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Geotherms and heat flow estimates in the Odra Fault Zone (NE margin of Bohemian Massif, Central Europe) and its relationships to geological structure of NE termination of the European Variscan Orogen

Jacek Puziewicz (1), Leszek Czechowski (2), Jacek Majorowicz (3), Anna Pietranik (1), and Marek Grad (2)

(1) University of Wroclaw, Institute of Geological Sciences, Wroclaw, Poland , (2) Unversity of Warsaw, Faculty of Physics, Institute of Geophysics, Warsaw, Poland, (3) University of Alberta, Department of Physis, Edmonton, Alberta, Canada

The NE margin of Variscan Orogen in Europe comprises Sudety Mts., Fore-Sudetic Block, Odra Fault Zone and Fore-Sudetic Homocline. The Sudety Mts. together with the located to the NE Fore-Sudetic Block form NE part of the Bohemian Massif. The Variscan crystalline basement is exposed at the surface here. The Odra Fault Zone is situated further to the NE. It is a ca. 20 km wide horst of crystalline basement, hidden beneath relatively thin (< 1000 m) Permian-Mesozoic and Cenozoic sedimentary sequences and is called the Odra Horst in the following. This horst marks the margin of stretching to NE Fore-Sudetic Homocline, in which the crystalline basement is dipping to NE under thickening Permo-Mesozoic strata, covered by few hundred meter thick Cenozoic sedimentary layer (Żelaźniewicz et al. 2016 and references therein). The Odra Horst is possibly a continuation of the Mid German Crystalline High at the NE side of the Bohemian Massif (Dörr et al. 2006).

The copper mines located at the central part of the Odra Horst at depth 600 – 1000 m enable the numerous high-quality temperature measurements. However, complicated geometry of geological units requires 3D simulations. We use 3D numerical thermal model for the considered region. The heat flow in the region is ∼80 mW/m2 (corrected for paleclimate). This value is higher than in the neighbouring parts of Sudetes and Fore-Sudetic Block (∼70 mW/m2) and compares rather to positive heat flow anomaly stretching NW-SE in Wielkopolska region north of the Dolsk Fault and continuing to NE Germany. This anomaly corresponds crudely to the extent of the Permian volcanic province of Polish and North-East German Basin. Unfortunately, preliminary results of the model are not conclusive, because they depend on many parameters, (compare e.g. Puziewicz et al 2012). It remains an open question if this anomaly could be related to the lithospheric mantle thermal anomalies (Tesauro et al. 2009) or is rather due to crustal rock contributions.

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