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Mining induced seismicity in Hamm and Ibbenbüren (Germany)

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Properties of mining induced seismic events in the coal mining districts Hamm and Ibbenbüren are investigated. In the Ruhr area, about 1400 seismic events with magnitudes Ml $<$ 3 are detected every year. Seismic energy is released rather constantly by seismic activity accompanying mining activity. Correlations in time and space show the causal connection between seismic and mining activity. For example, hypocenter locations follow the progressive motion of the longwall. Significantly less earthquakes occur at the weekend.

We compare magnitude-frequency distributions of the seismic activity of different longwalls. b-values are determined. They show strong variability in time and space. Time periods with characteristic events (magnitudes about 1.5) and bimodal magnitude-frequency distributions have been detected.

In contrast to this a few bigger events control energy release in Ibbenbüren. Wave form similarity of larger events is investigated. Source mechanisms of these events indicate that they occur on existing tectonic faults. It is assumed that tectonic faults are activated by stresses due to mining activity. Additionally, high seismic activity is observed in the magnitude range between -0.5 and 2. Up to 200 events are detected per day.