# P10-5 GEOPHYSICAL MODEL OF THE KOCANI DEPRESSION

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The paper presents a complex interpretation of data obtained so far by geological and geophysical investigations in the Kocani depression. Investigations were carried out over a couple of decades. Regional data about the geology, gravimetry, magnetism and deep seismicity were used in defining the geophysical model. Detailed geophysical measurements such as seismic defraction, geoelectric methods and drill holes data were used to define parameters of the model in the area.

The Kocani depression is situated in the central part of Eastern Macedonia striking along the River Bregalnica. Its average length amounts to 35 [km] and width to 5 [km]. It is delineated by Mts. Plackovica in the south and Osogovo in the north. The average latitude amounts to 350 [m], and borders to 1800 [m]. Analyses indicated that the bedrock is situated 1500 to 2000 [m] in depth. Intense tectonic dislocations took place in the area during the Miocene resulting in formation of depressions, one of them being the Kocani depression. It was formed due to intense movements along major border faults relative to the Plackovica and Osogovo blocks representing areas of uplift and the Kocani depression a block of subsidence. The structural model illustrates that the Kocani depression was separated into several blocks of different movements and locations.

This complex structure has an impact on the geophysical fields. In terms of the global model, the depressions subsides asymmetrically faster than the Plackovica block. Values of Bouguer anomaly were used in gravimetric investigations. Three local minimums are pronounced in the depression and its margin. Taking in consideration that density of rock masses at the base is higher than the density in the sedimentary layer comprising the depression, these minimums define the blocks of deepest subsidence. The gravimetric field of Bouguer anomaly of the Kocani depression and the border with Mts. Plackovica and Osogovo varies between $-48 \cdot 10^{-5}$ and $+ 0 \cdot 10^{-5}$ [m/s].

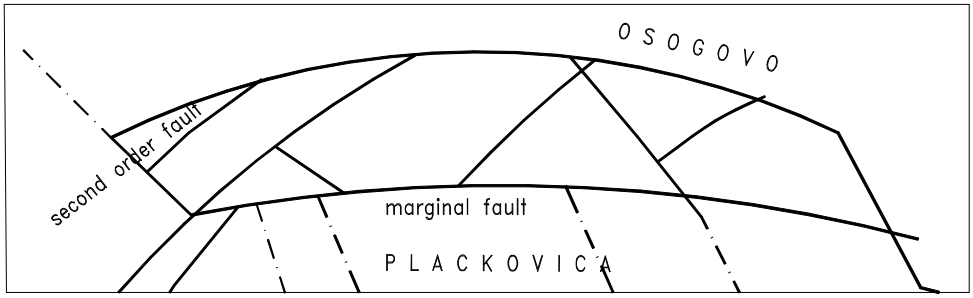
The magnetic field of the z-component is of complex structure. This complexity was strongly influenced by the Tertiary volcanism rock complexes which is best pronounced in the Osogovo block. Most probably this volcanism exerts a strong influence in the deep parts of the Kocani depression. The z-value of the magnetic field varies from $-8 \cdot 10^{-5}$ to $+5 \cdot 10^{-5}$ [nT]. An analysis of the deep seismicity in the Tetovo - Kocani cross section indicates that the Kocani depression is situated in a deep fault which cuts the earth's crust. The depth of Moho discontinuity in the depression and its border with Mts. Plackovica and Osogovo amounts to 33 - 35 [km]. The average seismic model defined by investigations carried out 300 [m] to depth is given in the table below:

| Layer | Velocity | Depth | Lithology |
|---|---|---|---|
| 1 | 500 | 0 - 5 | sandy clays |
| 2 | 1400 | 5 - 20 | clay sands |
| 3 | 1900 | 20 - 100 | marly clay |
| 4 | 2400 | 100 - 400 | clay sands, marls |

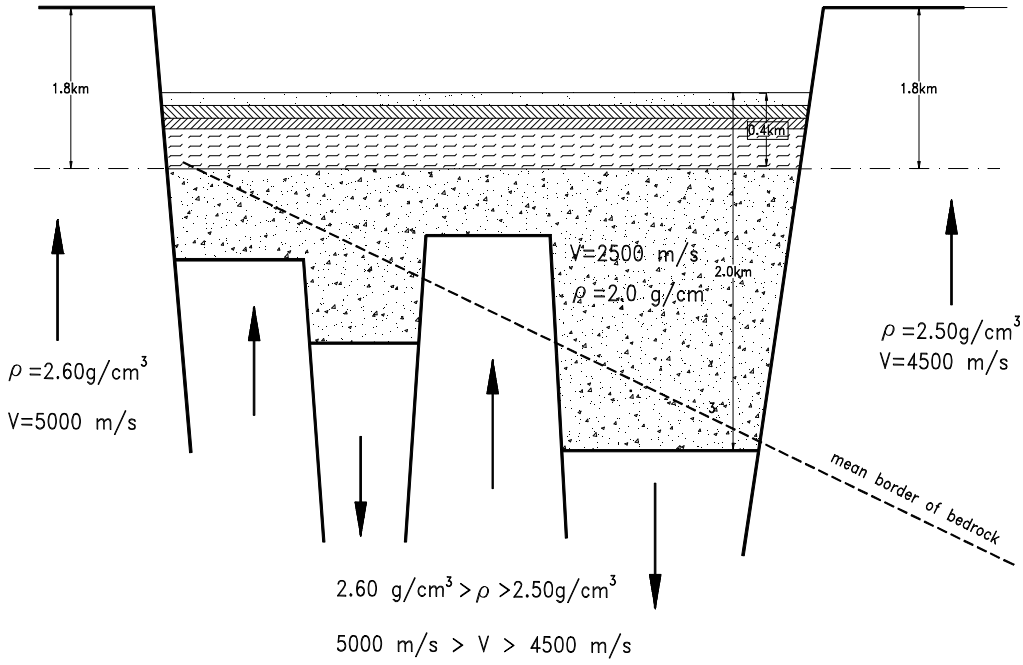
Speed parameters in the deep parts of the bedrock are not defined owing to insufficient length of seismic cross sections. Geoelectric methods in the depression determined that sedimentary layers have a specific resistance amounting from 5 to 100 [m]. The bedrock has a specific resistance higher than 100 [m]. Geoelectric methods made possible to define the geoelectric model in the Kocani depression as deep as the bedrock.

Analysis of data of the four geophysical methods and their correlation made possible to define the geophysical model, and the understanding of the geology of the area under survey made possible to define the structural model of the depression.

This single geophysical model represents the background for easy calculation and application to individual projects that require even more complex models.




Cross–section of the Kocani depresson




Neotectonic sketch of the Kocani depression

Geophysical model of the Kocani depression