

3D geological modeling towards proper geothermal resources management (Danube and Vienna basins, Slovakia)

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The TRANSENERGY – Transboundary Geothermal Energy Resources of Slovenia, Austria, Hungary and Slovakia project makes possible to create a new level of 3D models both to the Danube and the Vienna basins, including their basements and surrounding recharge areas.

The Project includes the modeling of several Europe-important geothermal basin areas: Vienna Basin, Danube Basin, Komárno-Štúrovo area, Lutzmannsburg-Zsira area, and Bad Radkersburg-Hodos area.

An international uniform approach consists of a series of conceptual and numeric models building on each other. The supra-regional model is in 1 : 500 000 scale and the scale of local models is 1 : 200 000, except for the Lutzmannsburg-Zsira area, where the scale is 1 : 100 000

The aim of the project for Slovakian geologists is to make possible the transboundary 3D modeling of the Danube Basin with the Hungarian partners, and similar way to do the same in the Vienna Basin with the Austrian partners.

The first step was to create a common transboundary correlative geological legend all to the surface maps and to the basement and surrounding mountains maps both in the scales of 1 : 500 000 and 1 : 200 000 for the exactly defined bounded areas.

The vertical steps include a creation of several “bird-view” maps for the Vienna Basin as follows:

- Quaternary covered (surface) geological map

- Base of Quaternary formations (pre-Quaternary)
- Base of Pannonian formations (pre-Pannonian surface)
- Base of Sarmatian formations (pre-Sarmatian view)
- Base of Badenian formations (pre-Badenian view)
- Base of Karpatian formations (pre-Karpatian view)
- Base of entire Neogene fill of the basin (pre-Neogene surface map)
- Base of “Mesozoic” formations (meant the base of the Austroalpine and Central Carpathian Mesozoic nappes)

The requested maps for the Danube Basin are similar, but include also:

- Base of Upper Pannonian formations (base of delta front sand)
- Base of Oligocene formations (pre-Oligocene view, in Slovakia SE-most part)
- Base of Cenozoic formations (in some places in Slovakia – Blatne depression)
- Base of Cretaceous formations (Gosau facies in Hungary)

For compilation of this model inputs we are using all available maps, comparing and creating transboundary legends. We are using hundreds of available lithologic and stratigraphic well data and a large number of interpreted and forwardly re-interpreted seismic lines.

For the 3D modeling we are using PETREL (Schlumberger) software.