



Evidence for the NW-Bohemia seismogenic fault from reflection imaging

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The NW-Bohemia/Vogtland area is characterized by strong earthquake swarm activity. It lacks active volcanoes, but features numerous mineral springs and mofettes with significant CO₂-emanations (Fischer et al., 2014, estimate the degassing rate at > 500 m³/h) that carry a mantle signature. As the fluids rise through the brittle upper crust, they may occasionally accumulate in crustal compartments until the fluid pressure exceeds the friction on the sealing faults, resulting in a small earthquake that opens a limited pathway for further migration. This fluid-induced seismicity is generally seen as the cause of the swarm-like earthquake activity.

Much of seismicity in NW-Bohemia recorded in the last 30 years occurred at the northeastern edge of the Cheb Basin, near the village Novy Kostel. Based on the spatial distribution of the swarm earthquakes at Novy Kostel, on the location of major degassing points near the Plesna river (Boublak, Hartousov), and on geological evidence of faulting in the Cheb Basin, Bankwitz (2003) and others postulated the existence of the Pocatky-Plesna-Zone (PPZ) as the main fault zone in the area that promotes fluid migration and fluid-induced seismicity.

However, the precise relocation of the hypocenters (Fischer et al., 2014) illuminates several segments that are part of a steeply (60°-80°) W-dipping, N9°W-trending fault zone. Its projected surface trace does not match either the PPZ, or the prominent basin-bounding Marianske-Lazne-Fault. In addition, a new reflection image of the sediments in the Cheb Basin exhibits no evidence of faulting at the PPZ in the last 20 Ma. Based on a projection of the relocated hypocenters along their strike direction onto a reprocessed section of the deep-seismic reflection profile MVE (located a few km beyond the northern edge of the Cheb Basin) we show that the trace of the seismogenic fault is located a few kilometers further to the East of the PPZ, near a line that connects the towns Cira-Kopanina (CKL).