

RESULTS OF THE GEOPHYSICAL SURVEY WITHIN THE FRAMEWORK OF THE TIBREG PROJECT

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Abstract : This paper shows the major results of geophysical study, performed within TIBREG project. They are based on interpretation of the gravity, magnetometry and vertical electric sounding surveys, using seismic and drilling data. New scheme of the pre-Tertiary basement depths, scheme of the various types of neovolcanic structures, Quaternary thicknesses and updated stripped gravity map in relation to the basement structures are presented.

Key words : TIBREG (Tisza-Bodrog Region) project, Transcarpathian basin, stripped gravity map, geometry and structure of basement, neovolcanics, Quaternary.

Introduction

The original extent of the TIBREG region (part of Slovakia, Hungary and Ukraine), necessary for unifying structural research, has been narrowed to Slovak – Hungarian part only. All activities, with exception of the supplementary measurements of cca 300 VES stations for Quaternary thickness interpretation, have had re-interpretation character. For this purpose, the gravity and geomagnetic maps have been unified (on Slovak and Hungarian territory). On the basis of these maps, using seismic results Magyar et al., 1996) and density values from 21 boreholes the updating and analysis of geological phenomena have been performed (Puchnerová et al., 2001).

Interpretation methodology

Besides Quaternary thicknesses interpretation by VES results, verified by VES parametric measurements at boreholes, following interpretation procedures and synthesis of geophysical data have been applied.

In the area in question, the density analysis for Neogene (with exception of neovolcanics) and seismic results, based on borehole data in form of basement relief or other stratigraphic boundaries (Šefara et al., 2000) has been used (Fig. 1). Along four profile lines, the values of stripped gravity map have been established by determination of gravity effect of sedimentary basin. After original models, these values have been interpreted to the space (Fig. 2). By follow – up subtraction, further map, expressing gravity effect of Neogene on whole territory, has been compiled (Fig. 3).

Moreover, the correlation of local gravity anomalies with geomagnetic map (Fig. 3) has been performed. From it, two basic structural types of neovolcanics have been established. First type is typical by expressive gravity anomaly and by usually to the ring oriented magnetic anomalies as a reflect of structure of the central volcanic zone with developed subvolcanic complex. Second structural type is characteristic by weak gravity effect and expressive magnetic anomalies as an effect of nonmetamorphosed volcanic complex of effusive character. The same synthesis has been applied for interpretation of anomaly sources in the basement.

Major results of the project

Quaternary structures

On the basis of previous geophysical measurements and supplementary VES survey (Tkáčová in Puchnerová et al. 2001), the first map of the Quaternary thicknesses has been compiled on Slovak territory. The Quaternary evolution of the studied area is divided after this map to the eight elevation and seven depression structures with maximum sediments thickness of 70 m. The largest is Bežovce depression of W-E coarse with continuation to the Ukraine.

Neogene structures

a) Map of Neogene thicknesses (Fig. 4) represents reinterpretation of original imaginations in part of area of interest (Magyar et al., 1996, Kováč 2000, etc), or on the whole region (Killenyi, Šefara et al., 1989). This map shows besides known structures predominantly Trebišov depression as a narrow and excentric one, with continuation of similar shapes to the sw. This expressive depression form divides Zemplín elevation from structures on Slovak – Hungarian border zone (Seredniany ridge – Rudinec, et al. 1981, Rudinec, 1989) with belated development of sediments.

b) Neovolcanics forms

They are divided to central volcanic zones and other ones (Fig.3). Besides central zones in the region limit (Slanské vrchy Mts., Vihorlat Mts.), similar forms have been defined at Brehov, Kráľovský Chlmec and two large forms on Hungarian side. The structure in surroundings of Streda nad Bodrogom is determined less convincingly. The rest of structures shows characteristics of nonmetamorphosed lava flows.

Basement structures

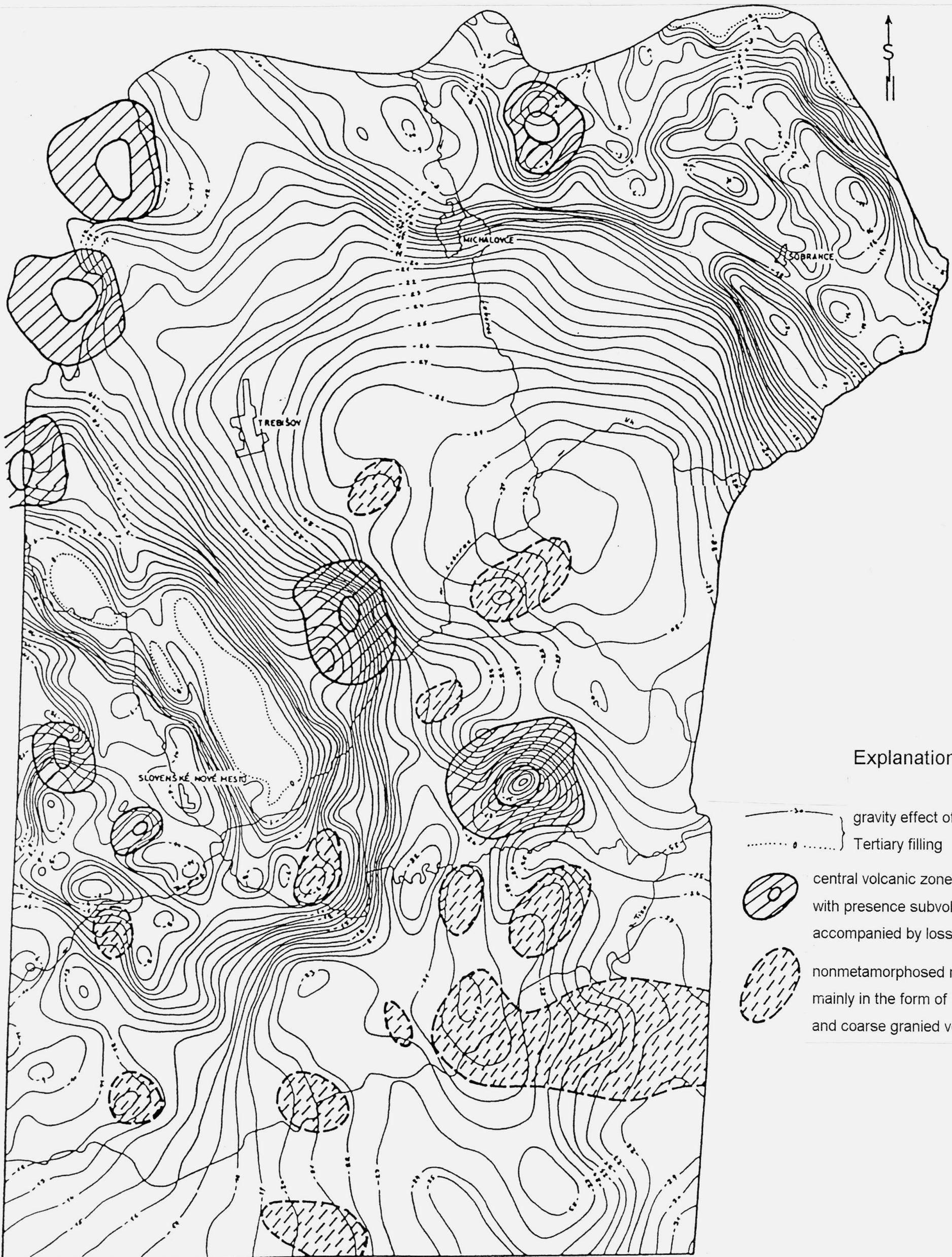
They are mainly defined from boreholes only (for example Iňačovo – Kričevo unit – Sviridenko 1976). Besides it, Humenné, Ptrukša and Zemplin units are defined in the basement (Rudinec et al., 1981, Bielik,1998,etc.). In western part of the area the complexes of Čierna Hora Mts. (Rudinec 1989) are expected. On Hungarian territory, up to now nondefined unit takes place. The updated stripped gravity map (Fig. 2) brings more information about these units. In this map, besides central gravity elevation with probably relation to the Sečovce magnetic anomaly (Bielik et al., 1998), as of picture about deep structure, the relative minima of lower intensity with relation to the basement may be shown. In Slovak – Hungarian border zone, the negative zone with relation to the envelope Zemplinicum (Upper Paleozoic to Mesozoic) take place. The negative gravity zone in n. part of studied area n. of Michalovce town) reflects zone with bed of highly magnetized body – original suture. The negative zone s. of Byšta village is do not explained for lack of supporting data and, thus, this zone is probably less real. We cannot exclude here higher concentration of the Neogene sediments.

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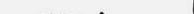
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CORRELATION OF TERTIARY GRAVITY EFFECT WITH FORM OF MAGNETIC ANOMALIES AND THEIR INTERPRETATION

(Šefara J. , Puchnerová M., Szalaiová V., Kiss J. Vértesy L., 2000)



Explanation

-  gravity effect of
-  Tertiary filling
-  central volcanic zones
with presence subvolcanic forms
accompanied by loss of magnetization
-  nonmetamorphosed neovolcanics
mainly in the form of lava flows
and coarse granied volcanoclastics

DENSITY ANALYSES $\sigma = f(d, t)$
 (ŠEFARA J., 2000)

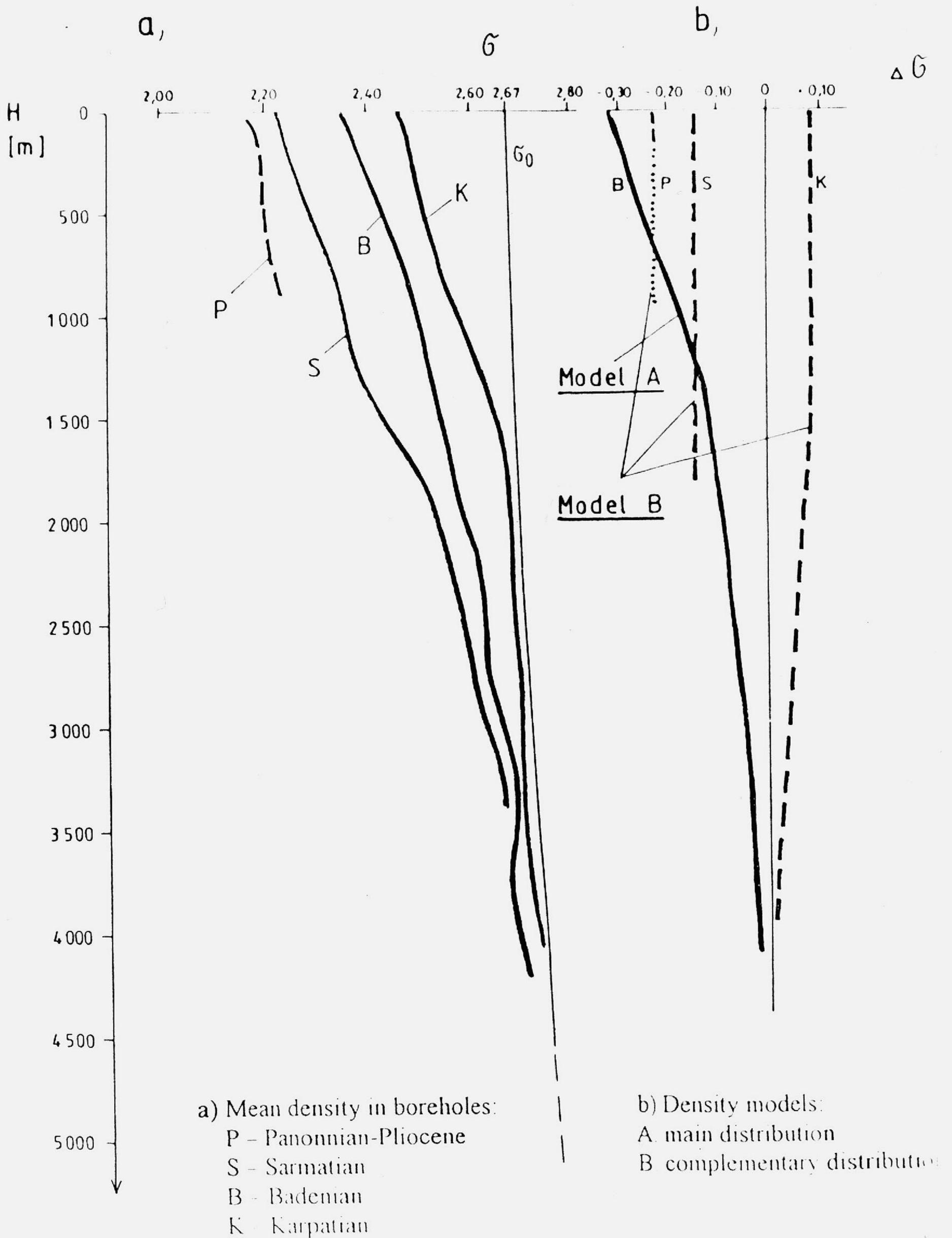


Fig. 1

MAP OF NEOGENE THICKNESSES

(Šefara J. , Puchnerová M., Szalaiová V., Kiss J. Vértesy L., 2000)

