

**P8-5****GEOPHYSICAL MODEL OF THE CO-SEISMIC RUPTURING  
FROM THE APRIL 4TH 1904  
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The epicentral zone of the April 4<sup>th</sup> 1904 earthquake of magnitude evaluated at 7.5, according to the records in Pasadena (USA), the strongest one in Europe for the last two centuries, is located in SW Bulgaria. Several seismological, geological, seismotectonical and geodetic studies have been performed after this date. Now, it is clarified that the earthquake process was more complicated, some reevaluations have given a magnitude 7.8 for the main shock (Catalogue of Earthquakes, 1974), some new investigations show reasons for two consecutive earthquakes of magnitudes more than 7.0. One of the most discussed problems was the place of the reported 2 m high barraging of Struma river after surface rupturing of the flood-plane terrace (Hörnes, 1904). Following the remaining traces of the surface rupturing along Kroupnik fault it was located the most probable terrain near the contemporary river bed, where the barraging took place. Vertical electrical sounding was performed using 4-electrodes Shlumberger array of maximum length  $AB/2 = 70$  m. The aim was the detecting of traces of the rupturing under the alluvium cover. This cover is composed by alternation of sandy-clays, sands and gravel with electrical resistivity from 20-30  $\Omega\text{m}$ , up to more than 1500  $\Omega\text{m}$ .

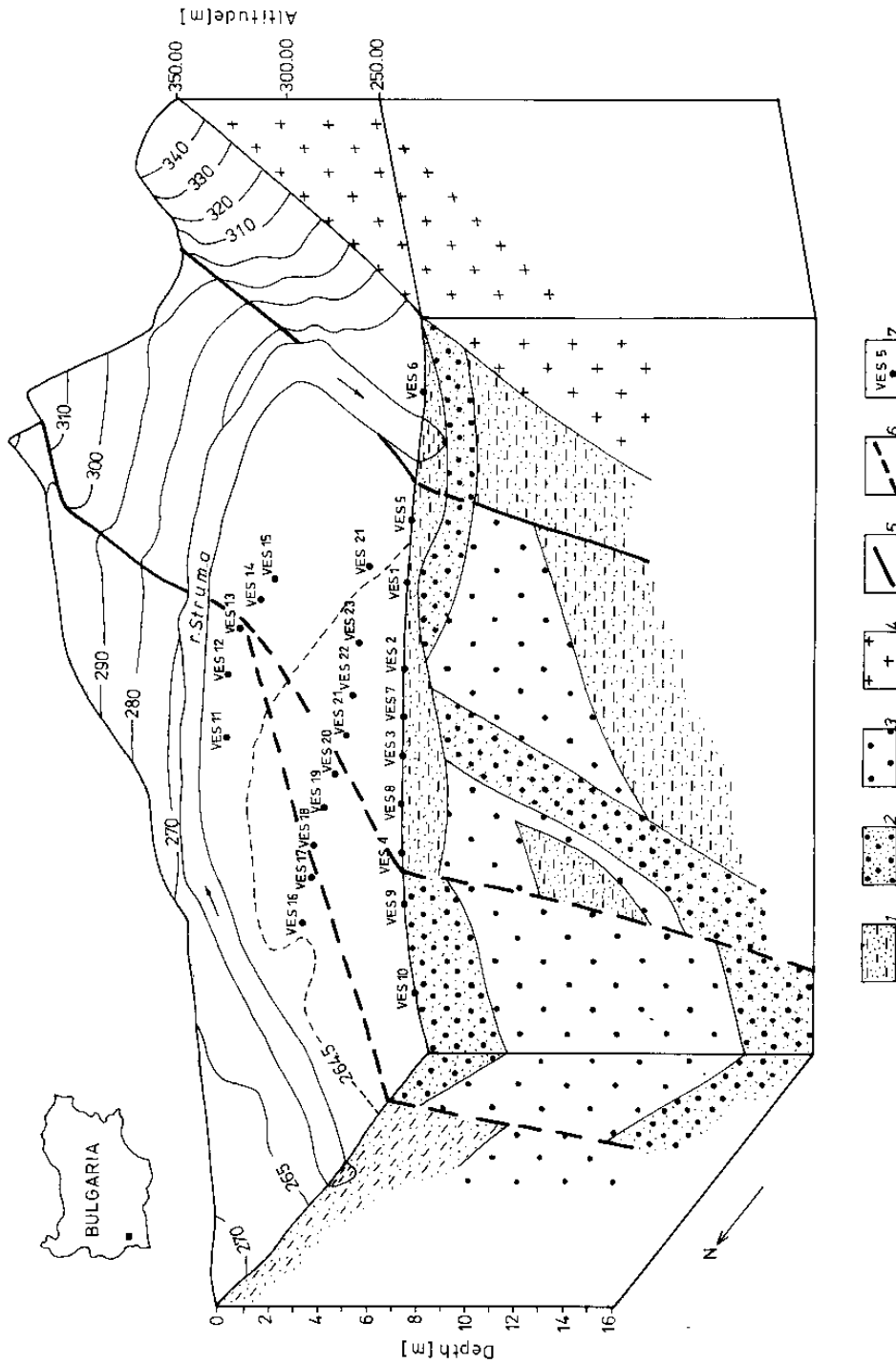
The presented block-diagram (Fig.1) shows the result of the interpretations. The clear difference between the VES curves type from the opposite sides of the expected fault remains in the river bed permits to postulate the existence of two steps of normal faulting. The SE part of the geo-electrical profiles is presented by alternation of layers with different electrical resistivity due to the different alluvial materials - sand, sandy clay and gravel. The same layer alternation is deeper from 3 m (profile III) to about 5 m (profile I) at the NW side of the fault trace. A layer of gravel with electrical resistivity more than 400  $\Omega\text{m}$ , covering the probable paleo-soil, has been deposited over the subsided block. This type of sedimentation is normal for the inner side of barraged river bed. This result could be used as the first step towards more detailed quantitative determinations in the future of the real surface deformations during the April 4, 1904 Kroupnik Earthquake.

**Acknowledgement**

The study has been performed in the frames and the financial support of the COPERNICUS Project "ASPELEA".

**References:**

- Catalogue of Earthquakes (Shebalin N. V. - editor), 1974. UNESCO, Skopje, Parts I and II.  
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Hörnes, R. 1904. *Berichte über das Makedonische Erdbeben von 4.IV.1904, Mittelungen der Erdbeben*. Kommission der Kaiserlichen Akademie der Wissenschaften, Wien, XXIV.



**Fig.1.** Block-diagram with the results from the geo-electrical investigation on the Struma river flood-plane terrace near the village of Kroupnik. 1 - sandy-clay layer (0 - 100 Ωm); 2 - sandy-gravel layer (100 - 400 Ωm); 3 - gravel layer (> 400 Ω); 4 - granite (> 400 Ω); 5 - fault; 6 - probable trace of the surface faulting during the April 4<sup>th</sup>, 1904 earthquake; 7 - point of vertical electrical sounding (VES).