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Static source parameters of the West Bohemia/Vogtland earthquake swarms

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The static source parameters like seismic moment, stress drop and size of the fault plane are important quantities in assessing the earthquake effects. The static stress drop is commonly accepted to be almost constant but recent studies show that this is not valid in many cases. Thus the confirmation of the validity of scaling laws in the case of small earthquakes can significantly contribute to the assessment of the seismic potential of a particular fault zone. One of the areas with such small intraplate earthquakes is the West Bohemia/Vogtland region in the Central Europe where earthquake swarms occur. Earthquake swarm is a specific type of seismicity when deformation energy is released in a large number of small events which are clustered in time and space. The area is continuously monitored since 1990 by WEBNET seismic network which nowadays consists of 13 permanent stations and similar amount of temporary stations. The main instrumentally recorded swarms occurred in 1997 (ML<=3.0), 2000 (ML<=3.2) and 2008 (ML<=3.8).
In our study we focused on the swarms 1997 and 2000 for which the absolute moment tensors are known from previous studies. As regards the swarm 1997 we analyzed 70 events recorded at 10 stations (MLmax= 3.0). As for the swarm 2000 we analyzed 102 events recorded at 21 stations (MLmax=3.25). We determined the rupture size both in time and frequency domain to get more robust results. In time domain we measured the width of the P-wave pulse; in frequency domain we measured the corresponding P-wave corner frequency and seismic moment. Using the estimated rupture velocity we got the characteristic length of the rupture. We found that the static stress drop can not be assumed to be constant in this area and ranges between 0.1-100 MPa. Besides it appears that the 1997 swarm shows smaller scaling of rupture size with seismic moment than does the 2000 swarm.