



Mining induced seismic event on an inactive fault in view of local surface and in mine underground networks

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On 19th March 2013 tremor shook the surface of Polkowice town where "Rudna" mine is located. This event of $M_L=4.2$ was third most powerful seismic event recorded in Legnica Głogów Copper District (LGCD). Citizens of the area reported that felt tremors were bigger and last longer than any other ones felt in last couple years. The event was studied with use of two different networks: underground network of "Rudna" mine and surface local network run by IGF PAS (LUMINEOS network). The first one is composed of 32 vertical seismometers at mining level, except 5 sensors placed in elevator shafts, seismometers location depth varies from 300 down to 1000 meters below surface. The seismometers used in this network are vertical short period Willmore MkII and MkIII sensors, with the frequency band from 1Hz to 100Hz. At the beginning of 2013th the local surface network of the Institute of Geophysics Polish Academy of Sciences (IGF PAS) with acronym LUMINEOS was installed under agreement with KGHM SA and "Rudna" mine officials. This network at the moment of the March 19th 2013 event was composed of 4 short-period one-second triaxial seismometers LE-3D/1s manufactured by Lenartz Electronics. Analysis of spectral parameters of the records from in mine seismic system and surface LUMINEOS network along with broadband station KSP record were carried out. Location of the event was close to the Rudna Główna fault zone, the nodal planes orientations determined with two different approaches were almost parallel to the strike of the fault. The mechanism solutions were also obtained in form of Full Moment Tensor inversion from P wave amplitude pulses of underground records and waveform inversion of surface network seismograms. Final results of the seismic analysis along with macroseismic survey and observed effects from the destroyed part of the mining panel indicate that the mechanism of the event was thrust faulting on inactive tectonic fault. The results confirm that the fault zones are the areas of higher risk, even in case of carefully taken mining operations.