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Estimation of earthquakes location errors distribution for LUMINEOS local seismic network in Poland.

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Estimation of hypocenter location errors is not a simple task. These errors are influenced by many factors. The most important are: the quality of velocity model, the configuration of stations in the observation network and the noise level recorded at stations. While the network configuration affects the error distribution in a deterministic manner, the noise level is largely random. It means that the uncertainties cannot be determined in a deterministic way and only statistical approach can be used. There are several methods for estimating location errors for particular seismic network. Some techniques use synthetic seismograms to calculate the detection range related to each station. However, this approach requires very precise knowledge of the geological model, which is not always possible. Instead, in this work we present a different approach, which uses only phase data for events included in the catalog. In this method, the detection range for each station is estimated using the detection probability (Schorlemmer & Woessner, 2008) used for both P- and S- waves first arrivals. The usefulness of this approach is discussed assuming the shape of LUMINEOS seismic network which operates in the Legnica-Głogów Copper District (LGCD), Poland. In the LGCD region seismic activity is related to three deep underground copper mines. Every year thousand of seismic events with magnitudes up to M4.0 are registered here. Some of them are followed by tragic mining collapses and are widely felt by local residents.