Geophysical Research Abstracts
Vol. 14, EGU2012-452, 2012
EGU General Assembly 2012


# The influence of the mining operation on the mine seismicity of Vorkuta coal deposit

T. Zmushko (1), S.B. Turuntaev (2), and V.I. Kulikov (2)
(1) Russian Federation, MIPT, Moscow (tzmushko@gmail.com), (2) Russian Federation, IDG RAS, Moscow

The mine seismicity of Vorkuta coal deposit was analyzed. Seismic network consisting of 24 seismic sensors (accelerometers) cover the area of “Komsomolskaya” and “North” mines of Vorkuta deposit. Also there is seismic station of IDG RAS with three-component seismometer near this mines for better defining energy of the seismic events. The catalogs of seismic events contain 9000 and 7000 events with maximum magnitude M=2.3 for “Komsomolskaya” and “North” mines respectively and include the period from 01.09.2008 to 01.09.2011. The b-value of the magnitude-frequency relation was -1.0 and -1.15 respectively for the mines, meanwhile b-value for the nature seismicity was -0,9. It was found, that the number of seismic events per hour during mine combine operation is higher in 2.5 times than the number of seismic events during the break in the operation. Also, the total energy of the events per hour during the operation is higher in 3-5 times than during the break. The study showed, that the number and the energy of the seismic events relate with the hours of mine combine operation. The spatial distribution of the seismic events showed, that 80% of all events and 85% of strong events (M>1.6) were located in and near the longwall under development during the mine combine operations as well asduring the breaks. The isoclines of seismic event numbers proved that the direction of motion of the boundary of seismic events extension coincides with the direction of development, the maximum number of events for any period lies within the wall under operation.

The rockburst with M=2.3 occurring at the North mine at July 16, 2011 was considered. The dependences of the energy and of the number of events with different magnitudes on the time showed that the number of events with M=1 and especially M=0.5 before the rockburst decreased, which corresponds to the prognostic seismic quietness, described in the research works. The spatial distribution of the events for the 6 month before the rockburst showed that the rockbust occurred at some distance from the main group of seismic events, in an area where the vent brake slope was made at that time. It was found that there is an area where the coal was not developed, but the seismic events occured. Such area could be noticed before the moment of the rockburst. The spatial distribution of the seismic events during the “seismic quietness” showed that for events with M = 1, and especially for the events with M = 0.5, the analogue of "seismic gap" (the area without events between the seismically active areas) can be noticed. The rockburst occurred at the boundary of the “seismic gap”.

Obtained results (which are in correspondence with known natural earthquake prediction phenomena) could be used for forecast of the considered rockburst in a 1 month before it occurred.