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Earthquake swarms in West Bohemia / Vogtland: at present and one century ago

M. Hrdličková and T. Fischer
Faculty of Science, Charles University in Prague, Czech Republic

The region of Vogtland / northwest Bohemia is known as one of the most interesting European regions with the occurrence of earthquake swarms. Detailed seismicity data are available for the last 50 years since several seismic networks have been built. For studying the seismicity of the previous period it is necessary to rely on macroseismic observations and for the 1st half of the 20th century on only rare records of activity from distant seismic stations. Better understanding of the present seismic activity is enabled also by deepening our knowledge of historical activity, especially for earthquake swarms in the second half of the 19th century, for which there are many macroseismic records from Czech and German sides. However, a complete catalog of the historical events focused on this area is missing.

In our study we used the macroseismic data from the Czech side to create a preliminary catalog of earthquakes from the period 1897 to 1908. We found a significant heterogenity in the available resources in terms of interchanging macroseismic observations and seismic events. We used cluster analysis for converting the macroseismic dataset to seismic catalog and found greatest concentration of earthquakes in the years 1897, 1900, 1903 and 1908, which corresponds to the published data on historical seismicity in West Bohemia/Vogtland. Similar to the recent earthquake swarms, the analyzed swarms showed episodic character which is typical by several phases of activity interrupted by periods of seismic calm.

Next we compare our catalog with the newest version of Earthquake catalog for Germany and Adjacent Areas for the years 800 to 2008 (Leydecker, 2011). We find some differences between the number of events reported in both catalogs. In some cases our preliminary catalog gives more events (e.g. 95 compared to 13 in 1903), while in other cases our catalog contains less events than the Leydecker's catalog (e.g. 49 compared to 88 in 1897). We analyze the possible causes of different results and study in more detail the available macroseismic datasets to verify the reported events and obtain more objective catalog for the given period in the area. We also compare the resulting time course of historical swarms with the recent earthquake swarms and find striking similarities.