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Altenberg-Teplice Caldera: Identification of crustal structures based on the geophysical methods

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The Altenberg-Teplice Caldera (ATC) in the eastern Krušné hory Mts./Erzgebirge (Czech and Germany) is the largest centre of Late Palaeozoic acid volcanism in the Bohemian Massif. It is thought to be a giant gravitational collapse caldera, where the eruptions of the rhyolitic lavas and ignimbrites of Carboniferous age are accompanied by granite and granite porphyry intrusions. The assessment of the actual size of the caldera has been hampered by the fact that its southern part is covered by Cretaceous and Tertiary sediments. Borehole data, geological mapping and geophysical survey enabled to gain a new image of its areal and vertical extent and to construct a 3D digital model of individual geological units (Mlčoch and Skácelová 2010). The ATC subsided asymmetrically bringing about a trapdoor-type collapse perceptible in particular in the 3D model for the crystalline relief. The subsidence was probably contemporaneous with the main volcanic phase of the Teplice rhyolite effusion.
The refraction S04 seismic profile was part of the international seismic refraction experiment in the Central Europe SUDETES 2003 covered also the territory of the northern part of the Bohemian Massif. It starts in the Germany and the Czech border passes near Fláje and through Bílina town continues on to SE. The S04 velocity model (Novotný, Skácelová and Mlčoch 2010) and its correlation with the reflection MVE-90 profile (DEKORP Research Group 1994) and gravity data bring the information about the depth of the ATC. The ATC region is located near the Saxothuringian Zone and Teplá-Barrandian Unit (TBU) contact where the Saxothuringian complexes are thrusted over the TBU rocks. The velocity image of the collision zone as seen in the S04 resulted from several phases of magmatic activities and associated processes affecting the host rocks and ascending melts during magmatic intrusions. The magmatic body discovered on the S04 was identified to be the shallower magmatic reservoir for the Altenberg-Teplice Caldera.

References

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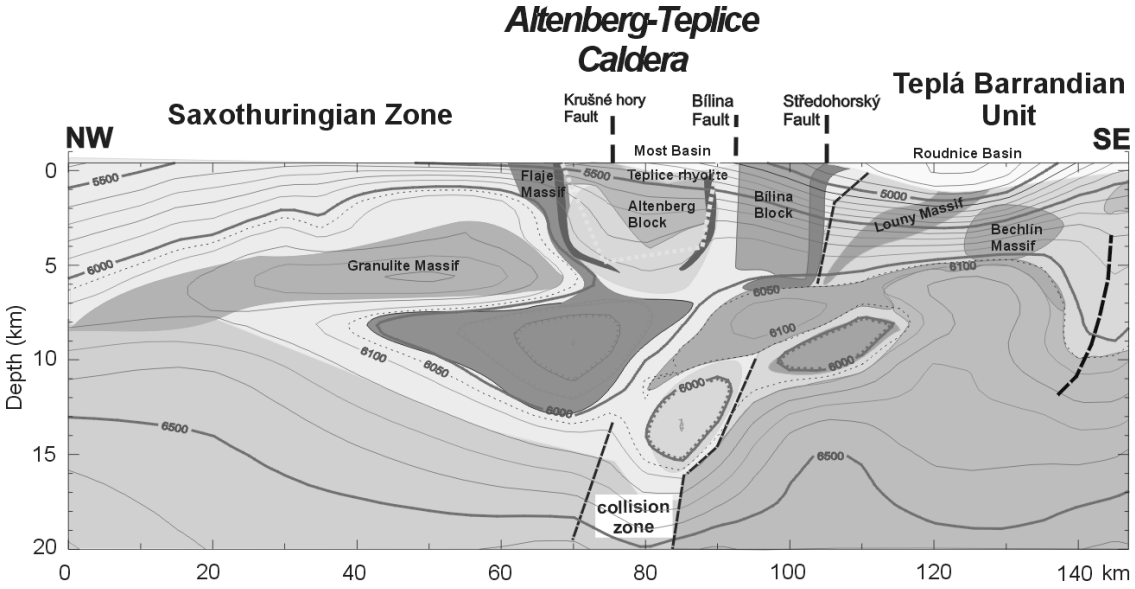

Figure 1: Geological interpretation of the S04 velocity model in the Altenberg-Teplice Caldera area.