynamical events before and after mass explosions.

Additionally we shall analyze here the morphology of structure features of the disintegration zones before a powerful dynamical event with energy lg E=6.9. in the Tashtagol mine on the depth 683m.Before 3 days till the rock burst in the holes 3,4 in the geoelectrical sections of the hole ground sub vertical discrete structures occur, which are the combining of the disintegration zones. That structures in a resonance regime on different frequencies and only on one frequency for each hole. That phenomenon we observed in different mines. The occurring of such structures are precursors of powerful dynamical events. For defining the place and magnitude of the event we must have an information about the place in the classification table of stability of the massive volume [12].

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