



3D geological modelling and geothermal mapping – the first results of the transboundary Polish – Saxon project “TransGeoTherm”

Wiesław Kozdrój (1), Maciej Kłonowski (1), Adam Mydłowski (1), Małgorzata Ziółkowska-Kozdrój (1), Janusz Badura (1), Bogusław Przybylski (1), Dorota Russ (1), Karol Zawistowski (1), Urszula Domańska (1), Paweł Karamański (2), Ottomar Krentz (2), Karina Hofmann (2), Peter Riedel (2), Silke Reinhardt (2), and Mario Bretschneider (2)

(1) Polish Geological Institute - National Research Institute, Lower Silesia Branch, Wrocław, Poland (transgeotherm@pgi.gov.pl), (2) Sächsisches Landesamt für Umwelt, Landwirtschaft und Geologie, Freiberg, Germany (TransGeoTherm.Lfulg@smul.sachsen.de)

TransGeoTherm is a common project of the Polish Geological Institute – National Research Institute Lower Silesian Branch (Lead Partner) and the Saxon State Agency for Environment, Agriculture and Geology, co-financed by the European Union (EU) under the framework of the Operational Programme for Transboundary Co-operation Poland-Saxony 2007-2013. It started in October 2012 and will last until June 2014.

The main goal of the project is to introduce and establish the use of low temperature geothermal energy as a low emission energy source in the Saxon-Polish transboundary project area. The numerous geological, hydrogeological and geothermal data have been gathered, analysed, combined and interpreted with respect to 3D numerical modelling and subsequently processed with use of the GOCAD software. The resulting geological model covers the transboundary project area exceeding 1.000 km² and comprises around 70 units up to the depth of about 200 metres (locally deeper) below the terrain. The division of the above units has been based on their litho-stratigraphy as well as geological, hydrogeological and geothermal settings. The model includes two lignite deposits: Berzdorf deposit in Saxony–mined out and already recultivated and Radomierzyce deposit in Poland – documented but still not excavated.

At the end of the modelling procedure the raster data sets of the top, bottom and thickness of every unit will be deduced from the 3D geological model with a gridsize of 25 by 25 metres.

Based on the geothermal properties of the rocks and their groundwater content a specific value of geothermal conductivity will be allocated to each layer of every borehole. Thereafter for every section of a borehole, belonging to a certain unit of the 3D geological model, a weighted mean value will be calculated. Next the horizontal distribution of these values within every unit will be interpolated. This step / procedure has to be done for all units.

As a result of further calculations a series of maps showing the geothermal conditions for the selected depths of 40, 70, 100 and 130 metres below the terrain will be elaborated and made available via the Internet. The prospective final users of the project results will be the local and regional authorities, inhabitants, engineers, etc. The project will provide information and data which are important for local and regional planning and development – on the one hand the maps will provide information on possibilities using locations for low temperature geothermal heating and cooling, while on the other hand they are needed to setup and dimension the geothermal installations in detail.