MAGNETIC AND GRAVIMETRIC MODEL CALCULATION IN THE VIENNA BASIN

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Abstract: The Vienna Basin (VB) is one of the most thoroughly investigated sedimentary basin in the world. In this paper we will present results concerning magnetic and gravimetric data mainly based on investigations of U. EBERHART and A. SMEJKAL.
Even if there are discrepances in some areas, the magnetic as well as the gravimetric model calculations in the VB fit into the geological view of this sedimentary basin.

Key words : magnetic, gravimetric, modeling, Vienna Basin

Already, at the beginning of the last century torsion-balance measurements were carried out in the Vienna Basin (VB). Magnetic surveys started in the mid-thirthies. Presently, the Austrian part of the VB is covered by ground magnetic measurements (ΔZ), an aeromagnetic survey (E-W running profiles: 2km apart; N-S running control-profiles: 10km apart; flight hight: 800m a.m.sl) and nearly 4000 gravity points. This paper will concentrate on the aeromagnetic and gravimetric data only.

Aeromagnetics : The magnetic data of the VB is mainly dominated by rather deep-burried magnetic structures. In spite of this fact, it was tried to recover also more shallow magnetic sources using an algorithm developed by PARKER (1972) to calculate a magnetic surface with varying topography. Depth-estimations, obtained by a combination of WERNER (1953)- and EULER-inversions (THOMPSON, 1982), were used as input to this algorithm. As a geological input, the depth of the lower boundery of the tertiary sedimentary rock sequence was used to classify the Werner-Euler solutions in a band width of ±500m. Also some borehole results intersecting the cristalline basement were considered.
As expected, most of the Werner-Euler solutions were obtained in the more shallow areas of the VB (W, SW, S, SE) whereas in the deeper parts (NE) only a few solutions were found.

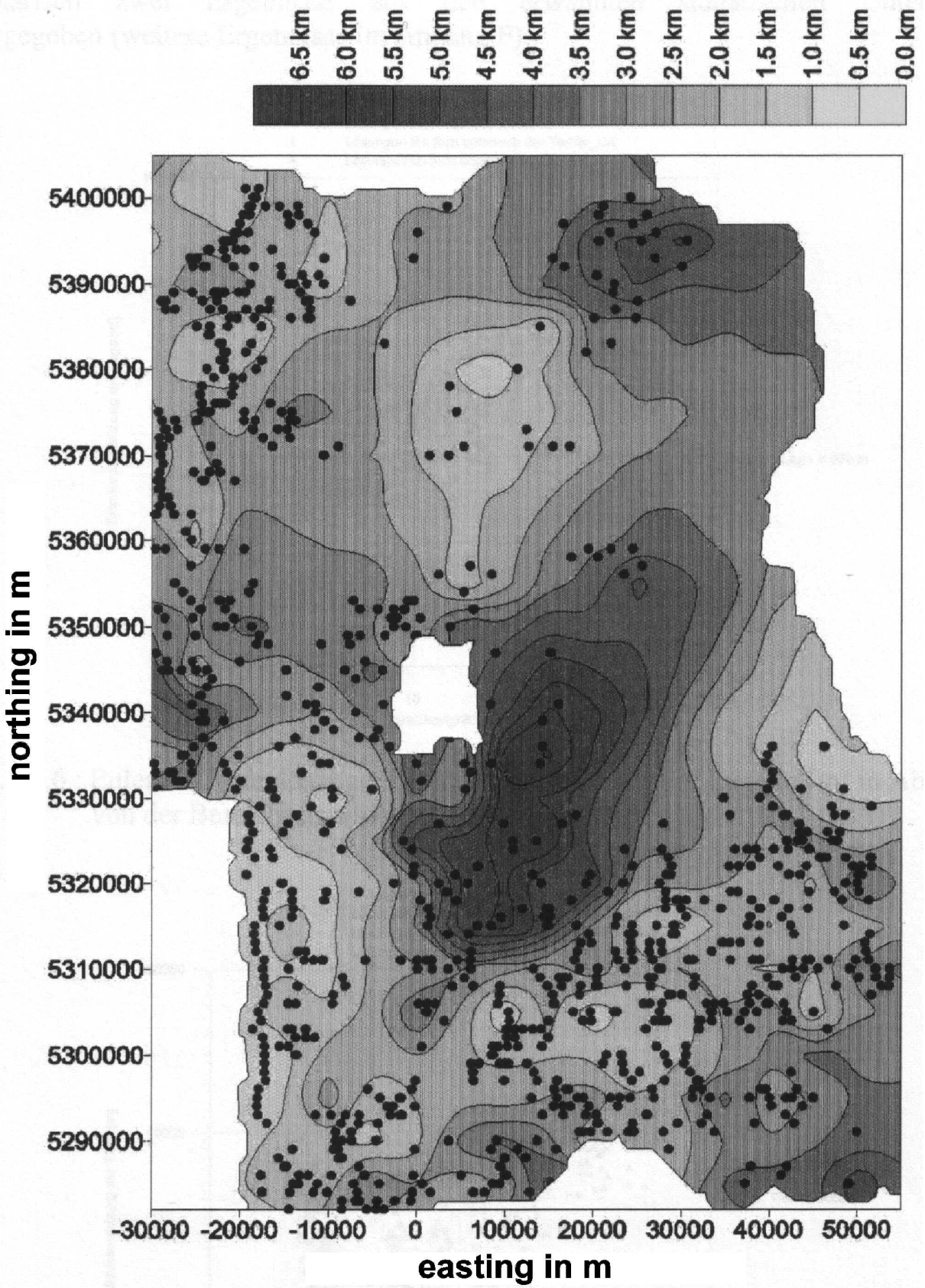

Figure 1. Basement-topography calculated from the depth-results of Euler- and Werner-deconvolution. In addition the positions of these results are plotted (•).

Summarizing the magnetic results, one can state that the overall structure of the VB can be deduced from magnetic data, in spite of the fact that in some areas large discrepancies between boreholes and calculated magnetic models are evident (e.g. overthrustbelt calcarous alps: borehole BERNDORF 001).

Gravimetrics : The VB can be recognized very well in the Bouguer-gravity data due to a number of pronounced minima.

These data have been modeled using three different methods : PARKER's (1972) above mentioned algorithm for gravimetric applications including a modification (GRANSER, 1987) to use a exponential density-depth functions instead of a constant density contrast, TALWANI's et.al. (1959) 2-D algorithm, 3-D algorithm published by GÖTZE and LAHMEYER (1988).

Looking into the results, once more there has to be stated (see above) that there are partly large discrepances between borehole sections and gravimetric models in certain areas. On the other hand the general signature of the VB is quite obvious in the model calculations. In the deepest part of the VB high rock density values had to be assumed to obtain reasonable results. As a surprise a very dense body (density 2.9 tm^{-3}) had to be assumed below the VB - east of Vienna - in the cristallin basement to fit the gravimetric data.

Conclusions : The magnetic as well as the gravimetric model calculations in the VB fit into the geological view of this sedimentary basin. As expected, more detailed structures cannot be obtained by the presently available dataset. This means, that with a denser data distribution, also smaller structures (e.g. minor faults) may be resolved. In the NW-part of the VB this was observed during an aerogeophysical survey with close linespacing (200m) and a sensorheight of 50m above ground.

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