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Gravity Maps of the Vienna Basin

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Abstract: The gravity data in the area Haugsdorf – Brno – Otrokovice – Smolenice – Neunkirchen has been unified and processed together and gravity images of the Vienna Basin and its surroundings have been constructed.

Key words: Vienna Basin, gravity data processing

The new set of maps constructed from a gravity data obtained by observations on relative homogenous net of gravity points in the petroliferous area of the Vienna Basin and its surroundings reveals new information on structures prospective for hydrocarbons. The political changes in the Central Europe enabled to carry out the unified processing of the gravity data in the area of the Vienna Basin and the adjacent geological units after 1990. The area is shared by the three states - Austria, Slovakia and Czech Reublic and geologically also covers part of the Carpathian Flysh Belt, Neogene Foredeep, Klippen Belt and the Calcareous Zone and the Central Zone of Carpathians and Alps (fig.1).

There were almost 100 000 primary gravity points observed in the area of 17 000 km^2 in number of survey stages over several decades. The average point density corresponds to 5.7 points/sq km and the average distance between neighbouring points is about 450 m. Numerous data sources were utilized when constructing the gravity maps - Ministerstvo životního prostředí České republiky (Ministry of Environment of the Czech Republic), Geofyzika, akciová společnost (Geofyzika, a.s.), Moravské naftové doly, a.s. (Moravian Oil Company), Geologická služba Slovenskej republiky (Geological Service of the Slovak Republic), Geocomplex, akciová společnost, (Geocomplex, a.s.), Oesterrechische Mineralölverwaltung Atiengesellschaft (OMV AG), Bundesamt für Eich- und Vermessungswesen (BEV Wien), Institut für Meteorologie und Geophysik Univesität Wien, Institut für Geophysik Montanunivesität Leoben and partly also Magyar Állami Eötvös Loránd Geofizikai Intézet (ELGI Budapest).

The primary gravity data (longitude, latitude, altitude (Adriatic system), observed gravity (Absolute system) and topographic correction (166,7 km) were processed by formulas according to Švancara (1996). The normal gravity field was calculated using parameters of ellipsoid WGS84 and the Bouguer anomalies were determined for the reduction density of 2.00 g cm^{-3} corresponding to the average density of the sedimentary fill of the Vienna Basin, and for the density of 2.50 g cm^{-3} that corresponds to the average density of adjacent geological units.

The Bouguer anomaly values were subsequently transformed into two regular grids with the sample interval of 250 m, that served for the construction of the gravity maps of the Vienna Basin region. The following set of the maps was derived from the two original grids:

- Bouguer Gravity
- Regional Gravity
- Residual Gravity
- Horizontal Gradient of Gravity
- Vertical Gradient of Gravity
- Second Vertical Derivative of Gravity
- Density Boundaries (Linsser Method)

There were also combined images of gravity maps as well as illuminated surface elevation relief constructed. The gravity maps depicting the geological configuration across existing administrative boundaries could be used - after correlation of gravity indications with seismic and drilling results - for further analyses, including gravity modelling and constructing the complex geophysical cross-sections for petroleum geology purposes.

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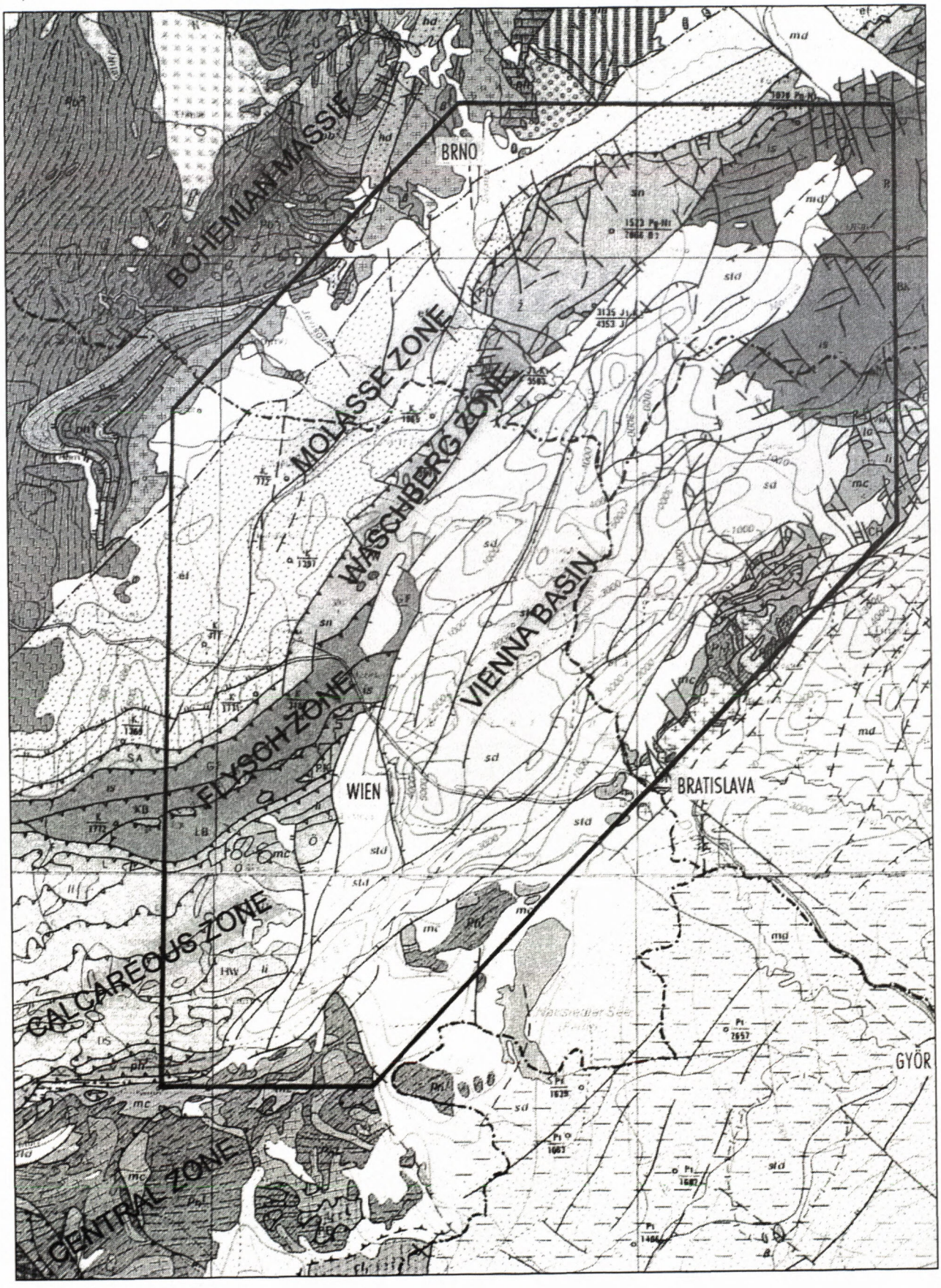

Fig. 1. Studied area.

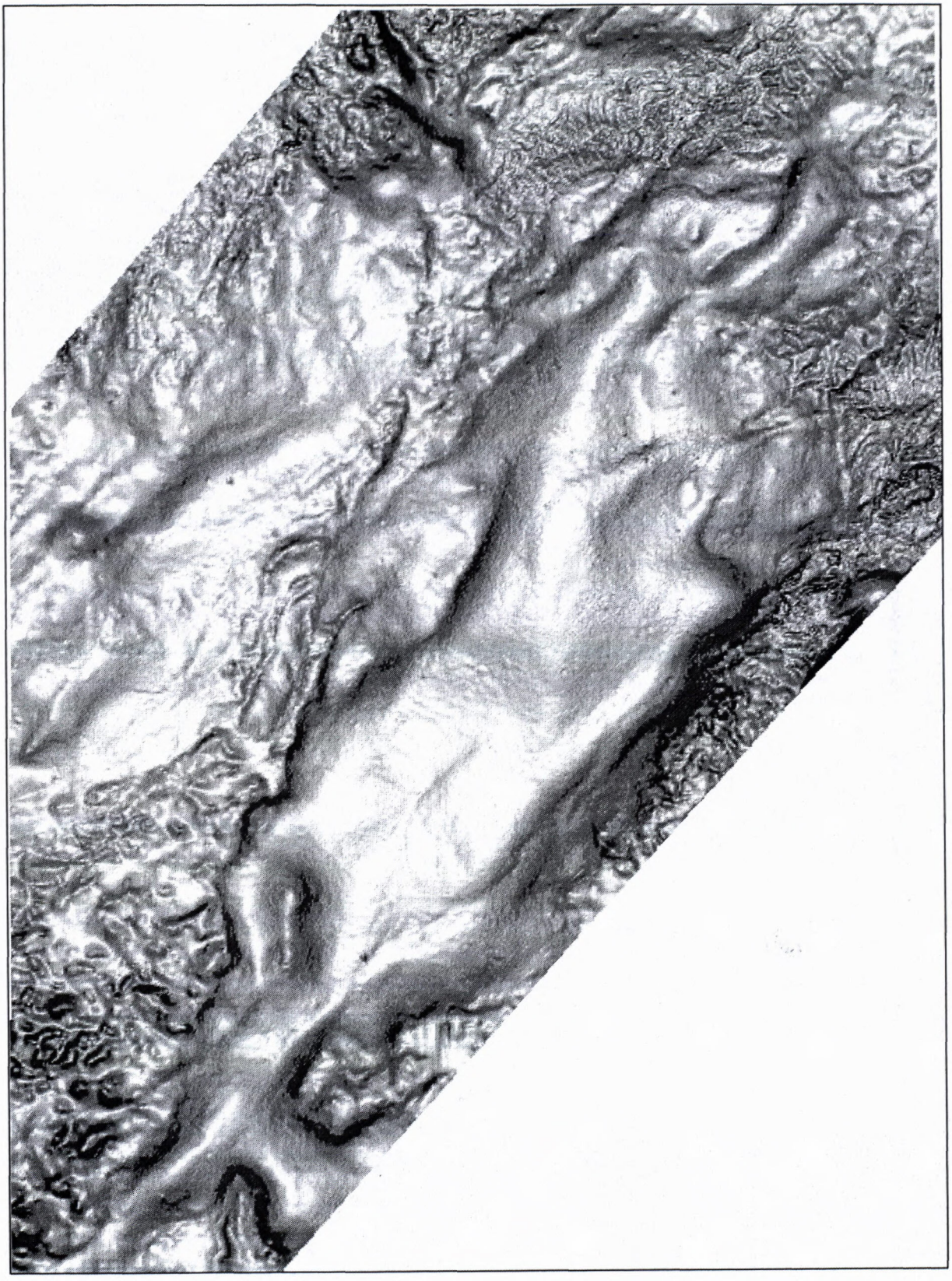

Fig. 2. Bouguer gravity. Shaded relief - vertical illumination.