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GEOPHYSICAL STUDY OF THE ALBANIDES

Abstract. On the basis of regional geophysical studies, the relationships between tectonic zones of Albania are given. An ophiolitic zone (Mirdita zone) is recognised as a covering tectonic unit of the External Albanides. The separation between the zones of Mirdita and Korabi (Pelagonian zone) is determined by an active seismogenetic thrusting process. The external zones also are affected by evident overthrusts. The front of orogene extends into the Adriatic Sea, where an important foredeep has developed.

FOREWORD

Geophysical studies are being used more intensively and extensively for the regional exploration of the Albanides, on land and in the Adriatic sea shelf. They have contributed in a determinant manner to the reconstruction of the involved tectono-stratigraphic setting (Arapi, 1982; Langora et al., 1983; I.G.S., 1985; Nishani, 1985; Diamanti et al., 1986; Sulstarova, 1987; Aliaj, 1988; Bushati, 1988; Kociaj, 1989).

For the solution of regional problems, the results of seismological, seismic, gravimetric, magnetometric, electrometric studies, geophysical studies of wells and petrophysical studies have been used. A description of these results is given here.

In the territory of Albania there is an extensive assemblage of geological structures in the Albanides (Papa and Konda, 1968; Auboin, 1973, 1977; I.G.S., 1983; Dalipi, 1985, 1988; Melo, 1986; Aliaj, 1987; Grazhdani, 1987; Kodra, 1987, 1988; Valbona and Misha, 1987; Ndoja, 1988; Kodra and Gjata, 1989; Shallo et al., 1989).

The Albanides began their development in the Triassic on a Hercynian substratum, and were formed by the Alpine orogeny, between the Jurassic-Cretaceous to Quartenary, during four recognised tectonic phases: paleotectonic (J3-Cr1), tectonic (Cr2-Pg2), late tectonic (Pg3-N1) and neotectonic (N2-Q). Thus in Albania there are rocks ranging from the Ordovician to the Quaternary, and the Albanides can be subdivided into two distinct orogenic zones: the Internal and External Albanides.

The paleotectonic stage affected only the internal Albanides, and lead to the emplacement of ophiolites as shavings of the oceanic and continental crusts of the Adria or Adriatic plates. The external Albanides are only affected by the later phases. In this way the orogenic evolution migrated outward in time and space from east (Internal Albanides) to west (External Albanides). Geological and geophysical regional studies have distinguished various tectonic zones (see Fig. 1).

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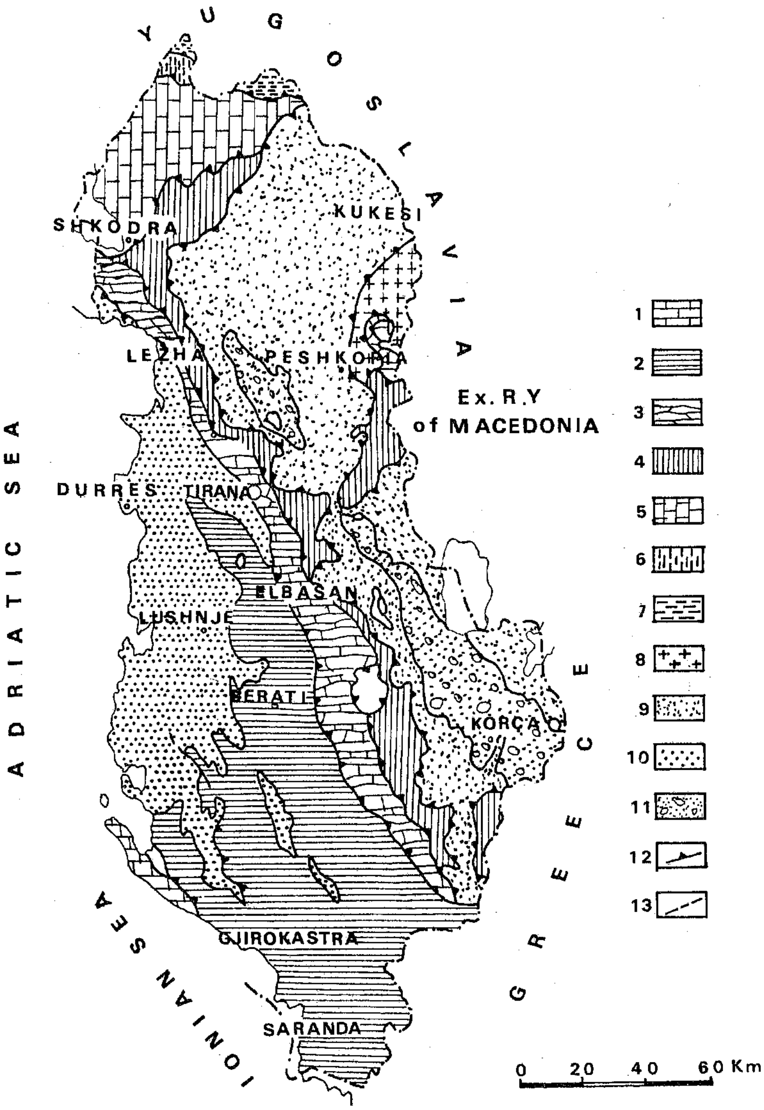


Fig. 1 - Schematic tectonic map of Albania. Tectonic zones: 1. Sazani; 2. Ionian; 3. Kruja; 4. Krasta-Cukali; 6.Vermoshi Unit; 7. Gashi; 8.Korabi; 9. Mirdita; 10. Pre-Adriatic depression; 11. Albanian- Thessalin depression; 12. Main overthrust; 13. Main fracture.

Seismological, gravimetric and magnetometric data indicate that the earth's crust, as expected, thickens from central regions of the Adriatic to the Albanides on land (Figs. 2, 7). The sedimentary crust is over 9 km thick in Adriatic seashore (Finetti and Morelli, 1972) and reaches up to 13 km in north-western Albania. The depth of the crystalline basement ranges from 12 km in coastal areas to 17 km in Southern Albania. The depth of the Moho discontinuity varies from 40 to 50 km, and its deepest zone is located under north-western Albania. The trends of the Bouger gravity anomalies are oriented parallel to the orogenic range (Figs. 3 and 4). Some large regional anomalies are evident. They seem attributable in the major part to the Moho discontinuity, and it seems evident that the Moho takes part in the tectonic deformation of the blocks (Fig. 2). From the gravity anomaly it is postulated that the mantle high is relatively shallow.

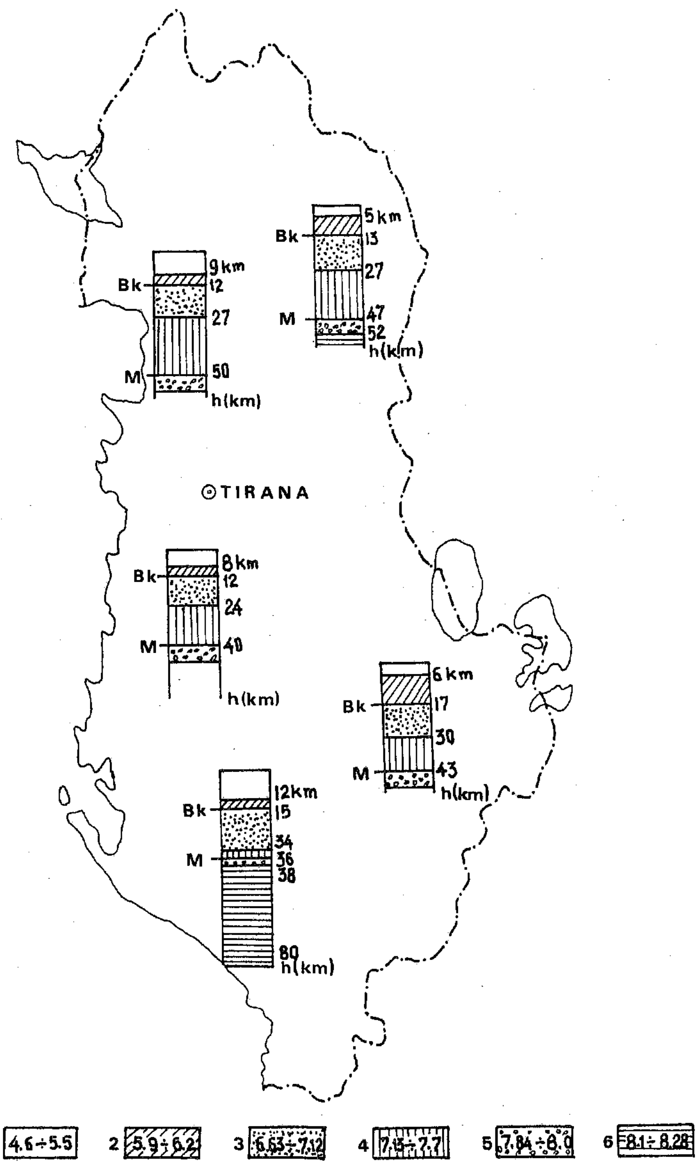


Fig. 2 - Geologic structure of earth's crust and upper mantle based on seismological studies (data are taken from Kociaj and Siasi, 1989). (The numbers given in the legend show the velocity of the seismic waves, in km/s). 1. Sedimentary crust; 2. Consolidated crust; 3.Granitic crust; 4. Basalt crust; 5. Upper Mantle; 6. Asthenosphere; 7. BK Crystal basement; 8. M Moho Discontinuity.

The north-western maximum is attributed to a crustal thinning towards the northern part of the Mirdita zone and that of Korabi, and the south-west of the Jonic zone in the Vlora district. The north-western maximum is interpreted as a mantle uplifting from the south of Elbasan to Gramos and even further in the south towards the Hellenides (Cadet et al., 1980). Two other tectonic units extend in the western part of Albania and the Albanian Alps. This tectonic reconstruction of the deep levels of the earth's crust also is reflected in the scattering of the magnetic fields (Fig. 6). In the southern Adriatic (Fig. 7) the crust has a uniform morphology which differs from the terrestrial crust (Morelli et al., 1969). The terrestrial crust of the Albanides is interrupted by a system of longitudinal fractures in the NW-SE direction and transversal fractures that even affect the Mantle and are reflected in the contours of the Moho (Fig. 3).

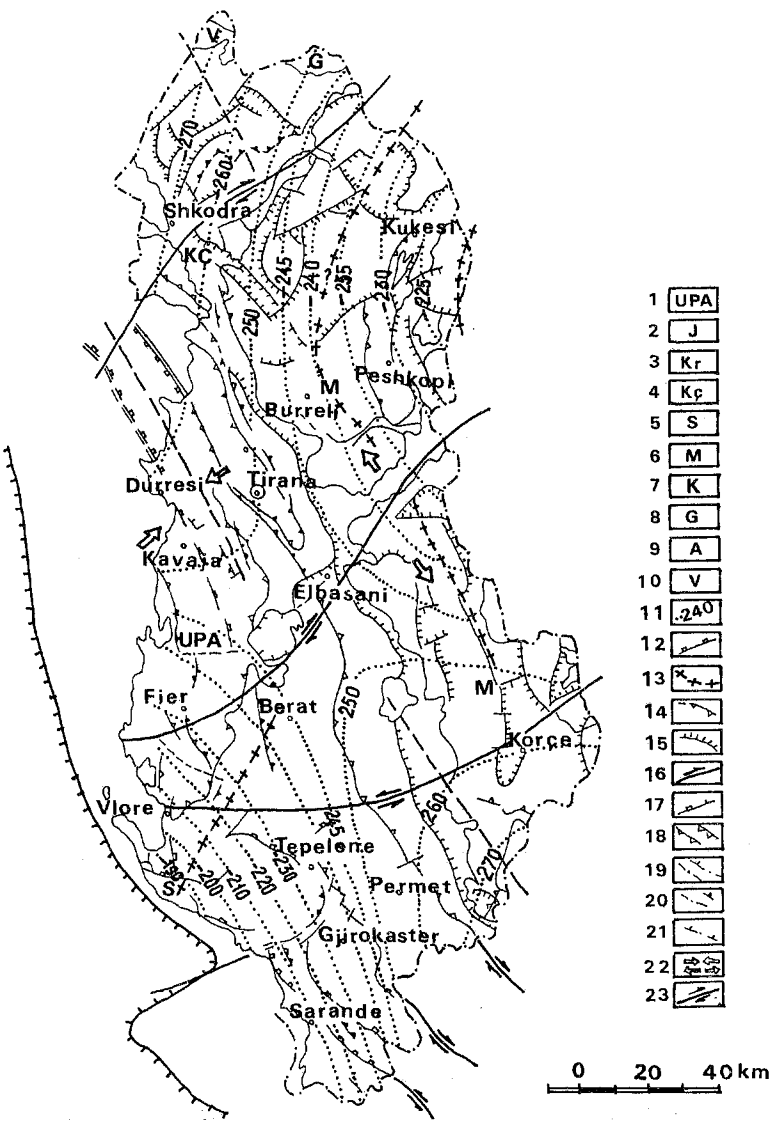


Fig. 3 - The complex tectonic map of the trend of the 3 rd degree Bouguer anomaly in the Albanides: 1. Adriatic depression; 2. Ionian zone; 3. Kruja zone; 4. Krasta-Cukali zone; 5. Sazani zone; 6. Mirdita zone; 7. Korabi zone; 8. Gashi zone; 9. Albanian Alps zone; 10. Vermoshi zone; 11. The trend of 3 rd degree Bouguer anomaly; 12. Boundary between shelf and continental slope; 15. Normal fault; 16. Pressure; 17. Limit of deformed envelopment during the neotectonic period; 18. Overthrust; 19. Flexure; 20. Flexure and faults based on geophysical data; 21. Inactive overthrust; 22. Compression (a) and (b) extension zones; 23. Deep faults.

INTERNAL ALBANIDES

Korabi Zone (K)

This extends eastward into the Pelagonian zone, beyond the national borders. In this zone the Bouger anomaly is normal which shows that the structures are of low orders (Figs. 4 and 5). Anhydrite diapir of Korabi extends towards the SW and coincides to some extent with the Shengjergji flysch area, along which the deep Diber-Elbasan-Lushnja seismogenic fracture passes. The quiet gravitational zone of Korabi in the west is in contact with the anomalous zone laid

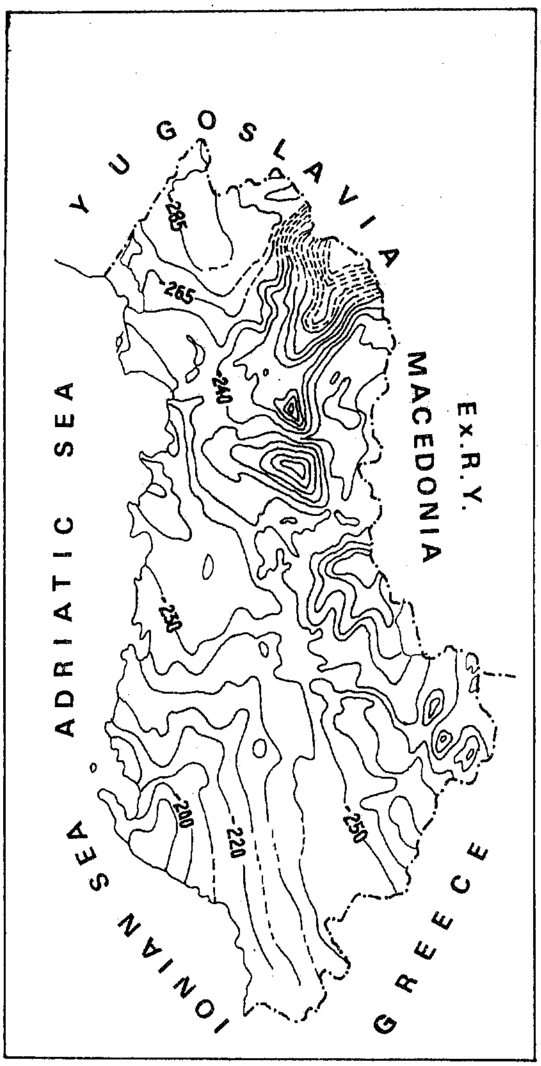


Fig. 4 - Bouguer gravity map of Albania.

over the ophiolites of the Mirdita tectonic zone. The contact between them has a southern direction and coincides with the deep Oher-Qarishte-Qafe Murre-Kukes seismogenic structure. It also connects these two tectonics units.

In this zone the oldest formations of Albania are present, and are represented by sandstones, schistose conglomerate and metamorphic limestones of Silurian, Devonian and Carboniferous age, and sandstone-conglomerate and anhydrite of lower Permian-Cretaceous age. In some places, there are also some volcanic and sub-volcanic rocks with basic and acidic-alkaline contents. In the Korabi zone, some folds, thrust-fault and cover rocks are present.

Mirdita Zone

This zone consists of a wide belt along the whole length of the country, from north to south. During different orogenic phases, three tectonic units were formed in the Mirdita zone. The lower unit is formed of oceanic crust ophiolites. This ophiolitic belt is surrounded by a border of volcano-sedimentary formation and limestones of the Upper Triassic and Lower Jurassic (T3-J1). The ophiolitic belt is composed of ultrabasic massifs on both its sides, gabbros, normal-acid,

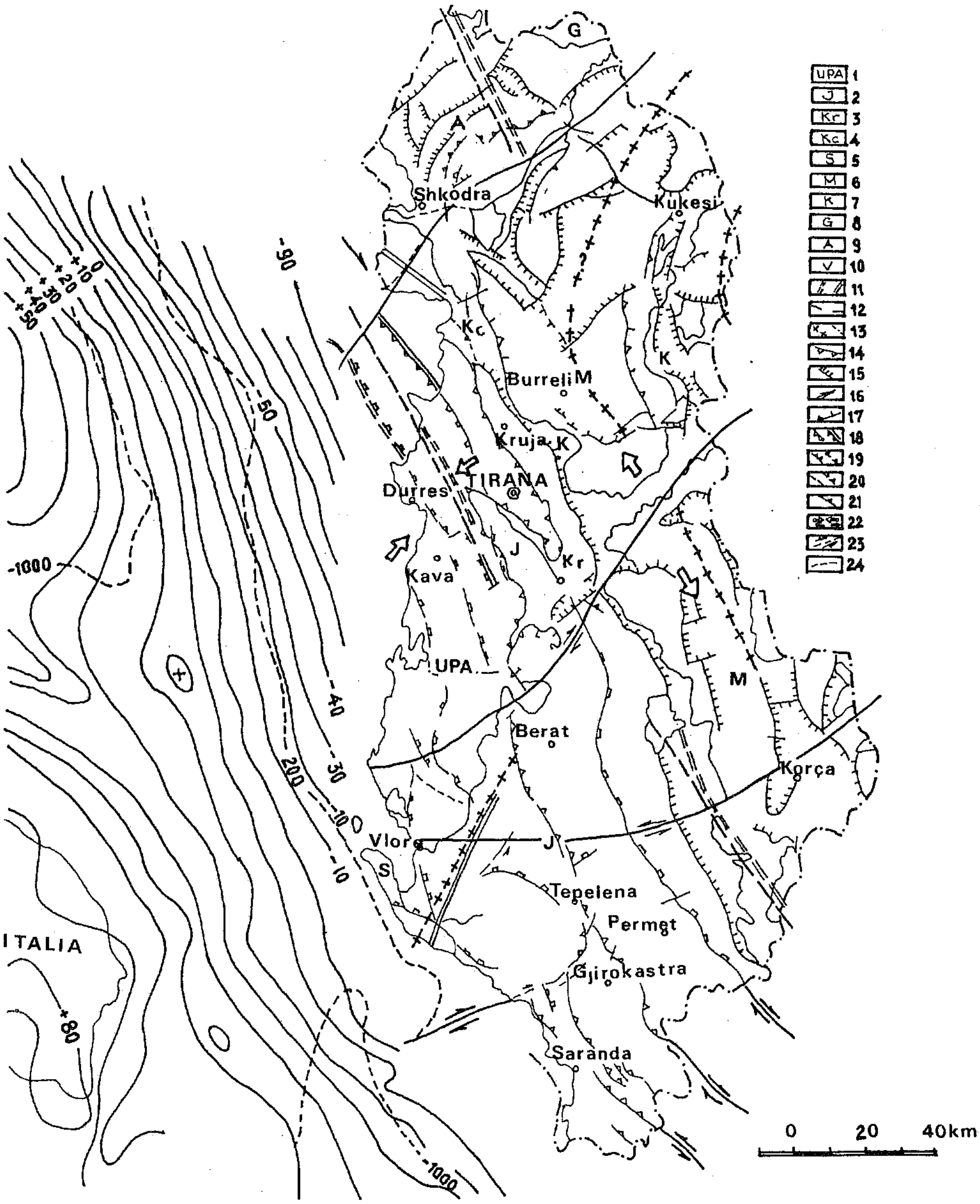


Fig. 5 - The complex tectonic map and axes of the Bouguer anomaly in the Albanides and continental plate of the Adriatic sea. 1. Pre-Adriatic depression; 2. Ionian zone; 3. Kruja zone; 4. Krasta-Cukali zone; 5. Sazani zone; 6. Mirdita zone; 7. Korabi zone ; 8. Gashi zone; 9. Albanian Alps zone; 10. Vermoshi sub-zone; 11. The axes of the Bouguer residual anomalies, positive (a) and negative (b); 12. Isoanomalies of the Bouguer anomaly in the Adriatic and Ionian sea; 13. The axes of the up-left and down-left (b) of the Mantle; 14. Boundary of Pre-Adriatic depression with angular discordance; 15. Normal fault; 16. Compression; 17. Limit of deformed envelopment during the neotectonic period; 18. Overthrust; 19. Flexure; 20. Flexures and disjunctions based on the geophysical data; 21. Inactiv overthrust; 22. Compressional zone and extensional zone (b); 23. Seismogenic deep up-rupt; 24. Isobaths of the water depth, in metres.

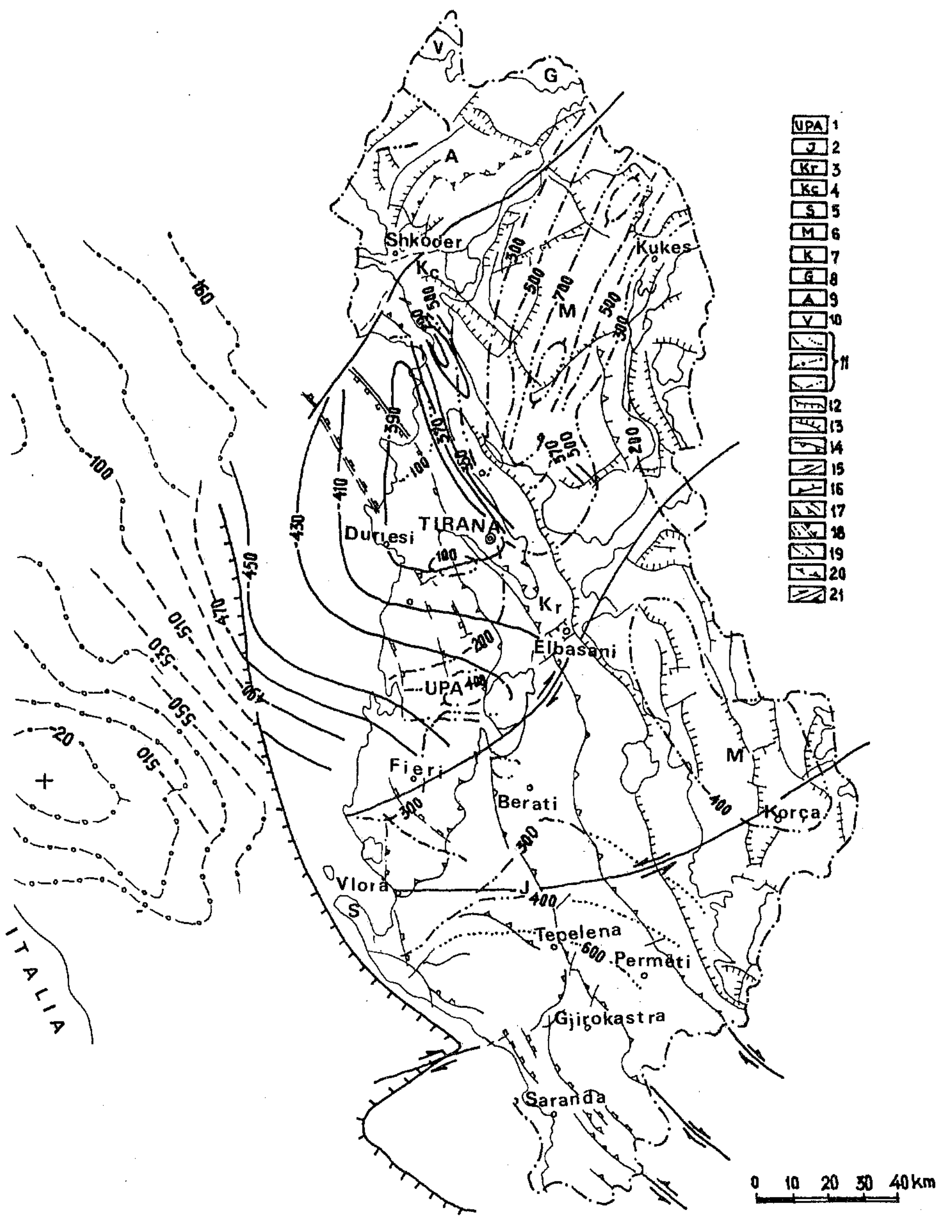


Fig. 6 - The complex tectonic map and magnetic anomalies of the Albanides and Adriatic sea continental plate. 1. Pre-Adriatic depression; 2. Ionian zone; 3. Kruja zone; 4. Krasta-Cukali zone; 5. Sazani zone; 6. Mirdita zone; 7. Korabi zone; 8. Gashi zone; 9. Albanian Alps zone; 10. Vermoshi sub-zone; 11. Isoanomalies of residual anomaly of magnetic field total intensity; 12. Limits between the plate and continental slope; 13. Normal faults; 14. Limit of Pre-Adriatic depression; 15. Pressure; 16. Limit of deformed envelopment during neotectonic period; 17. Overthrust; 18. Flexure; 19. Flexures and disjunctions based on geophysical data; 20. Inactiv overthrust; 21. Depth seismogenic up-rupt.

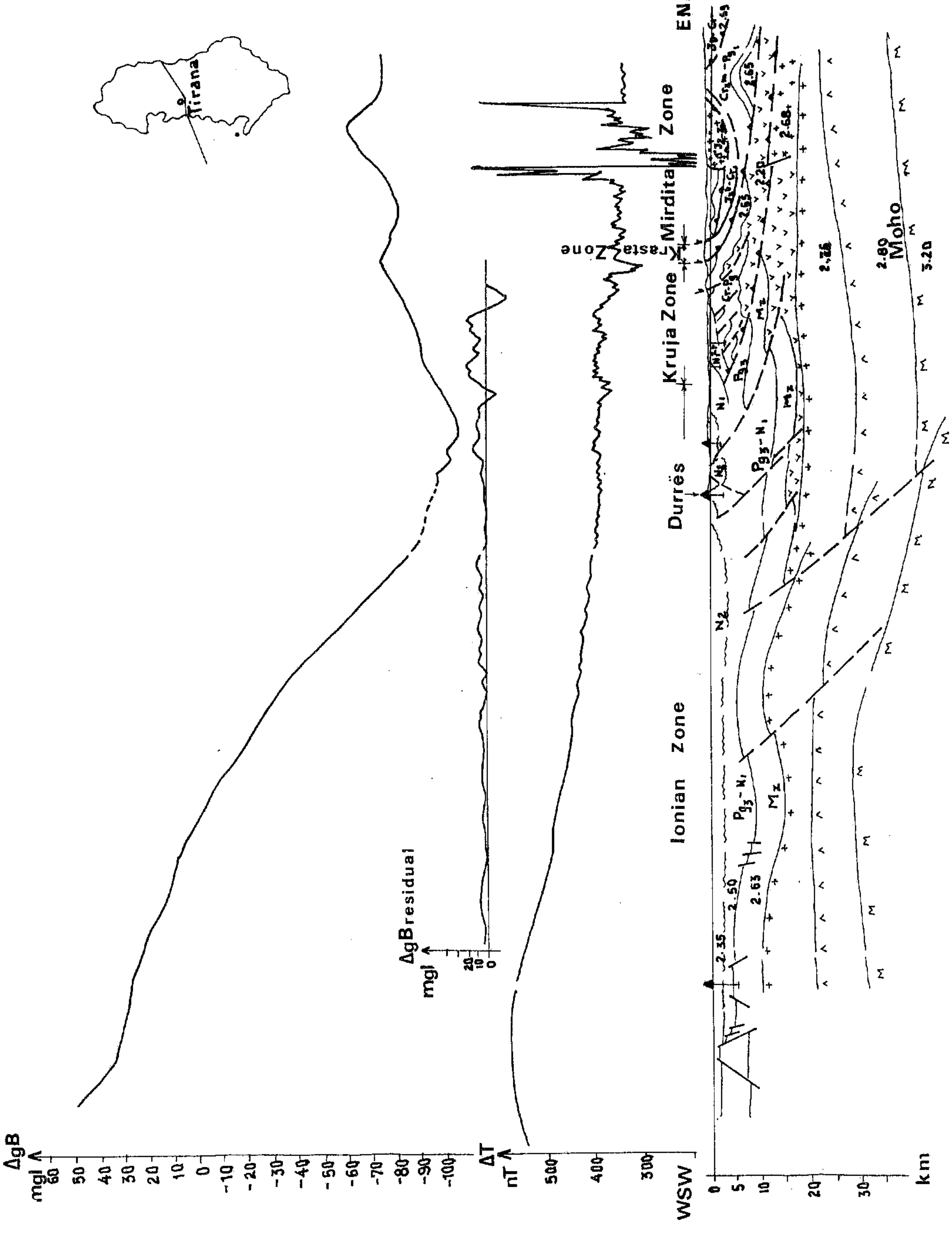


Fig. 7 - Geological-geophysical profile: Adriatic Sea-Durres-Tirana-Diber. (The data from the western part of the profile are taken from Richetti, 1980).
1. Pliocene Substratum; 2. Substratum of Tortonian molasses; 3. Paleogenic flysch (Pg^3) and molasses over the limestones; 4. Flysch of Maastrichtian ($Cr^m{}_1$), Lower and Middle Paleogene (Pg^{12}); 5. Old Flysch of Lower and Upper Jurassic (J_{13}) and middle Cretaceous (Cr_2); 6. Carbonatic facies divided by tectonic zones; 7. Ultrabasic rocks; 8. Disjunctive tectonic; 9. Depth up-rupt; 10. Top of crystal basement; 11. The basalt earth crust; 12. Moho discontinuities; 13. Focus nodal plan of the earthquake in the Kavaja region; 14. Seismic reflection; 15. Deep well.
$G_{B,t}$ - Trend of 2 nd degree Bouguer anomaly.
$g_{B,t}$ - Residual Bouguer anomaly of 2 nd degree.
T_t - Trend of the 2 nd degree of total intensity magnetic anomaly.
T_r - Residual magnetic anomaly of the 2 nd degree of total intensity.
To - Observed total intensity magnetic anomaly.

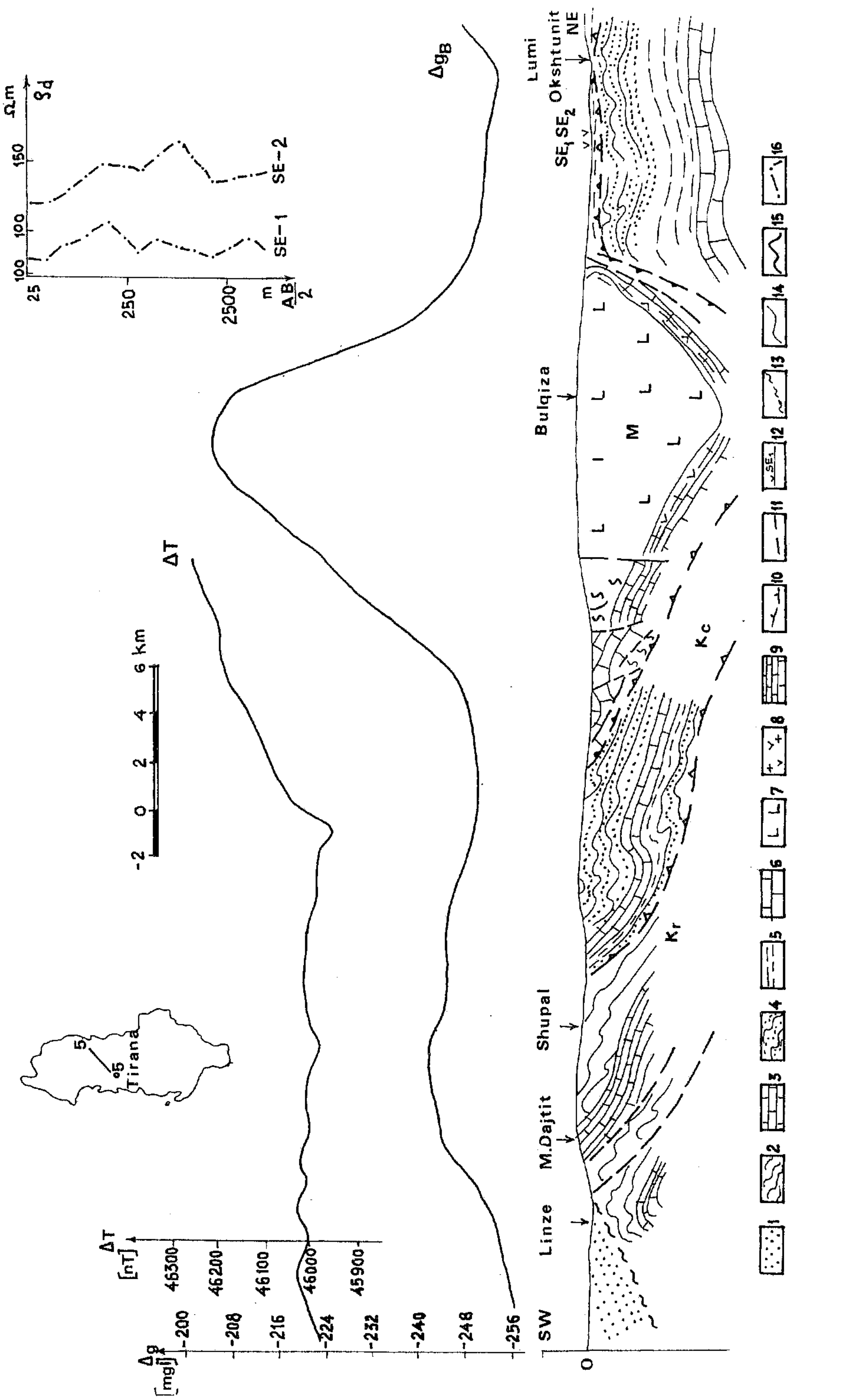


Fig. 8 - Geological-geophysical profile of Tirana-Bulqize-Shupenze. 1. Terrigenous Tortonian deposits; 2. Paleogene flyschoidal deposits; 3. Upper Cretaceous-Paleogene Limestone; 4. Titonian-Lower Cretaceous flyschoidal deposits; 5.Upper Triassic-lower Triassic limestones and Radiolaritic limestones with silicic radiolaritics; 6. Ultramaphic rocks. 8. Effusive rocks; 9.Limestones with siliceous of middle Triassic-lower Jurassic; 10. Overthrust plane; 11. Up-rupt tectonical; 12.Electrical sounding; 13. Leaching surface; 14.Bouguer anomaly; 15. Magnetic anomaly; 16. Apparent ES resistivity curve.

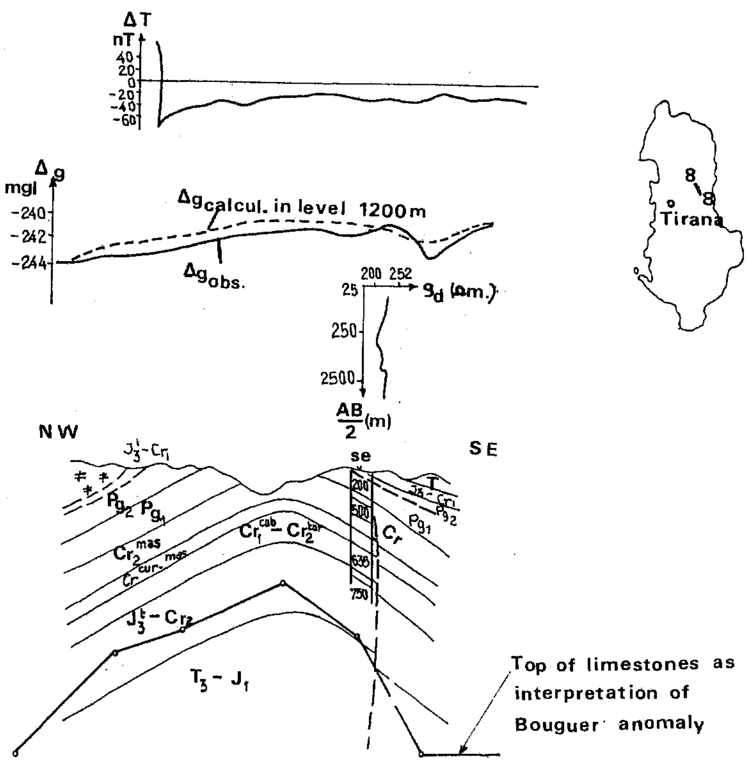


Fig. 9 - Geophysical-geological profile over the flyschoidal corridor in the Okshtun region.

and volcanic rocks in the middle.

The ophiolites were formed in the oceanic part of Tethys and emerged and started to be emplaced at the end of the Jurassic, gradually moving westwards over the continental crust. The ophiolitic belt is characterised by intensive Bouger gravity anomalies with density 2.6 g/cm (Figs. 4 and 5), and by a magnetic field with small anomalies (Figs. 6 and 7).

Gravity and magnetic anomalies are very evident through the ophiolite area, and their lines coincide quite well. It is to be noted that Bouger anomaly in the Tropoja massif has an amplitude of 50 mGal, 48 mGal in Bulqiza , 30 mGal in Shebenik and 10 mGal in the southern extremity of the ophiolitic belt. In the northern part the magnetic anomaly has an amplitude of 400 nTesla, whereas about 100 nTesla is its amplitude in the southern part.

As results from more detailed surveys, the gravity anomaly belt is formed by anomalies of local significance, with maxima in each ultramaphic massif, especially in the eastern belt; these anomalies may have more than one maximum in the same massif (Boltz, 1963).

A plot of Falko-Tirana-Bulqiza transverse profile is reconstructed (Fig. 7). This profile passes through the ultramaphic massif of Bulqiza, where the gravity anomaly is strong (48 mGal). Deep boreholes in Bulqiza have created new possibilities for petrophysical studies. The samples taken 1000-1320 m deep show that the ultramaphic rocks have a density between 2.74 and 3.31 g/cm^3. These data, together with that obtained from geological-geophysical studies, made possible a new geological-geophysical model of this profile (Fig. 8). In this figure it is clearly seen that the transversal profile of the Bulqiza massif is asymmetrical. The thickest part of the massif, about 6 km, is to the east of Bulqiza town, and it is 5.5 km in the west of the western edge of the massif, and 1.1 km in the western edge. In Mali me Gropa there are no gravity anomalies. Interpretation of the profile in Fig. 8 shows that the limestone thickness is limited.

In the eastern part of the ophiolitic belt is the Korabi zone, which is characterised by a

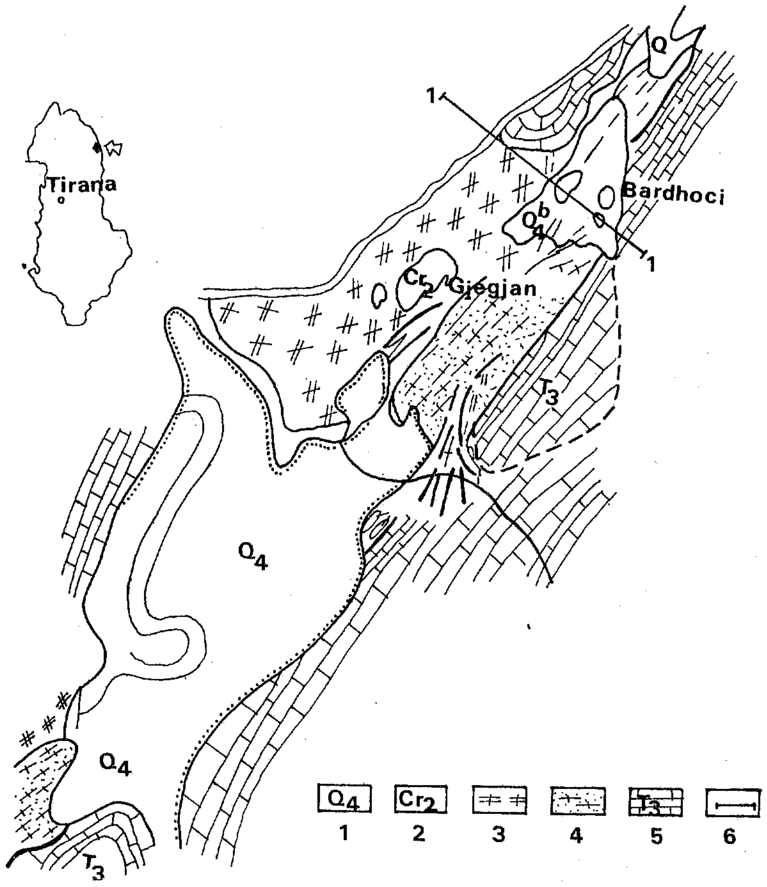


Fig. 10 - The geological profile of the Kukesi region.

quiet gravity field. This shows that large masses of ophiolite are missing here. The transition from the Korabi zone to the ophiolitic one has caused a change in the gravity field, with a strong gradient along the length of the ophiolitic belt.

The separation of the gravity and magnetic anomalies belts, which coincides with the Shengjergji flysch corridor and begins in Korabi, passes through Dumre and even further to the south-west, bringing evidence of the important Diber-Elbasan-Lushnje transversal structural element. This tectonic unit played a significant role in the geology of the Albanides. The geophysical data show that the Shengjergji flysch corridor represents a structural, carbonatic-terrigenous, long and wide chain, without ophiolites under the flysch deposits (Fig. 9).

All this proves that the ophiolite belt of the Albanides is genetically unique and tectonically split into two parts along its length. The ophiolitic belt has its thickest zone (about 14 km) in its north-eastern extremity, in the ultramaphic belt of Kukes. Towards the west and south-east this thickness is reduced to 2 km. The north-eastern extremity is near Kukesi town (Fig. 10). It is characterised by a gradual, monotonous diminishing of the Bouger and magnetic anomalies, which are intensive in the ultramaphic massif of Kukes. Further away in the east, over the volcano sedimentary massif, the fields are quite normal (Fig. 11).

In this geological-geophysical profile, it is seen that the magnetic anomalies extended even in the east of the ultramaphic rock outcrop. These are the only magnetic rocks in this region. They have a magnetic susceptibility K = 800x10 SI, which sometimes reaches values up to 20000x10 SI. The rocks situated round ultramaphic units are not magnetic. Magnetic susceptibility

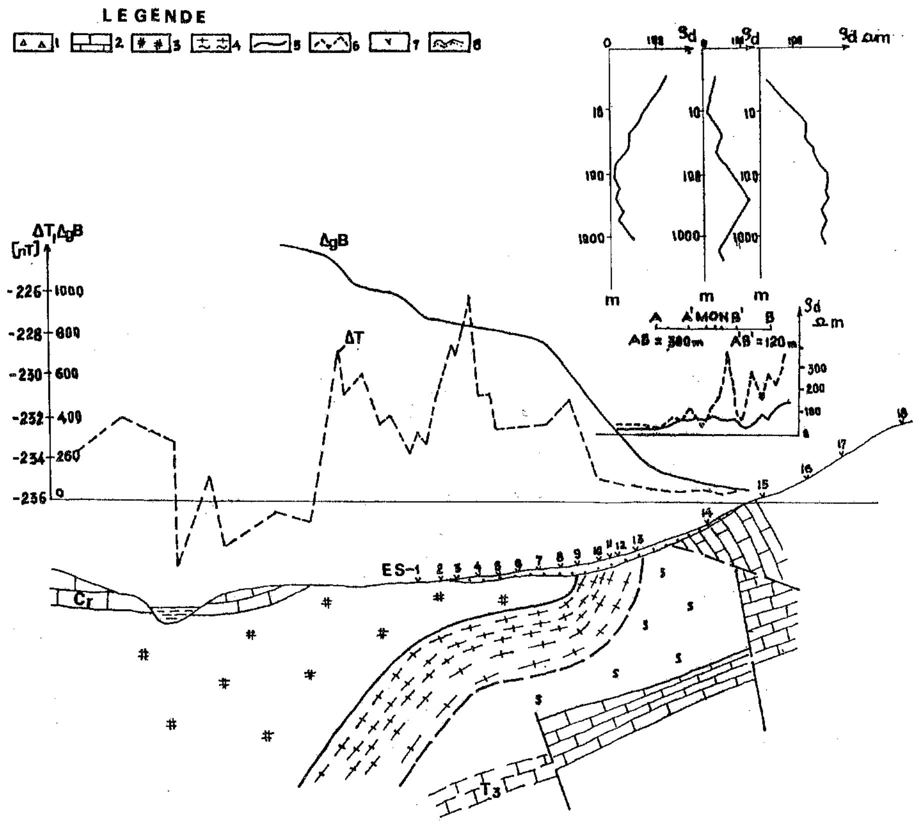


Fig. 11 - Geological-geophysical profile: Gjegjan district. 1. Deluvion; 2. Upper Triassic limestones; 3. Volcanic-sedimentary series; 4. Ultramaphic rocks; 5. Bouguer anomaly; 6. Magnetic anomaly; 7. Electrical sounding; 8. Apparent resistivity profiles (electrical profiling with array AA' MM B'B).

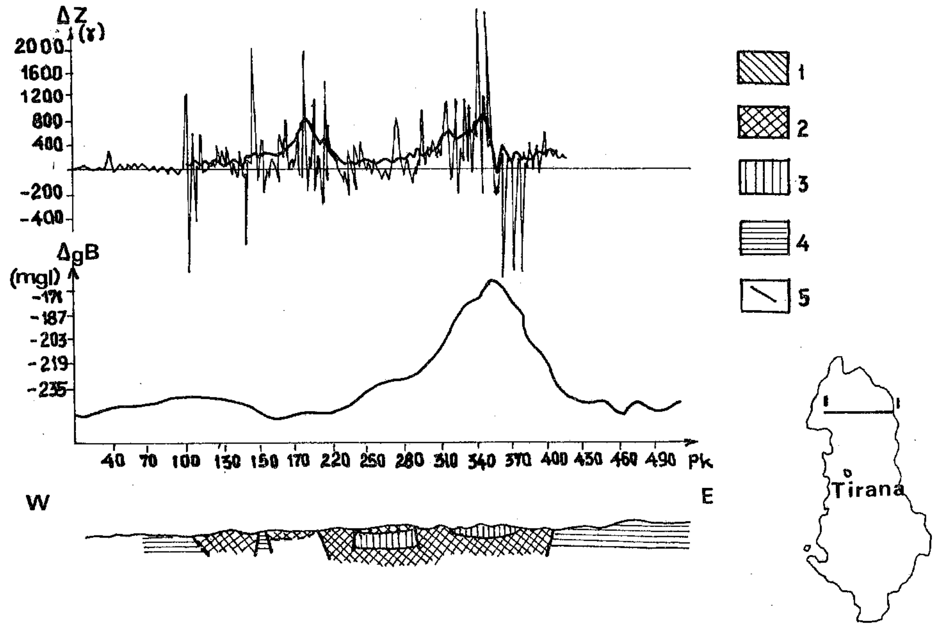


Fig. 12 - Geological-geophysical Shkoder-Kukes profile: 1. Effusive; 2. Ultrabasic; 3. Gabbros; 4. Sedimentary rocks; 5. Tectonic.

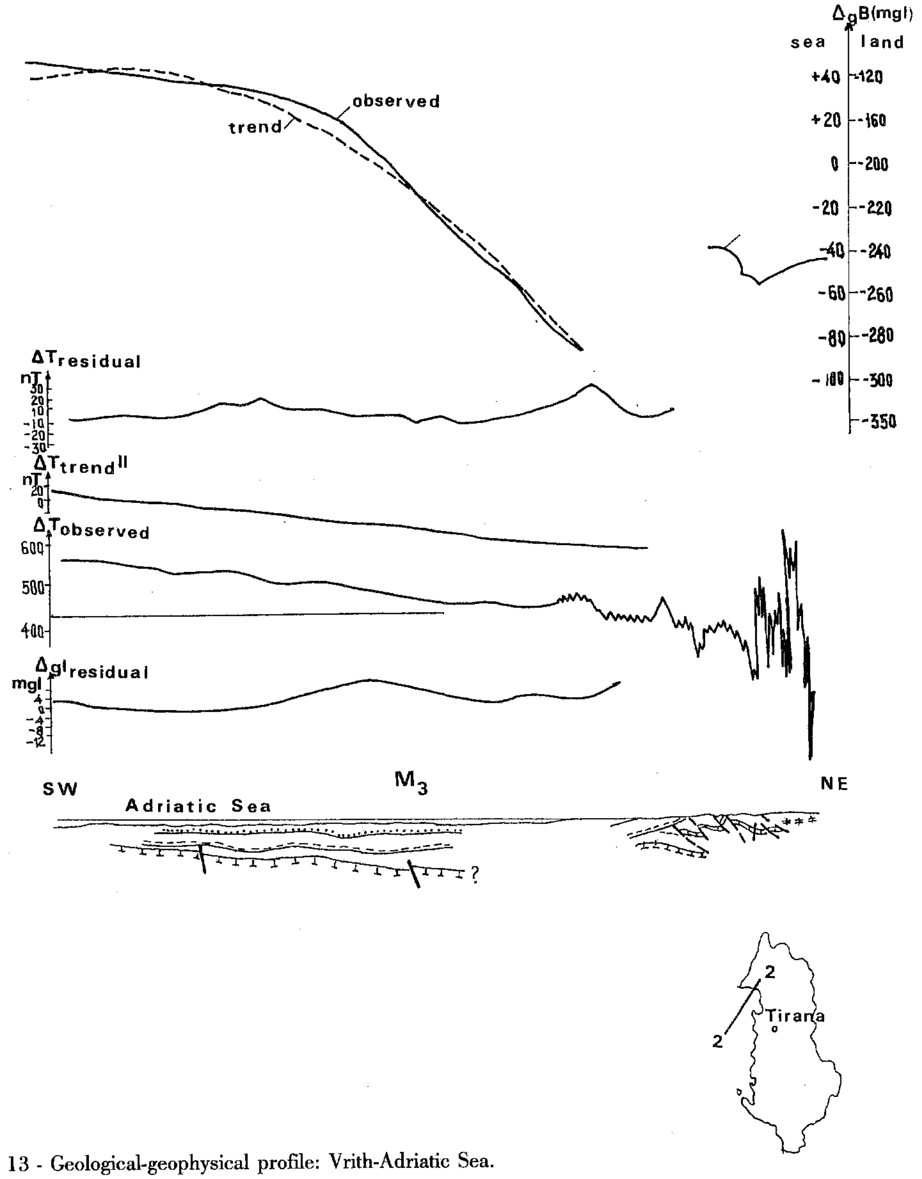


Fig. 13 - Geological-geophysical profile: Vrith-Adriatic Sea.

of the schist, clay and silicic rocks range between 25 to 75x10 SI, whereas that of the limestone is K = 25x10 SI.

Interpretation of the magnetic anomaly data, based on the petromagnetic characteristics of the rocks, indicates that the ultramaphic rocks extend under the alluvium further to the east of their outcrop. But this extension is limited. The absence of the gravity anomaly, and the interpretation of the anomaly over the Kukes ultramaphic massif show that the eastern border of this massif has a general westward deepening.

The north-eastern sector of the ophiolitic belt occurs east of Shkodra town. This sector is situated in the Adriatic-Shengjin-Vrith profile (Figs. 12, 13 and 14).

The intensity of the gravity and magnetic fields reduces from the seashore at Shengjin towards Vrith in the east, in the ultramaphic massif of Gomsiqe. This tendency is explained by the increasing depth of the crystalline basement towards land. Interpretation of the gravity anomaly

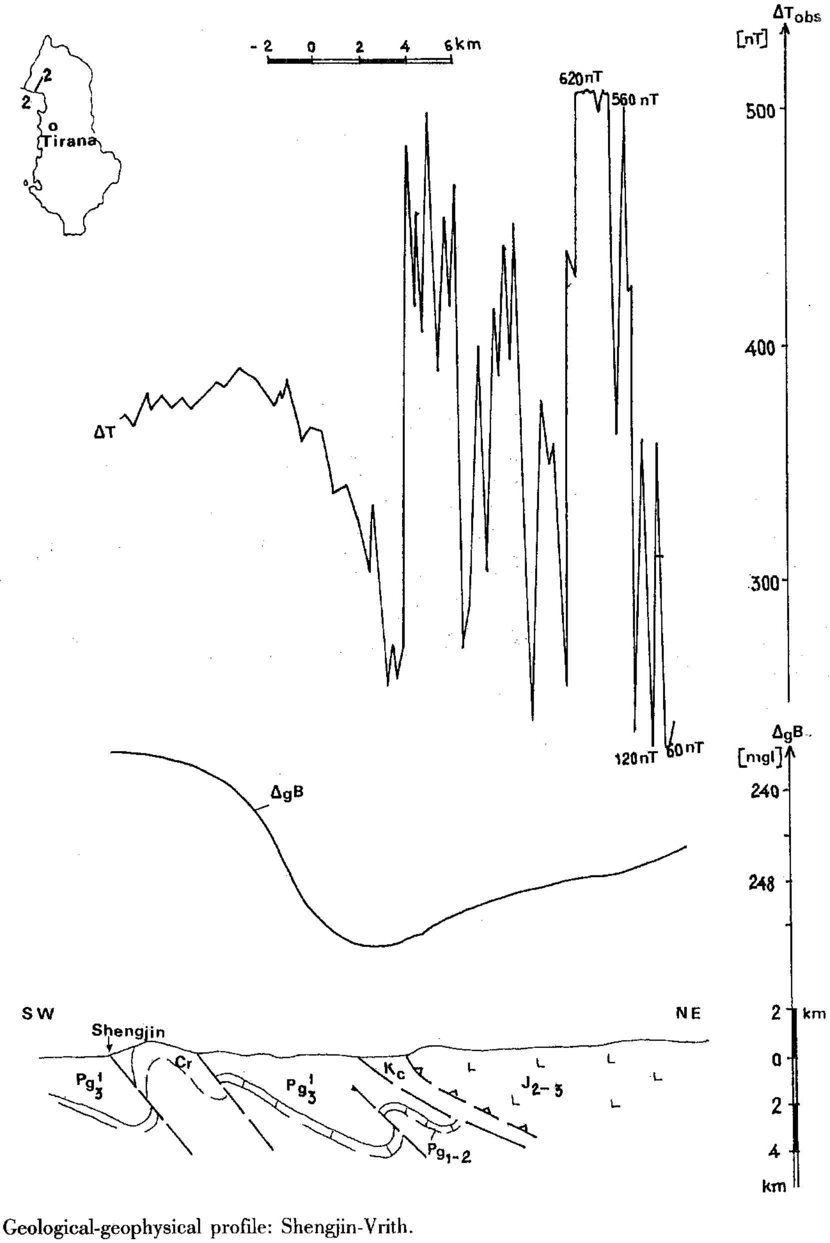


Fig. 14 - Geological-geophysical profile: Shengjin-Vrith.

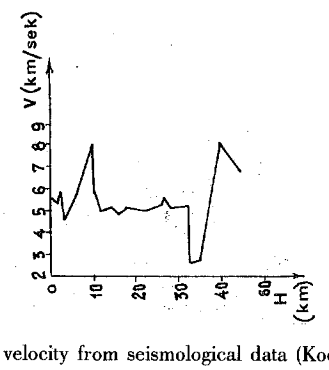


Fig. 15 - Inversion of seismic P waves velocity from seismological data (Kociaj, 1989).

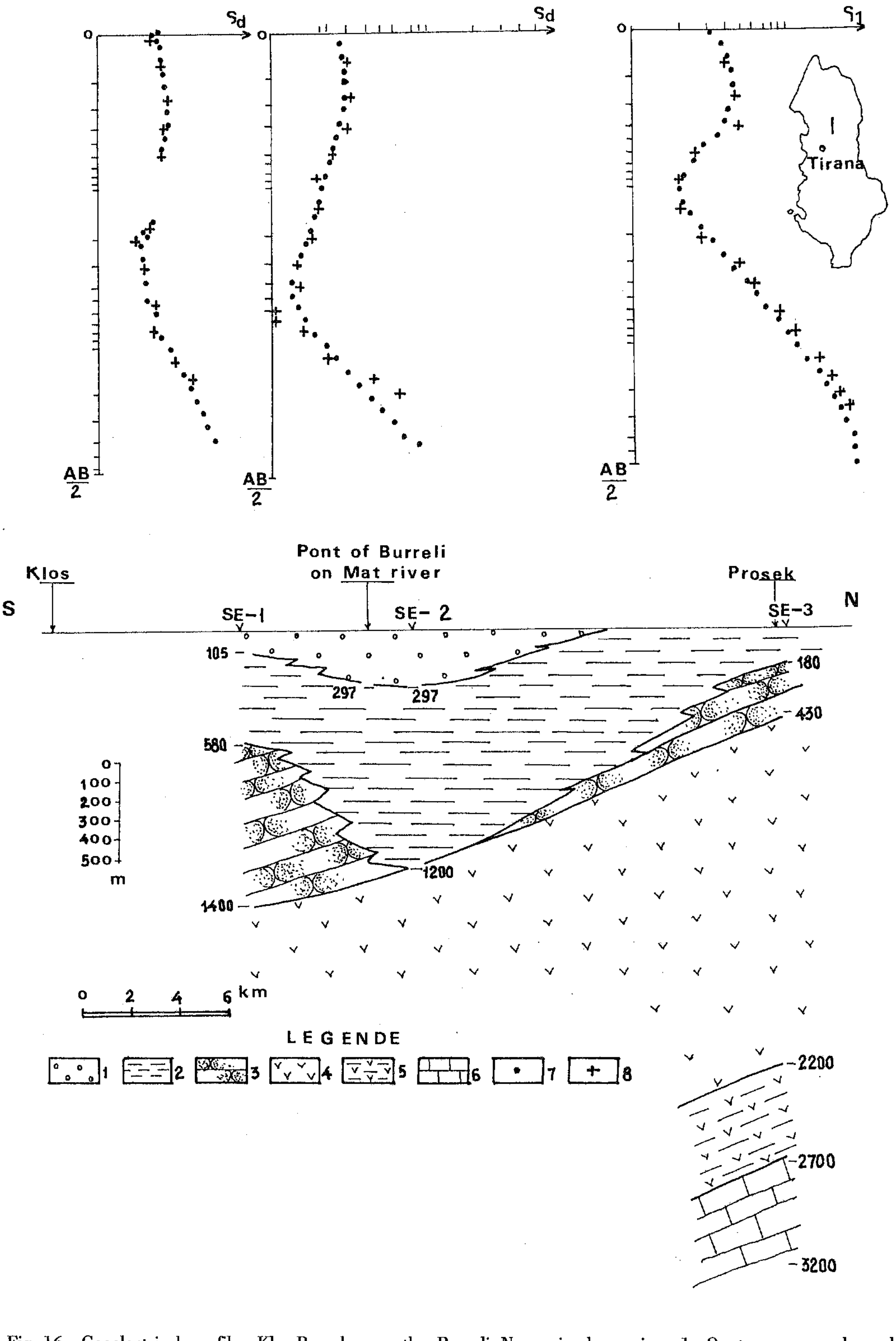


Fig. 16 - Geoelectrical profile: Klos-Prosek over the Burreli Neogenic depression. 1. Quaternary gravels and conglomerates; 2. Detritic-argillaceous pack; 3. Sandstones conglomerates; 4. Volcanic rocks; 5. Volcanogenic-sedimentary pack; 6. Limestones; 7. Theoretical ES curve; 8. Observed ES curve.

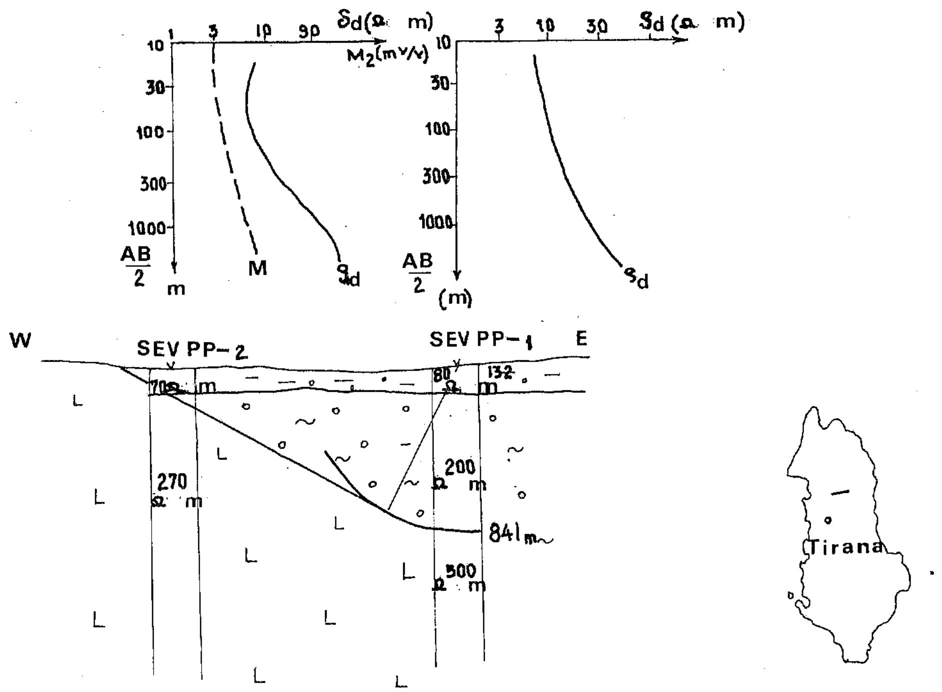


Fig. 17 - Geoelectrical profile in the western border of the Burreli neogenic depression: Burreli district.

gave an estimate of the thickness and dip direction of the western border of the ophiolitic belt.

A second gravity anomaly is associated with the carbonatic anticlinal structures of Renz-Kakariq. The presence of this more intensive anomaly than that over the ultramaphic massif could be explained by the existence of another deeper carbonate structure, under those outcropping.

The seismological studies of Fierze-Himare profile show that there is an inversion of the wave velocity dispersion in Mirdita zone (Kociaj, 1989). Under the high velocity rocks there are low speed sedimentary intervals (Fig. 15).

Over the ophiolites in various places there are blocks of Cretaceous limestones tectonized during the second orogenic phase.

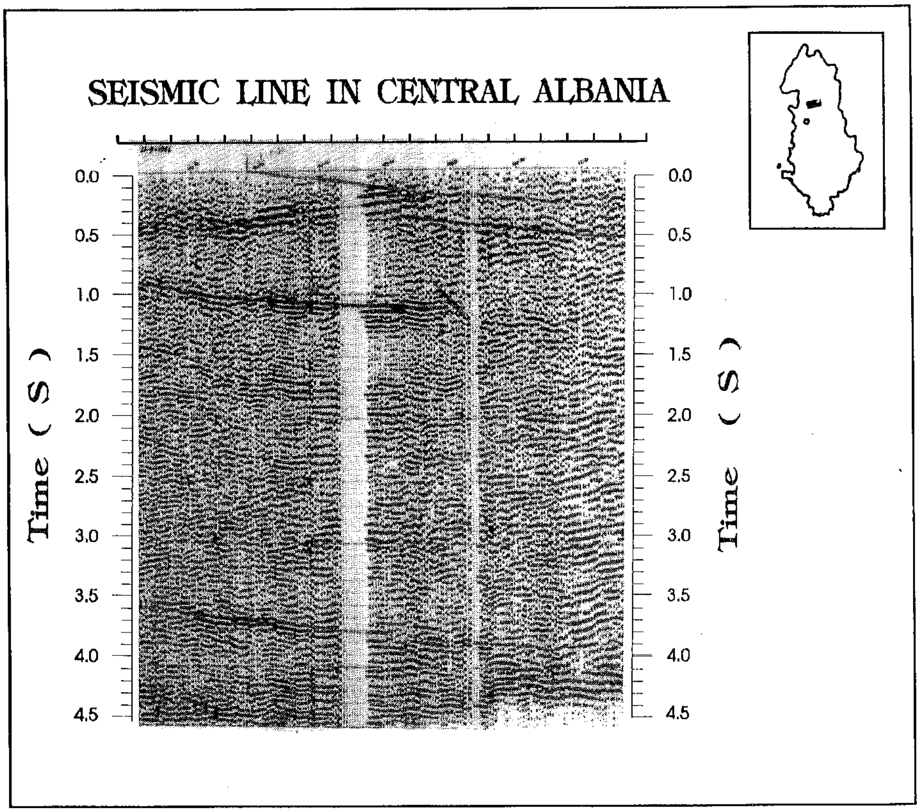
The interpretation of the curves of apparent resistivity indicates that the neogenic molasse thickness reaches about 1500 m in the northern part of the basin (Fig. 16). Under it lies a geoelectrical layer with a resistivity of 2200 ohm and thickness 1900 m in the northern part of the basin, which may be attributed to the ophiolites. Under the ophiolites there is a layer with resistivity 100 ohm. This layer overlies rocks with high resistivity (3200 ohm).

Electrical soundings of induced polarisation in the western margin of the neogenic basin of Burreli (Fig. 17) have found a high resistivity and polarisable rocks, under the neogenic molasses, which may be attributed to serpentinised rocks (Avxhiu, 1979).

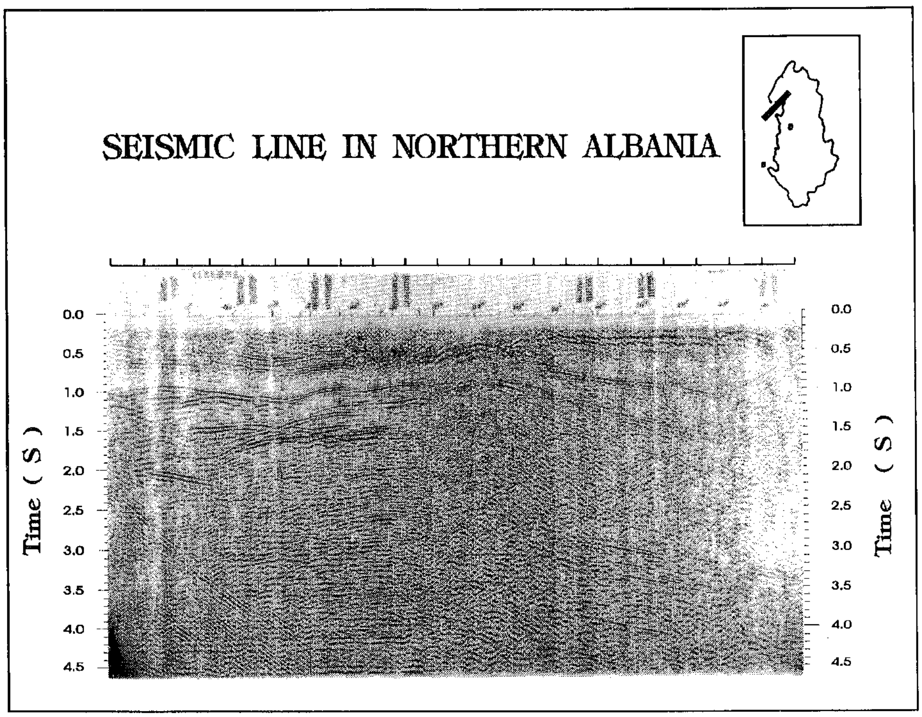
The seismic profile in the Burreli basin shows that under neogenic deposits there is a belt without seismic reflections, which is interpreted to be linked to the ophiolitic formation. Before it, many seismic reflections and thrusting deformation are evident (Fig. 18).

Gashi Zone (G)

Beyond its border it continues into the Durmitori zone of the Dinarides. This zone includes metamorphic rocks, terrigenous rocks, limestones, metamorphic volcanics, basic intermediate and acid rocks. Basic and ultrabasic rocks are less frequently encountered.



a)



b)

Fig. 18 - Time sections of Burreli neogenic depression (a and b).

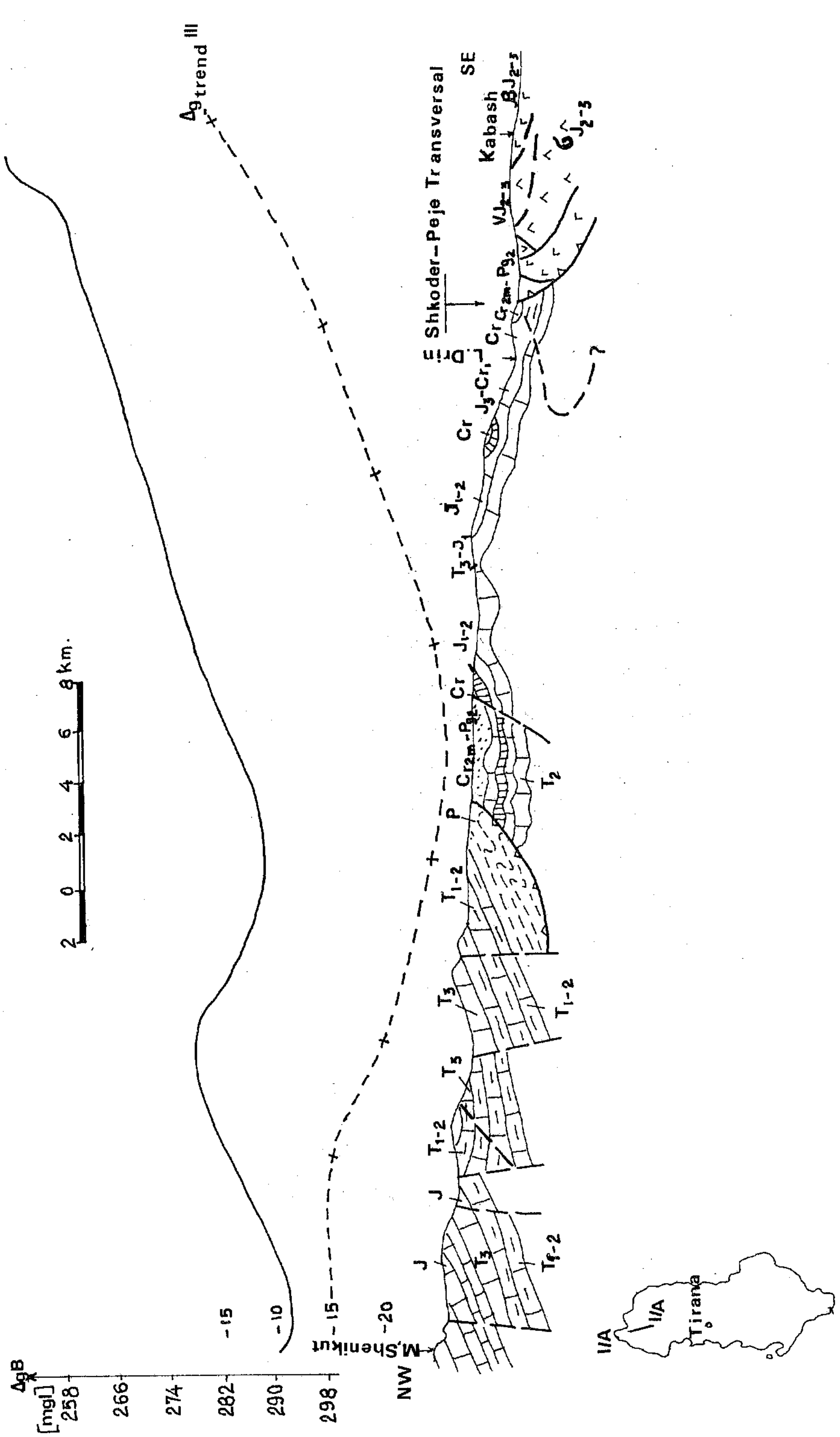


Fig. 19 - Geological-geophysical profile: Alps-Cukali-Mirdite profile over the Scutary-Pec Transversal.

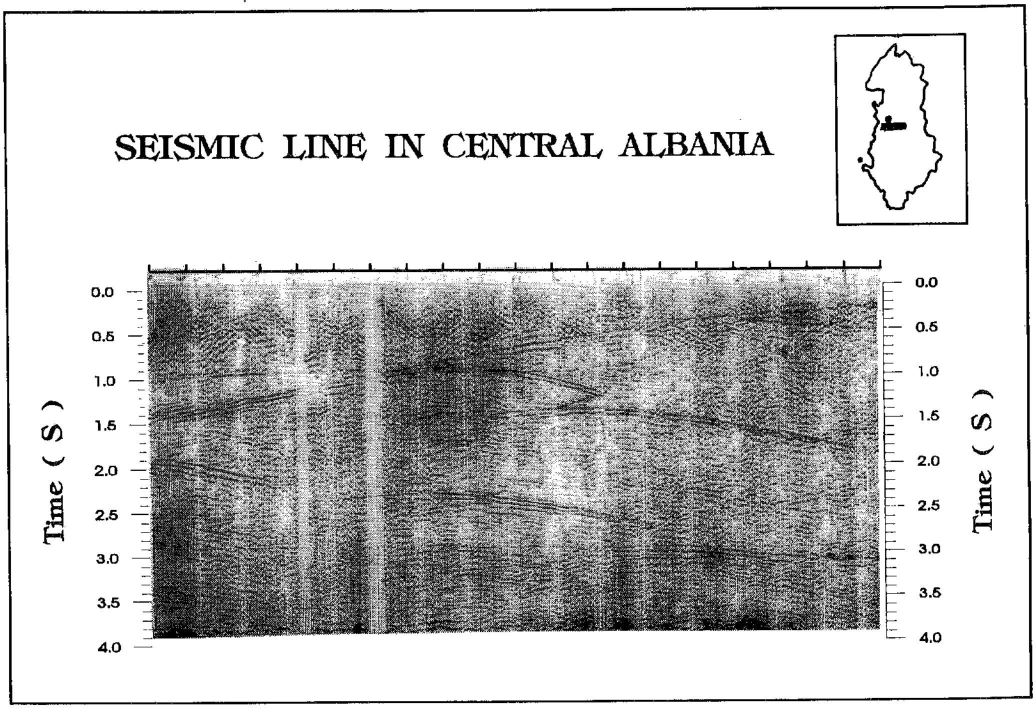


Fig. 20 - Time section of Tirana Neogenic depression.

In the Gashi zone, a granite massif separates the terrigenous layers from the volcanics.

EXTERNAL ALBANIDES

In the external Albanides up to the Adriatic shelf, geophysical datation has revealed that the acoustic basement deepens from the central Adriatic region towards the Albanian coast (Fig. 7), from about 9.5 km in the Adriatic to 12 km in land (Fig. 2).

The deepest zone of the top of the basement, in the area explored with magnetic methods, seems to occur in the Durres-Tirana-Shengjin region, where there are also the observed gravity minima (Fig. 5).

Alps Zone (A)

In this zone, sandstone and conglomerates of Permian age form to the oldest rocks. Over them are carbonatic rocks with interbeds of Middle Triassic (T) volcanic tuffs, Upper Triassic (T) limestones and dolomites, Jurassic-Cretaceous organogenic neritic limestones which have few interbeds of chert, and the Lower Cretaceous and Eocene top flysch.

Krasta-Cukali Zone (K-C)

This continues beyond the Albanian border into the Pindi area in Greece. It is an intermediate zone between the Internal and External Albanides. The sub-zone of Cukali in the north is composed of Mesozoic (T-Cr) carbonatic rocks, some Middle Triassic effusive rocks and a few radiolarites on the top of the Upper Jurassic. These rocks are overlain by flysch of Maastrichtian-Paleocene-Eocene age. A large undulating anticline is present in the Mirdita zone overthrust. The longitudinal Kabash-Shenikut profile is plotted in Fig. 19.

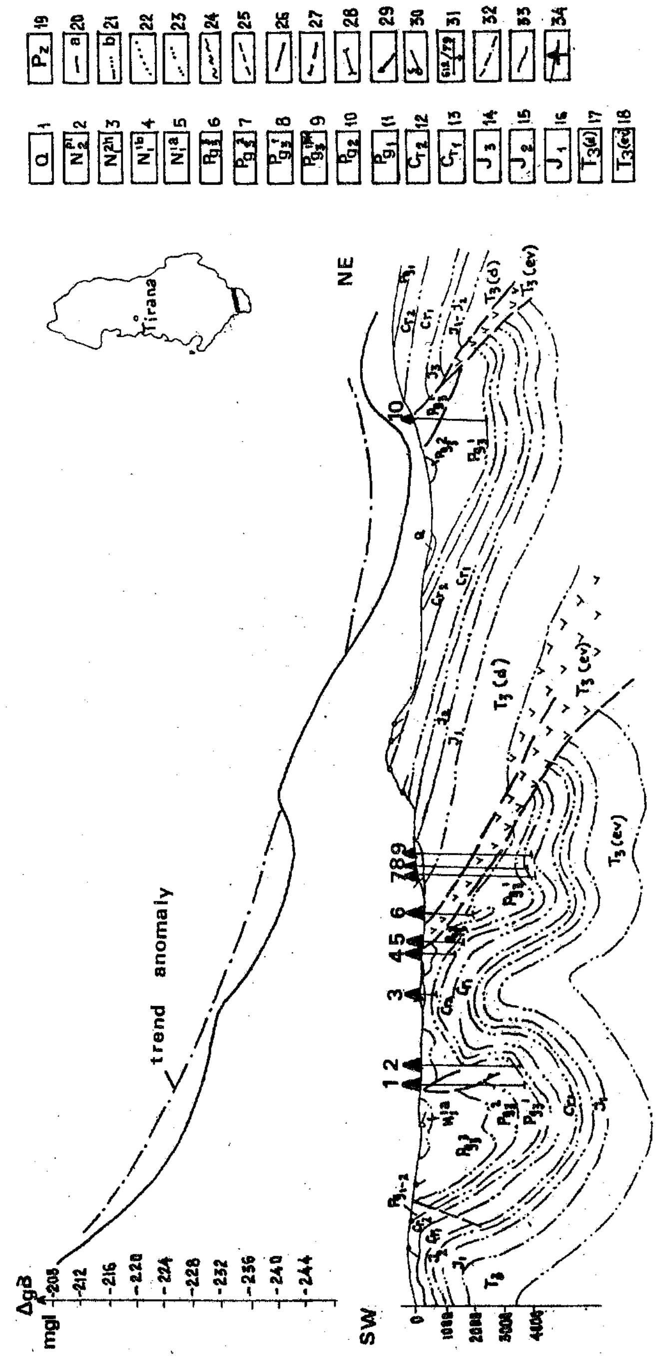


Fig. 21 - Geological-geophysical profile in Saranda-Gjirokastra region. 1. Quaternary; 2. Pliocene; 3. Helvetian; 4. Burdigalian; 5. Aquitanian; 6. Upper Oligocene; 7. Middle Oligocene; 8. Lower Oligocene; 9. Lower Oligocene of suite Tommorri; 10. Eocene; 11. Paleocene; 12. Upper Cretaceous; 13. Lower Cretaceous; 14. Lower Jurassic; 15. Middle Jurassic; 16. Lower Jurassic; 17. Dolomites of the Upper Triassic; 18. Upper Triassic with evaporites; 19. Paleozoic (substratum of Ionian zone); 20. Verified paleological boundary; 21. Postulated geological boundary; 22. Verified lithological boundary; 23. Postulated lithological boundary; 24. Transgressive boundary; 25. Lithological marker; 26. Verified fault; 27 Postulated fault; 28. Seismic reflector; 29. Normal attitude element; 30. Reversed attitude element; 31. Interruption of seismic profiles; 32. Regional background curve; 33. Bouguer anomaly; 34. Drill-hole.

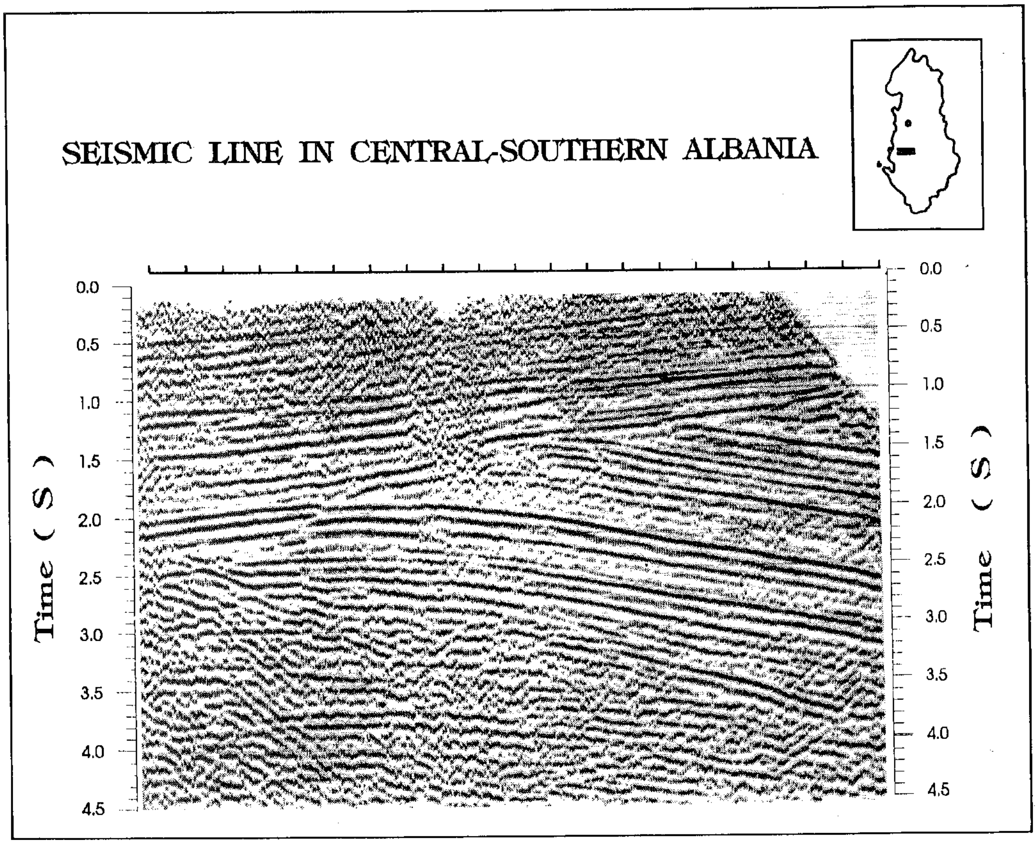


Fig. 22 - Time section in the Patos-Verbas structure in the Ionian tectonic zones (by Geophysical Enterprise of Fieri).

Kruja Zone (K)

This continues in Dalmatia to the north and in Greece to the south.

In the lower part of its section, there are Cretaceous-Paleogene carbonate-neritic rocks and Oligocene flysch. The main folding of this zone took place in the Middle Oligocene and Lower-Middle Miocene, so in some places there are transgressive layers of Tortonian deposits over the oldest ones.

Seismic data from the central part of Kruja zone show reflections at about 2.3-2.5 s which are partially parallel to the reflections identified as the top limestones of the Kruja structure (Fig. 20). These reflections may be attributed to the floor of the carbonatic deposits or to the roof of the Jurassic-Cretaceous salts.

Ionic Zone (Io)

This is the zone of the External Albanides which has constituted a deep pelagic trough since the Upper Trias. The Permian-Trias evaporites are the oldest rocks of this zone. Over this formation lies a thick deposit formed by Upper Trias-Lower Jurassic (T-J1) dolomitic limestone interbedded with Jurassic-Cretaceous-Paleogene (J-Cr-Pg2) pelagic cherty limestones. Limestones are covered by paleogenic flysch (Pg), flyschoidal formation of the Aquitanian (N1), a thin section of Burdigalian-Helvetian and, partially, of Tortonian. Burdigalian deposits cover with an angular unconformity the underlying tectono-sedimentary elements (Figs. 21 to 24).

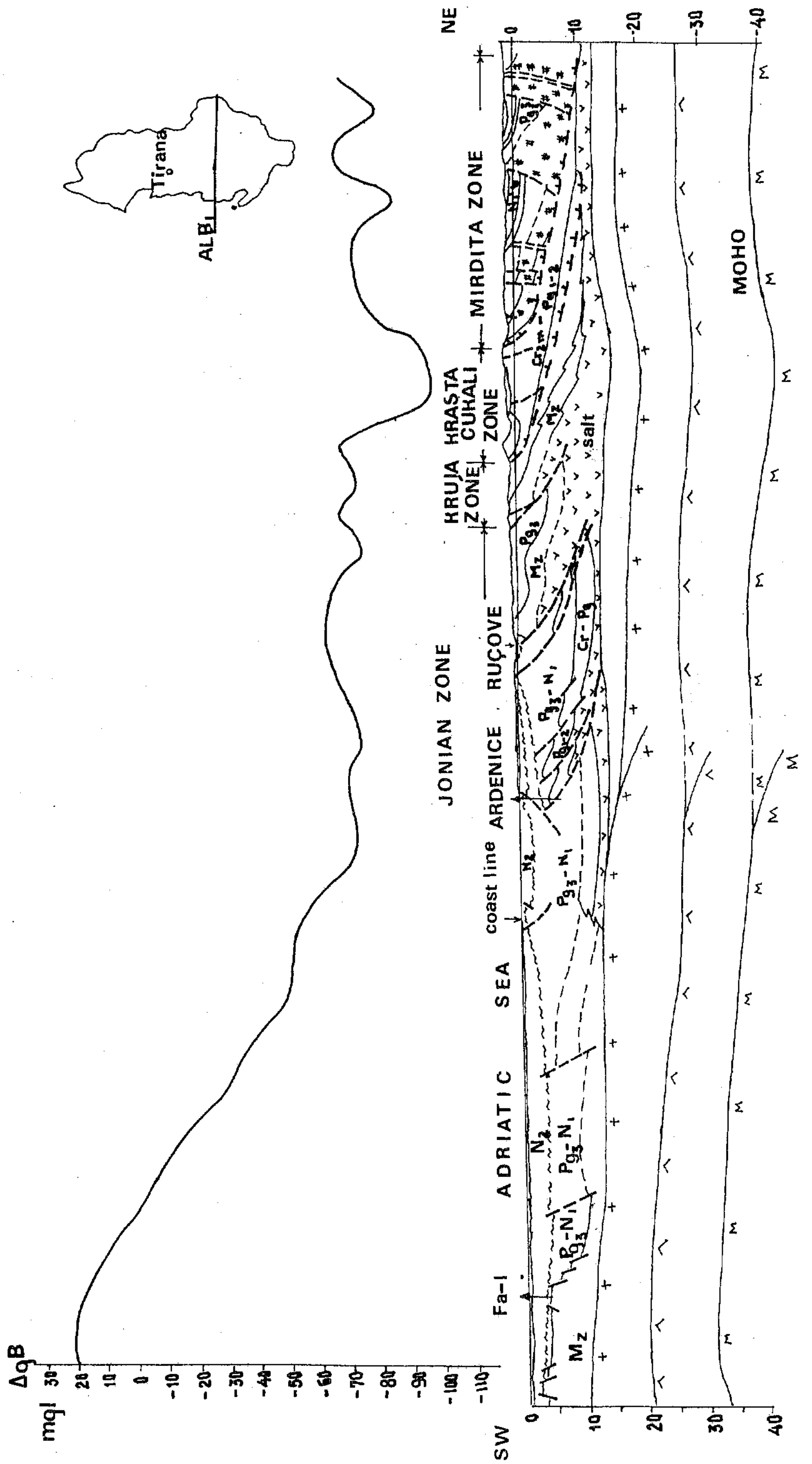


Fig. 23 - Geological-geophysical profile Albanides.

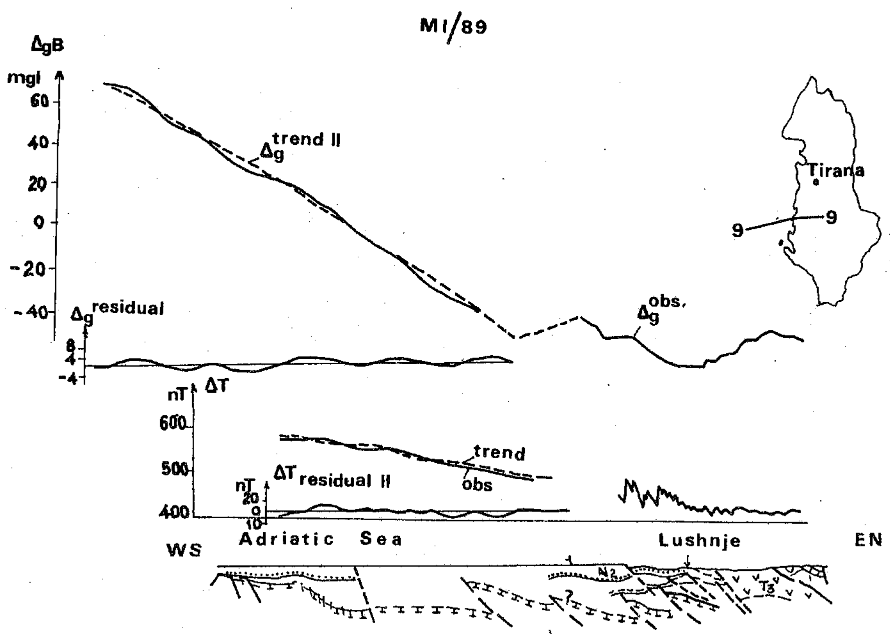


Fig. 24 - Geological-geophysical profile Adriatic Sea-Lushnje.

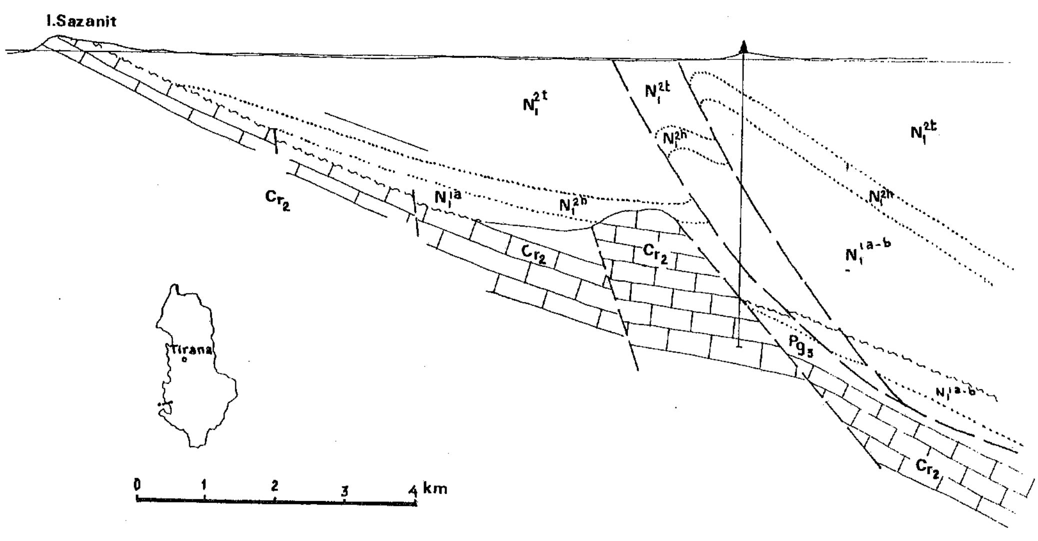


Fig. 25 - Geological profile of Sazani-Zvernec in Vlora region.

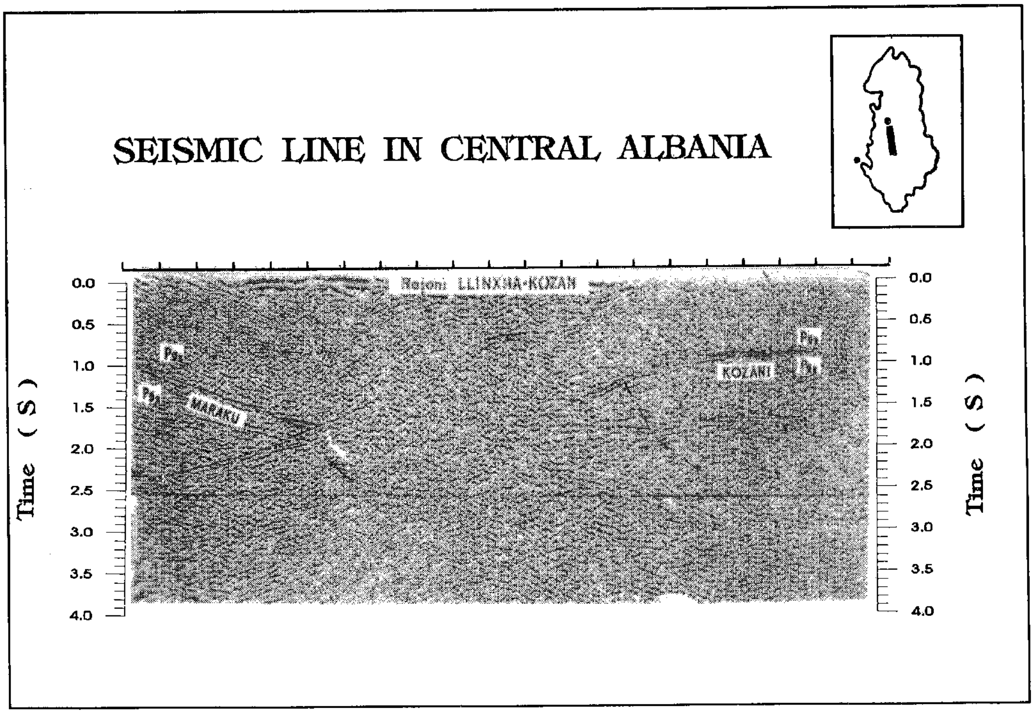


Fig. 26 - Time section over Diber-Elbasan-Lushnja area (Bakiaj and Bega, 1989).

Sazani Zone

This is the continuation as thrusted blocks of the Apulian platform with thick Cretaceous-Eocene (Cr-Pg1-2) limestone and dolomite rocks. Marly Burdigalian (N1) deposits are also transgressive over the carbonate formation (Fig. 25).

ADRIATIC FOREDEEP

This is a foredeep filled with Miocenic and Pliocenic molasses, and covered by Quaternary deposits. These layers also cover the north-eastern part of the Ionic zone and part of the Kruja and Sazani zones (Figs. 22 to 26).

Sandstone-clay Tortonian (N1-2t) deposits transgressively overlie older layers up to the limestones. Pliocene deposits consist of clay and sandstone conglomerate. This thick Albanian sedimentary basin extends widely into the Adriatic. In the profiles of Figs. 7, 13, and 22 some local anomalies of the gravity and magnetic fields in Adriatic shelf are seen (Richetti, 1980). Some researchers have reached the conclusion that the Apulian platform is tectonically quiet. The maxima of the gravity anomalies coincide with minima of the magnetic field: this is interpreted as due to the elevation of the top of carbonatic formation. Another uplifting of the carbonatic formation is expected to occur in Durres.

In summary, it can be established that the Albanian basin is an important foredeep depression of the Albanides orogene where the classic compressive deformation produced thrust structures. Inwards the thrusting process includes rigid blocks disrupted by the subducting Apulian platform. The possible existence of transverse tectonic fractures (strike-slips) seems supported by geological and seismotectonic data.

CONCLUSIONS

The Albanides form that sector of the Alpine orogene which extends into Albanian territory between the Dinarides to the north and Hellenides to the south. The geophysical studies, as well as regional geological data, show that it is possible to distinguish two orogenic zones: the Internal and the External Dinarides.

The general tectonic setting of the Dinarides is the result of a complex compressive geodynamic process, accompanied by crustal shortening and thrusting structures. Different pre-deformation paleogeographic zones of basins and highs took pass to the deformative evolution of the investigated area. The eastern margin of the Apulian platform was also involved in the compressional geodynamics of the Albanides.

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