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3-D velocity heterogeneity in earthquake swarm area of NW Bohemia/Vogtland (German-Czech border region)

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3-D Vp and Vp/Vs structure of the geodynamically active NW Bohemia/Vogtland area, located at the border region between Germany and Czech republic, has been determined from local earthquake tomography using 543 earthquakes which have been recorded during 2000 to 2010. This region is known for the occurrence of earthquake swarms that are supposed to be triggered by fluid upwelling in the crust, although fluid behaviour and migration paths in the subsurface of NW Bohemia is still poorly known. The events used in this study were selected based on a minimum 12 P and S phase observations and an azimuthal gap less than 160º. This data set is employed to derive a minimum 1-D velocity model and to relocate the hypocenters. The minimum 1-D velocity model is then used as an initial model in non-linear inversion to derive 3-D P-velocity and Vp/Vs ratio. Using synthetic tests, it can be shown that a high resolution is obtained in the central part of the studied region with the given source and receiver configuration. Two branches of high Vp/Vs ratio anomalies have been detected above the swarm quakes' focal zone. These anomalies support the existence of two main fluid passages toward Bad Brambach and Bublak moffette. Another interesting result is a high Vp/Vs line-like anomaly along Mariánské Lázně fault where most of the swarm quakes occur, which could be due to a fluid saturated area around the cracked zone of the fault plain. Hypocenters in the swarm region are located in a low Vp and Vp/Vs anomaly. The correlation between the detected Vp and Vp/Vs anomalies and the location of earthquake swarm suggests a model in which CO_2 as part of magmatic fluids exist in a vast area beneath NW Bohemia and frequently migrate up to the surface.