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Response of seismic activity in mines to the stress changes due to mining induced strong seismic events

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Seismicity in mines is controlled mainly by time-varying mining works which entails its transient character and tendency to form clusters correlated in space and time with mining works. Although human-induced mining stresses are primary causes of mining seismicity, the static stress changes due to seismic events can alter the occurrence time and location of the next mining tremors. Observations from mines confirm that large events can cause an increase in seismicity rate which afterwards decays gradually towards its initial value.
However, the mining loading is irregular and changes in time. Therefore, this rapid activity increase effect can be delayed with respect to the strong event occurrence.
To explore the impact of static stress transfer on the behavior of mining induced seismic activity we analyze seismic data from Rudna Mine from Legnica Glogow Copper District in Poland. We calculate static stress changes on the most probable rupture plane of future seismic events and we compare the pattern of stress changes with the time-space distribution of subsequent seismicity.
The results show that the Coulomb stress changes influence the location and rate of the subsequent seismicity. In areas where the static stress decreased we observe very low or no seismic activity. In areas where the static stress increased the seismic activity rapidly increases either immediately or after a time when mining loading reaches these areas.

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