Mineral Res.Expl. Bull., 109, 25-36, 1989

THE STRATIGRAPHY AND GEOLOGICAL DEVELOPMENT OF THE CARBONATE PLATFORM IN THE POZANTI-KARSANTI-KARAİSALI (EAST TAURUS) AREA

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ABSTRACT.— The basement of the investigated area is composed of the Karahamzauşağı formation of Paleozoic (Permo-Carboniferous) age. The Mesozoic is represented mainly by calcareous Demirkazık formation (Jurassic-Upper Cretaceous) and pelagic foraminifera bearing Yavça formation (Campanian-Maastrichtian). The Tertiary succession developed on an irregular paleotopography of the Paleozoic-Mesozoic aged lithostratigraphic units. In the Tertiary succession, lateral and vertical transitions are quite common within short distances the terrestrial Gildirli formation (Oligocene-Lower Miocene) is found at the base of the Tertiary succession. The lacustrine Karsantı formation overlies the Gildirli formation. In the Lower Miocene, the Kaplankaya formation of shallow water-beach elastics and the Karaisali formation of reefal carbonates developed during a progressive transgression of the sea from the south. Fore reef facies of the reefal Karaisalı formation is represented by the Güvenç formation which is composed mainly of deep marine shales and marls.Turbiditic Cingöz formation developed due to the high sediment influx to the investigated area. The compressional forces were dominant during the evolution of the study area through the considered period. The Kızıldağ melange and the Faraşa ophiolite were emplaced on the platform which was stable till Maastrichtian, during which northern and northeastern parts of the platform had uplifted and the sea had retreated towards the south and southwest. Today, tectonic activity still is going on in the form of a normal block faulting.

INTRODUCTION

The study area, located at the Eastern part of the Taurides, is bordered by Pozantı in the northwest, Karsantı in the north, Karaisalı in the southwest and İmamoğlu in the southeast (Fig.l). Paraautochthonous, neoautochthonous and allochthonous rock bodies are present in the region.

The most important structural property of the region, which is outlined by Blumenthal (1952), is the existence of the nappe structure. The most common rock bodies of this structure ranging from the Upper Devonian to the Early Senonian are paraautochthonous sequences in which carbonates are dominant; allochthonous ultramafic-mafic typed ophiolithes and the units of melange character which are less common relatively to the others. Neoautochthonous units were deposited on both the paraautochthonous and allochthonous rock bodies with an angular disconformity while overthrusts were dominant in the middle and western Taurides after Maastrichtian age (Brunn et ah, 1971; Özgül, 1976), in the studied area no tectonic structure of this type was developed. Instead of this tectonic movements were dominant all along the Ecemiş fault, which played an important role in the structural formation of the investigated area and its vicinities after Maastrichtian age. The Ecemiş fault, which crosses the eastern Taurides in the NE—SW direction both tectonically and morphologically, has been interesting for geologist up to now. Arpat and Şaroğlu (1975) stated that this zone is active. The Ecemiş fault is defined as a sinistral strike-slip fault.

In the study area, while Paleozoic and Mesozoic aged units form the basement, the Tertiary age units of the Adana basin are wide spread. The sequence representing the basement of Carboniferous-Upper Permian age generally exhibits a steadiness, in respect of facies features and depositional environment, whereas there is, in this terms, an obvious difference in the units of continental margin which were deposited at the interval of the Upper Jurassic-Cretaceous age.

STRATIGRAPHY

In the studied area, the units of Paleozoic, Mesozoic and Cenozoic age are present.

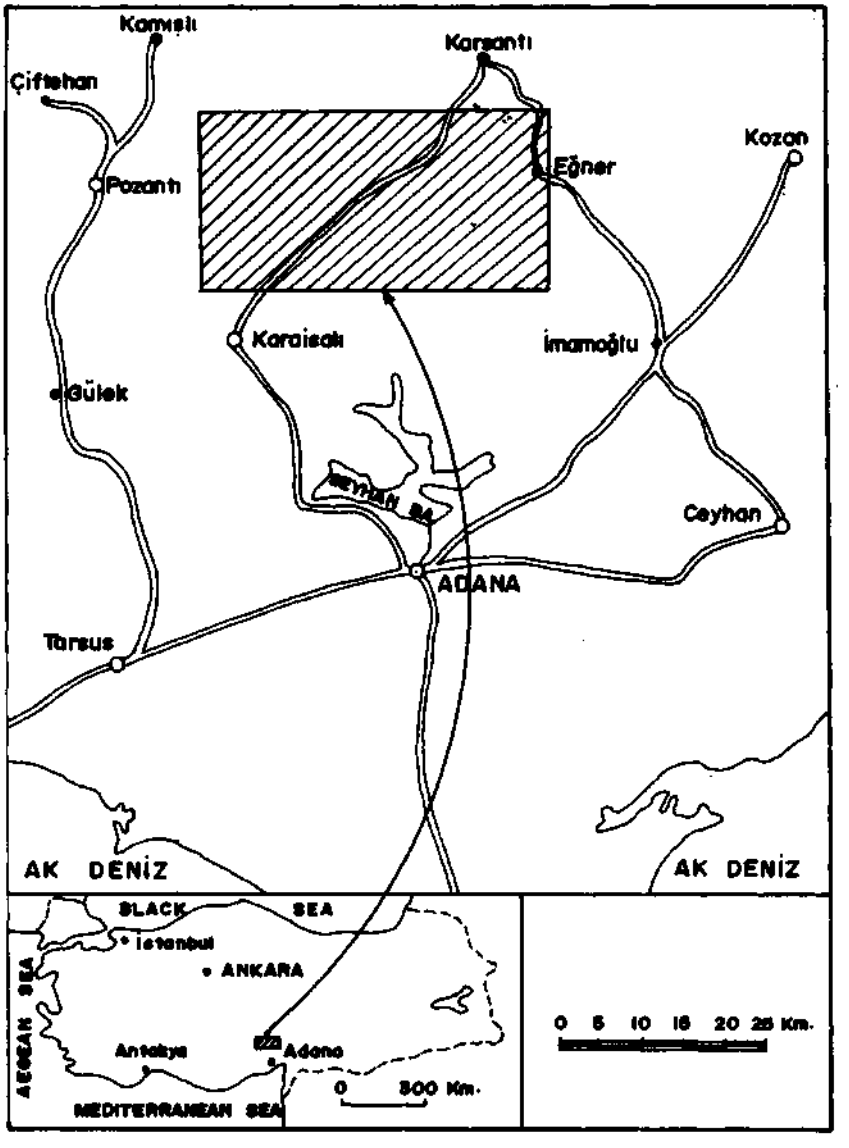


Fig.1 – Location map.

PALEOZOIC

Karahamzauşağı **formation** (PKbk)

The upper part of the unit is composed of limestone of wackestone-packstone type which is yellow-grey, brown-grey, dark-grey, thin-middle thick bedded, clayey, abundant fossiliferous (brachiopoda, foraminifera, echinoids), in some place dolomitized and neomorphized. Lamination and stilolitization are observed at some horizons. This unit is overlain by thin-middle thick bedded limestone including terrigeneous detritus, and is green-brown grey in colour. Limestone of wackestone-grainstone type comprises thin interiayers of mudstone-marl. In this part, some levels of grainstone-wackestone formed by the envoloping of fossils grain by alga are observed. Girvanella in algal shells is common around fusilinoids. The upper part is represented by blue, green, brown quartz sandstone and mudstone-marl interbedded fine-middle thick bedded limestone. At the same time, grey thin-thick bedded limestone and

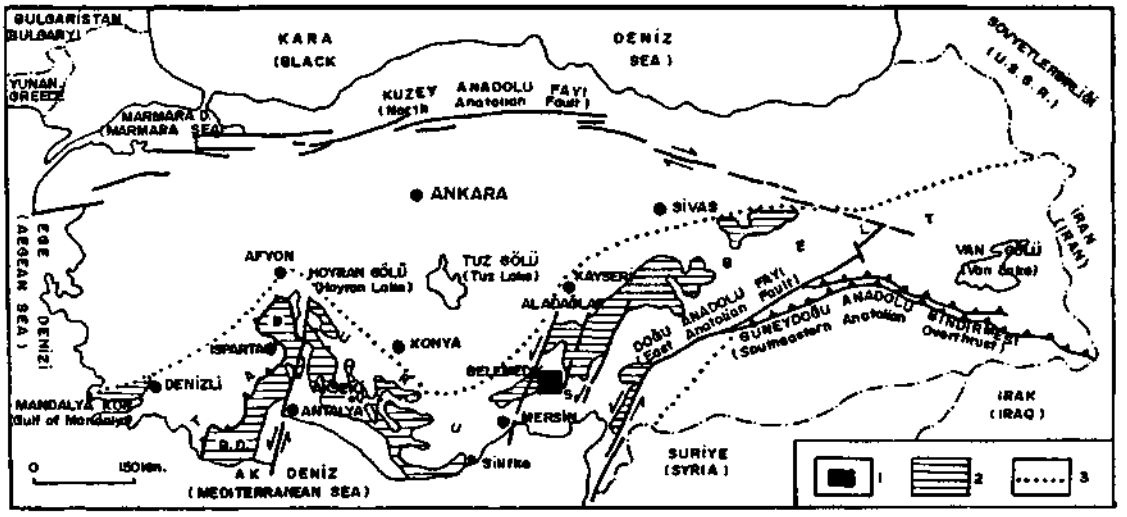


Fig.2 – Map showing the distrubition of para–autochthonous platform sediments of the Taurus belt and main structural lines (Simplified from Adamia and others, 1980).
1- Studied area, 2- Paraautochthonous platform sediments of Taurus belt, 3- Aproximate boundary of Taurus belt. B- Barladağ, BD- Beydağları.

marl levels are also observed. The limestone include echinoids, crinoids, ostracods, algae, bryozoa, gastropods, brachiopods, corals and foraminifera. Ironish marl and silty levels are present. Bioturbation and stilolitization are common. Cross-bedding in quartzite, chert and dolomitization in limestone are present.

The Karahamzauşağı formation: the dominance of colours of green, brown, grey, the beds having different thicknesses, the existence of abundant terrigeneous elastics (quartzite, sandstone, mudstone, marl), the observation of quartz and microfossils widely in carbonates indicate that a shallow environment deposition. The sequence deposited in shelf-shelf lagoon environmental conditions is suggested by the majority of limestone including terrigeneous materials, grainstone interbedded wackestone-packstone together with abundant echinoids, gastropoda, brachiopoda, fragments of foraminifera in some parts, the enveloping grains of oncoid shape by alga and iron material.

In the study area; the lateral changes of the unit with fault-boundered outcrops can not be traced. The basement can also not be observed. The Carboniferous-Permian aged unit is overlain unconformably by younger units.

MESOZOIC

Demirkazık formation (JKd)

In the investigated area the unit composed mainly of limestone, dolomitic limestone, dolomitic and pelagic foraminiferous micritic limestone, is named as the Demirkazık formation (Yetiş, 1978). In the bottom of the unit is grey, hard, angular fractured, locally containing chert, calcite-filling and limonitized, thick-very thick bedded micritic limestone. This limestone is overlied by a dark grey, yellowish grey, thick bedded, hard, locally calcite-filling, scarcely chert-banded, fossiliferous limestone. Neomorfic alteration and dolomitization prevent both the primary matrix and some grains being recognized. Neomorphic spar formations around the pellet grains are observed. The upper unit of the sequence is grey-yollowish, thick bedded, dolomitic and thin-middle crystallized. There are locally yellow-brown mudstones in the dolomite.

The unit, which is unconformably on the Karahamzauşağı formation, is concordant in many places with the Yavça formation of the Upper Cretaceous age in the extending of Köpekdağ (A—5),Çilgurliz Dağı, western part of the studied area (Fig.3). The unit re-

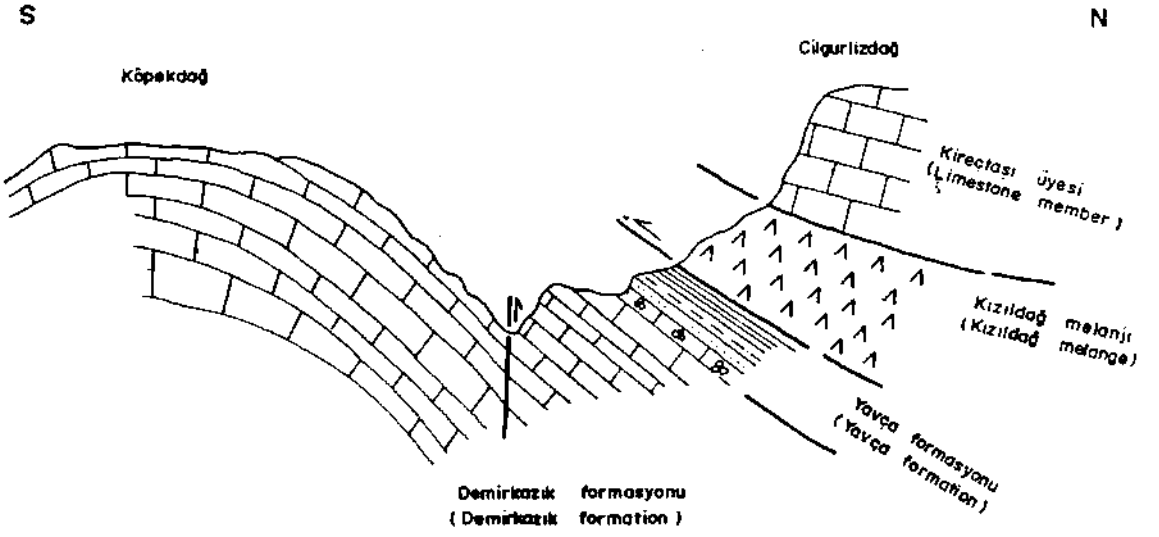


Fig.3 – The shematic cross section of the Köpekdağ–Cilgurliz Dağ area and the contact relations between the Kızıldağ melange and the Yavça formation, the Demirkazık formation.

fleets tidal lakes and tidal plainlagoons in limetted platform facies-belt. The Demirkazık formation was deposited in Jurassic-Upper Cretaceous age (Ünlügenç and Demirkol, 1988).

Yavça formation (Ky)

The unit which starts at the bottom with pink, pelagic foraminiferous micritic limestone and passes up into abundant ophiolite and limestone derived turbiditic sediments is distinguished as the Yavça formation (İlker, 1975; Monod and Erdoğan, 1981). The limestone at the bottom of the sequence comprises reddish-pink coloured, thin-medium bedded and abundant foraminiferous biomicritic limestone, and is overlain by light-dark green, yellow-brown elastics. These are made mainly of an alteration of angular limestone, radiolarite, chert, basalt, quartzite, and serpantinite-derived thick-medium bedded, unsorted, scarce gravel-mudstone and greenish-grey, black, thin bedded, locally dominated shales.

The unit overlying conformably the Demirkazık formation exhibits lateral and vertical facies changes. This is overlain by the Kızıldağ melange and limestone member with a tectonic contact. The deposition of the unit can be considered between Campanian and Upper Maastrichtian age (Unlligenc, and Demirkol, 1987).

Kızıldağ melange (Kk)

In the south of the studied area, the unit which comprises radomly scattered massive and big rock blocks of various sizes in a good relief is named as Kızıldağ melange (Ünlügenç and Demirkol,1988). Spilitic lavas are dominant and flysch, volcano-sedimentary material, volcanic sediments, radiolarite, terrigenous mass movements are common. It includes serpantinite lenses of various size and position, granodiorite and gabro blocks of various kinds, ophiolitic rocks and various sedimentary rocks. The radiolarite blocks are red-brown, often with small folds and interbedded by clay having 30 cm thickness. The serpantinites have a blocky structure. The orientation of long axes of the rock fragments displays the existence of a tectonic control. Additionally, individual rock fragments have their own internal deformational structure.

The Kızıldağ melange was thrusted over the lithostratigraphic units of pre-Upper Maastrichtian age and overlain tectonically by the Faraşa ophiolite where the Tertiary aged sequence was not exposed (Fig.4).

The limestone blocks of various sizes from a few meters to kilometers were seperately mapped (Ünlügenç and Demirkol, 1987). Block-shaped, massive, cherted-limestone, massive limestone, radiolarite, volca-

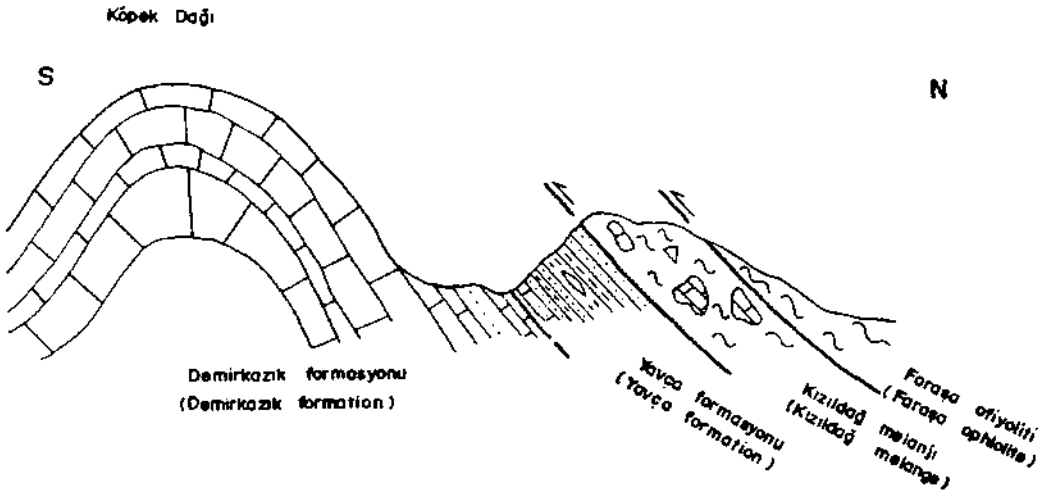


Fig.4 – The shematic cross section of the northern part of the Köpekdağ which shows the contact relations between Farasa ophiolite and the Kızıldağ melange, the Yavça formation.

nic breccia, gabro, diabase, granodiorite which form a morphological highs are present. All rock blocks have a caotic relation with each other, and their long axes extend nearly in E—W direction. The orientation of their long axes indicates the existence of a tectonic control. The blocks also reflect their own internal deformational structure. The limestone blocks are similar to the Mesozoic carbonates. The blocks of limestone exhibit locally dolomitic limestone and dolomitic character.

The Kızıldağ melange is thrusted over the Demirkazık formation of Jurassic - Upper Cretaceous age and the Yavça formation of the Upper Cretaceous (Campanian - Maastrichtian) in the boundaries of the investigated area (Çalapkulu, 1976; Yılmaz, 1984). Thus the Kızıldağ melange may have emplaced in the region during and after the Upper Maastrichtian age (Ünlügenç and Demirkol, 1987).

Faraşa ophiolite (Kf)

The unit has two seperate outcrops in the north-northwest of the region, which are serpantinized ultramafic and mafic rocks assemblage. Harzburgite, dunite, pyroxenite gabro and diabase dykes are common. It is observed that harzburgites have dunite interlayers-and isoclinal folding within well developed foliation and li neation-contacts. It is informed that there is diorite and granite in a little amount in the north of the studied area (Çakır, 1972; Juteau, 1979). The unit is thrusted over the Kızıldağ melange and is overlain with a heterolitic discordance by the Karsantı formation of lake character, composed of clastic carbonates of Tertiary sequence of the Adana basin. The Aladağ ophiolite complex, distinguished by Tekeli et al. in the Aldağ, is similar to the plutonic assemblage and dolerite, diabase dykes and volcanic rocks, defined but unnamed by Anıl et al. (1986) in the Gerdibi-Pozantı area.

Within the investigated area the Kızıldağ melange is thrusted latest over the Demirkazık and Yavça formations of the Upper Cretaceous. This is overlain with a second overthrusting by the Faraşa ophiolite (Fig.4). The Oligocene-Lower Miocene aged Tertiary deposits are unconformably on the ophiolite nappe.

Since the Faraşa ophiolite was placed tectonically on the Yavça formation of Campanian-Upper Maastrichtian age within the investigated area and the units deposited outside it after the emplacement of the ophiolite nappes are of or younger than Maastrichtian age, it should have emplaced during or after the Upper Maastrihtianage.

CENOZOIC

Gildirli formation (Tgi)

Schmidt (1961) described Miocene aged conglo-

merate, sandstone, shale which deposited in the southwest part of the investigated area. Gildirli formation crops out around Gildirli village (B-6) and consists mainly of conglomerate, pebbly sandstone, siltstone and mudstone which are characteristically pink-pale red to reddish brown. Poorly sorted and imbricated conglomerate is quite thick at the base of the formation and it contains detritics derived from limestone, ophiolite, radiolarite, metamorphic rocks, subrounded and in same places it contains intraformational mud balls. Every cycle of the Gildirli formation generally has erosional bases at the base, cross bedded conglomerate transits to pebbly sandstone to sandstone with grain size decreases. Sandy layers transits to fine sandstone-siltstone alternations and at the top of each cycle reddish mudstone is found: 25-35 cm thick mudstone layers are poorly consolidated, and displays parallel lamination.

The basement of the Senozoic succession has an irregular topography and this trough filled by basal conglomerate of Gildirli formation. The formation normally disconformably overlies Paleozoic and Mesozoic aged rock units. It transits to Kaplankaya formation at the topographic depressions; by contrast at the topographic highs it is overlain by Karaisalı formation. At the base of the formation Jurassic-Upper Cretaceous aged Demirkazık formation are found and Gildirli formation conformably is overlain by Burdigalian-Langhian aged Kaplankaya formation. On the other hand, Lutetian aged rock units are outcrupped around the investigated area (Schmidt, 1961; Abdüsselamoğlu, 1962; İlker,1975; Yetiş.,1978; Yetiş, and Demirkol,1984). During the Lutetian-Paleogene transgression has reached to a maximum in Turkey and its surrounding area. In spite of unfossiliferous character, Gildirli formation has to be deposited in Oligocene-Lower Miocene time period.

Karsantı formation (Tk)

Karsantı formation which outcrops in the northern part of the investigated area, mainly consists of marl and mudstone with some pebbly sandstone and sandstone intercalations at the base. Bedding thickness and grain size of pebbly layers decrease towards the top. Mudstone and marl are dominant at the upper level of the succession and have some sandstone intercalations, coal beds and plant debris. Karsantı formation is generally green-grey, medium to thick bedded, poorly sorted, and it sometimes shows spheroidal alteration surfaces. Slump and sliding structure, current ripples are. common. Karsantı formation reaches to amaximum thickness in the northern part of the investigated area, but its thickness diminishes by the reason of being nearer to the edge of the basin (Schmidt, 1961; Abaci, 1986;Yurtmen, 1986).

Karsantı formation unconformably overlies the Kızıldağ melange and Faraşa ophiolite at the base and it form a transition between Miocene deposits of Kaplankaya and Karaisalı formations. Through basinal relationship and vertical-horizontal transition with the terrestrial Gildirli formation, Karsantı formation started to deposite during Oligocene. The upper age limit of formation is still unclear. But some fossil descriptions (Cyprinotus, Eucyris, Loxoconcha, Costa, Heterocypris, Thyrrenocythere, Viviparus, Planorbis) from the upper level of marl-mudstone layer indicate the period of Middle-Upper Miocene (Abacı, 1986;Yurtmen, 1986).

Kaplankaya formation (Tkp)

Kaplankaya formation was differentiated by Yetiş, and Demirkol (1986). It mainly consists of pebbly sandstone, sandstone, pebbly-sandy limestone and siltstone. Sandstone and siltstone alternations are found at the upper level which contains lamellibranchia and gastropoda. Carbonate ratio increase to the top of the formation. Kaplankaya formation unconformably overlies Paleozoic and Mesozoic rock units at the paleotopographic highs. There is a conformably contact relation between Gildirli and Kaplankaya formation. It has lateral and vertical transitions with Karaisalı, Cingöz and Güvenç formations at the top (Fig.5). The outcrops of Kaplankaya formation are scattered and parallel to each other in the southern of Paleozoic and Mesozoic aged rocks in the investigated area. Its thickness mainly related to the paleotopographic situations. Pebbly-sandy limestone of the upper level of this unit is fossiliferous and it contains echinid, corall, coralline algae, small bentic algae etc. Fossil description indicates

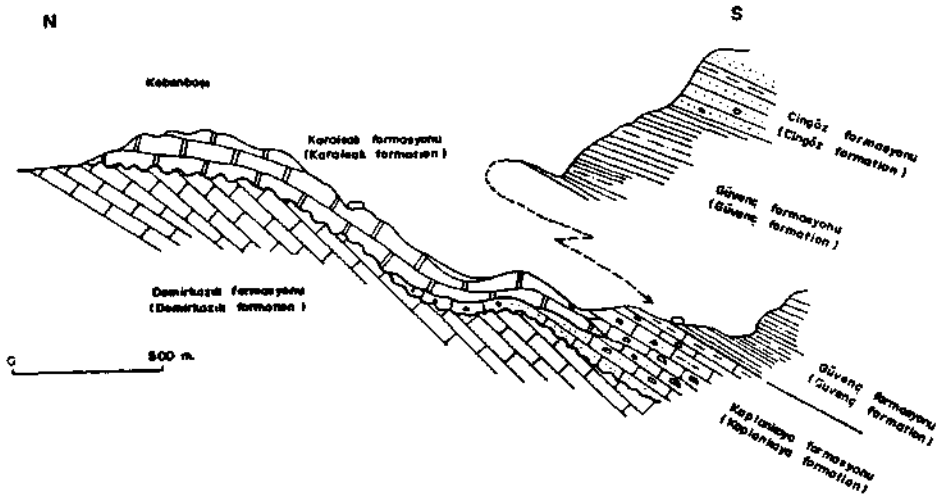


Fig.5 – The shematic cross section of the southwestern part of the Mustafaağalar illustrating the facies relations between Kaplankaya formation. Karaisalı and Güvenç formations.

Lower-Middle Miocene age for Kaplankaya formation (Yetiş, and Demirkol, 1986). With the transitional contact relation of Burdigalian-Langhian aged Karaisalı formation, Kaplankaya might have been deposited during Burdigalian-Langhian (?) time space.

Karaisalı formation (Tka)

Karaisalı formation is mainly composed of reefal carbonates and dolomitic limestone at the investigated area. It generally white to pale grey, medium to thick bedded and it contains coralline algae, echinoderms, bryozoa, corals, mollusca and foraminifera. Karaisalı formation accumulated on the pre-Miocene topographical highs and in the adjacent areas it formed reef and associated deposits. The unit has a lateral and vertical facies relationship with Kaplankaya and Gildirli formations at the base, and Güvenç, Cingöz formations at the top (Fig. 5,6). According to the related fossil descriptions, Karaisalı formation might have been deposited during Burdigalian-Langhian time space (Yetiş and Demirkol, 1986).

Cingöz formation (Tc)

Cingöz formation crops out at the eastern-southeastern side of the investigated area. This unit begins with conglomerate, pebbly sandstone and sandstone on the fine grained sediments of Güvenç formation at the base. This basal section of the Cingöz formation comprises subrounded grains of granule to block sized limestone, ophiolite, chert,.etc.,and forms transition between sandstone and sparse pebbly sandstone to the south. The subrounded clasts are composed mainly of quartz, feldspars, limestone, ophiolite, etc. The sandstone is generally light grey to green, subrounded, coarse-very fine grained, and well sorted. Sandstone layers have occasionally bases with some poorly developed bottom structures such as flutecast, scour and fill, tool marks. At the top, Cingöz formation is covered conformably with shale of the Güvenç formation. The contact zone is identified with sand/shale ratio. Cingöz formation has a turbiditic character. Normally, Cingöz formation has a vertical and lateral transition with transgressive marine succession of the Kaplankaya and Karaisalı formation (Fig. 5,6). There are no fossils were determined for this unit. Burdigalian-Langhian age are applied to the Kaplankaya, Karaisalı and Güvenç formations which are found at the base of the Cingöz formation (Yetiş and Demirkol,1986). On the other hand, Cingöz formation transits to Burdigalian-Serravalian aged Güvenç formation at the top. According to this information, Cingöz formation was deposited in Burdigalian-Langhian period (Yetiş and Demirkol, 1986).

Güvenç formation (Tgü)

Güvenç formation emerges in the southern part of the investigated area. The unit mainly consists of

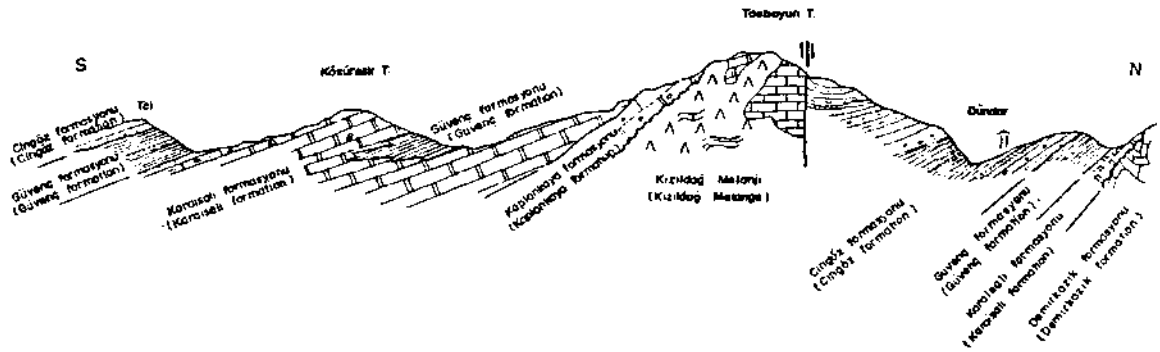


Fig.6 – The shematic cross section of the Dündar region illustrating lateral and vertical facies relations of the marine Miocene units deposited on the Kızıldağ melange.

dark grey, greenish grey, grey colour of sandstone interbedded siltstone and clayey limestone with abundant pelagic microfauna. Güvenç formation starts with fossiliferous sandstone-siltstone and shale alternations. Shale layers contain pelagic and sandy layer with bentic forams. Quartz, feldspar and lithoclast are common in the siltstone and sandstone. The Cingöz and Güvenç formations has lateral and vertical transition with the Karaisalı and Kaplankaya formation at the base (Fig. 5,6). According to the fossil determinations of the Güvenç formation age was Burdigalian-Serravalian time space (Yetiş, and Demirkol, 1986).

QUATERNARY

Terrace (Qt)

The terrace formation was developed along the bed of Körkün, Eğlence Suyu, Seyhan river and has different width. Terrace mainly consists of rough conglomerate with rare pebbly sandstone interbeds. Subrounded grains are made up by ophiolite, radiolarite, quartzite, limestone of different source rocks, cherts, etc.

Alluvium (Qal)

Developed along streams,consisted of poor sorted consolidated gravel,sand and clayey material. The grains depending on the basement are derived from ophiolite, limestone, radiolarite, chert and quartzite.

DEVELOPMENT OF CARBONATE PLATFORM

In the study area and its surroundings while Carboniferous-Upper Permian aged sequence reflecting intracratonic basin conditions shows steadiness in terms of facies features and sedimentary environment, in the Jurassic-Upper Cretaceous aged sequence of continental margin having reefal and back-reef character no obvious differentation in these terms were observed.

In the investigated area, the sediments of Upper Paleozoic age are generally composed of terrigeneous elastics interbedded liniestone. Terrigeneous elastics are, in order of their distribution; quartzite, quartz-sandstone, mudstone-marl and shale. During this period, in the Belemedik sequence, the western part of the investigated area, there is a stratigraphic discontinuity (Tekeli et al., 1981; 1984). In the study area, the Karahamzauşağı formation of Carboniferous-Permian age bears a resemblance to cyclic shelf carbonates. The reason for cyclic deposition should have been eustatic changes of sea level repeated with a constant and regular deposition, which can be attributed to tectonic and glacial reasons (Wilson, 1975). It can be said that the unit was developed in shelves and platforms present in open circulation intracratonic basins. At the end of Permian age, block faulting started (Fig. 7a).

The Paleozoic (Upper Devonian-Permian) aged Belemedik sequence, similar to the Karahamzauşağı formation in terms of lithological features and cronostratigraphy, was deposited in shallow intracratonic basins and reflects eustatic changes of sea-level repeated with a regular deposition (Tekeli et al., 1984).

In the interval of Jurassic-Upper Cretaceous age, the Demirkazık formation, made of limestone and dolomitic limestone, overlies the units of the Upper Pale-

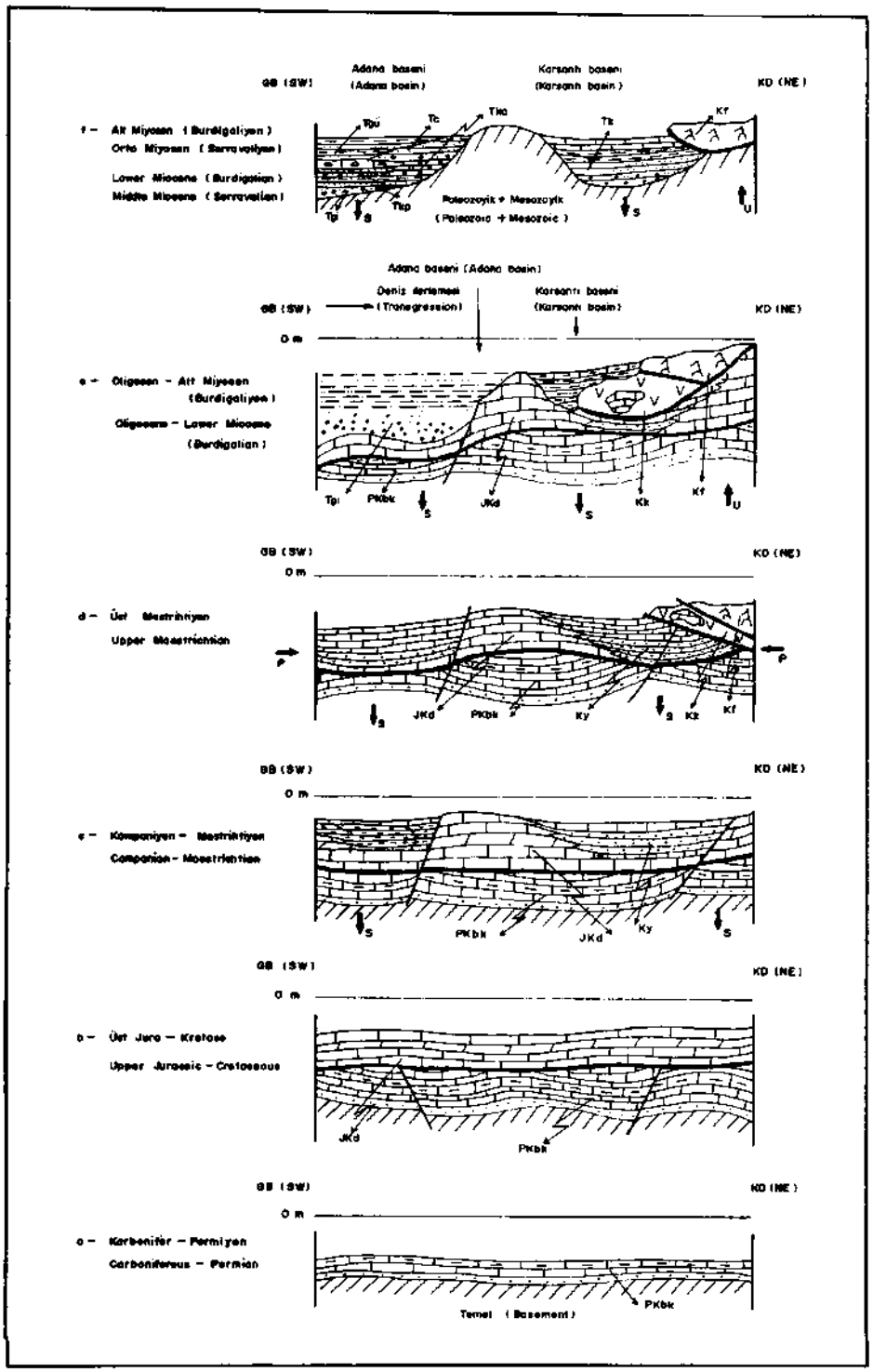


Fig.7 - Serial sections illustrating the evolution of the northern Adana Basin. PKbk- Karahamzauşağı formation; JKd- Demirkazık formation; Ky- Yavça formation; Kk- Kızıldağ melange; Kf- Faraşa ophiolite; Tgi- Gildirli formation; Tkp- Kaplankaya formation; Tk- Karaisalı formation; Tka- Karaisalı formation; Tc- Cingöz formation; Tgü- Güvenç formation; S- Subsidence; P- Compressional stress; U- Uplifting.

ozoic age with an unconformity. It often includes such fossils as Miliolidae, etc. The unit which reflects platform/bank environments and organic deposition in marginal areas of the platform and reaches a great thickness should have developed in lagoons on the platform of limited circulation and on a tidal flat and it should have developed in subtidal and intertidal conditions. This suggests that, during Mesozoic, basinal conditions belonging to shelf were developed on the continental margin (Fig. 7b). The Demirkazık formation starts with foraminiferous micritic limestone, and overlain by the Yavça formation formed from abundant ophiolite and sandstone derived turbiditic sediments in Campanian-Lower Maastrichtian age (Fig. 7c).

The stable position of the region lasted till Upper Cretaceous (Campanian - Maastrichtian) age. The evidence of this stable position is that carbonates pass up into pelagic limestone upward getting deeper.

According to Tekeli et al. (1981), who have interpreted the evolution of the Aladağ in various ages in the northern part of the studied area, the sequence of Triassic-Cretaceous age was deposited in environment of continental margin. It is considered that some relations reflecting stable continental conditions in between Tethys Ocean and Arab-African continent, in the eastern part of Mediterranean.

The stable position of the region was broken by Laramide orogenic phase during and after Maastrichtian age. The Kızıldağ melange was superimposed for the first time by compressional tectonic and the Faraşa ophiolite unit was thrusted over to continental crust (Fig. 7d).

The units in the region were folded and emerged from the sea due to Laramide orogenic phase, then the weathering process has started. A transgression took place in Eocene age. Clastics were deposited on the bottom but some units of limestone in the upper parts, which none of them can be observed in the investigated area (İlker, 1975; Yetiş, 1978). Outside the study area, the Lutetian aged rock, in the northern parts suggest that the Lutetian sea lasted till Late Lutetian (İlker, 1975; Yetiş, 1978; Gedik et al., 1979). In the Late Lutetian the regression resulted from Pironian orogenic phase coused continental environment conditions to redominate in the region.

The Gildirli formation, which overlies unconformably the Mesozoic aged units in the south of the studied area, was deposited at the interval of Oligocene-Miocene (Burdigalian) age as various facies relative to an irregular topography (Yetiş and Demirkol, 1984). In many parts this units is overlain by the Kaplankaya formation, which reflects a character of Shallow sea beach and reefal Karaisalı formation but in the north (the Karsantı basin) by Karsantı formation (Fig.7e).

The Gildirli formation comprises elastics having terrestrial character and cyclic alternation. It is mainly made up conglomerate, sandstone, siltstone and mudstone. The unit starts, on an erosional surface, with an abrupt bottom and channel-filling mudstone and passes up into the alternation of sandstone-siltstone-mudstone by fining upwards of grains. On the Gildirli formation, the Kızıldağ melange and Faraşa ophiolite which are in the bottom of the Karsantı basin is the Karsantı formation composed of sandstone, siltstone, claystone and shale, and the Karsantı formation also comprises coal seams in the lower-middle horizons.

In the Early Miocene (Burdigalian age) during a transgression from south-southwest should be land, on the one hand the elastics of beach-shallow sea character (the Kaplankaya formation) was developed in areas where terrigeneous sediments are dominant, on the other hand the Karaisalı formation of reefal character developed on topographic highs. The Kaplankaya formation overlies terrestrial Gildirli formation and passes up into the Karaisalı formation of which the upper contact is reefal and it is overlain by the Cingöz and Güvenç formations in some areas where environmental conditions are not favourable for the deposition of the Karaisalı formation. The Karaisalı formation to the southward transits into the Güvenç formation of fore-reefal facies which is composed of grey, locally thin sandstone interbedded, deep marine marl and shale (Fig 7f).

Since the transgression of the sea level in the Miocene advenced to the northward until Tortonian, shoreline advanced towards Karaisalı formation and its fore-reefal facies progressed to the northward, e.g. allunits from the Burdigalian to the end of Langhian (?) and early Seravillian occasionally pass over each other to the northward.

During the deposition of the Güvenç formation, elastics were transported via some paleotopographic lows, which coused sedimentation of the Cingöz formation of proximal-distal type. The Cingöz formation is southwestwardly transitional with the Güvenç formation, and shales of the Güvenç formation overlies the Cingöz formation.

CONCLUSIONS

1. In the Upper Paleozoic cyclic sediments derived from an epiric sea basin were deposited in the intracratonic basin. These are generally interbedded with terrigeneous elastics and composed of shallow marine carbonates of a steady platform.

2. In the study area, the Kızıldağ melange was thrusted onto the continental platform for the first time by the Laramide orogenic phase with a continuity of compressional tectonic and then the Faraşa ophiolite slice was emplaced on the continental crust.

3. The Taurid carbonate platform deposits, except some properties, bear important resemblance to those of Africa-Arab platform, specially during Mesozoic and Cenozoic age, which suggests that a marginal sea was deposited between the Anatolian plate and Africa-Arab plate during the Mesozoic age.

ACKNOWLEDGEMENTS

This study is a section of so-called "The detailed geological investigation of the western part of the Adana Basin" which is carried out by Geological Department of MTA General Directorate, the East Mediterranean District Directorate and Geological Department of the Engineering-Architecture Faculty of the Çukurova University. The author is grateful to the mentioned foundations for their supports and also to the Geological Engineers and Ass. Hasan Lagap and Ulvican Ünlügenç as well as Özcan Özaykan for their helps during studies.

Manuscript received January 4, 1988

REFERENCES

Abaci, Ş., 1986, Çukurova baseni Karsantı yöresi genç Tersiyer istifinin kil mineralojisi: Ç.Ü. Fen Bilimleri Enst., 94, 59, Adana.

Abdüsselamoğlu, M.Ş., 1962, Kayseri—Adana arasındaki Doğu Toroslar Bölgesinin jeolojisi hakkında rapor: MTA Rep., 3262, 33 (unpublished), Ankara.

Anıl, M.; Özüş, S.and Billor.Z., 1986, Gerdibi-Gertepe-Çataltepe—Çeştepe (Pozantı—Karsantı—Adana) kromit yataklarınınjeolojik,metalojenikveekonomiki n c e l e n m e s i : T Ü B İ T tirma Grubu, Project nu: TBAG-667, 131.

Arpat, E. and Şaroğlu, F., 1975, Türkiye'deki bazı önemli genç tektonik olaylar: TJK, Bull.,18,91-101.

Blumenthal, M.M., 1952, Toroslar'da yüksek Aladağ silsilesinin coğrafyası, stratigrafisi ve tektoniği hakkında yeni etütler: MTA Publ., ser: D, 6, 136, Ankara.

Brunn, J.H.; Dumont, J.H.; Graciansky, P.C.H.; Gutnic, M.; Juteau, T.; Marcoux, J.; Monod, O. and Poisson, A., 1971, Outline of the geology of the Western Taurids; Campbell, A.S., Ed., Geology and history of Turkey: Pet. Expl. Soc. Libya Tripoli, 225-255.

Çakır, Ü., 1978, Petrologie du massif de Pozantı—Karsantı (Taurus Cilicien, Turquie): Etude de la partie centrals, These 3 eme cyl, 251,Strasbourg.,

Gedik, A.Birgili, Ş.; Yılmaz, H. and Yoldaş, R., 1979: Mut-Ermenek—Silifke yöresinin jeolojisi ve petrol olanakları: TJK Bull., 22, 1,7-27.

İlker, S., 1975, Adana baseni kuzeybatısının jeolojisi ve petrol olanakları: TPAO Arama Arşiv Rep. nu: 973, 63 (unpublished), Ankara.

Juteau, T., 1979, Ophiolites des Taurides:Essai sur leur historie oceanique, Revue de Geologie Dynamique de Geographic Physique, 21, 3, 191-214, Paris.

Monod, O. and Erdoğan, T., 1981, Namrun Yöresinin yapısı üzerine on rapor: TPAO Arama Arşiv Rep. nu. 1662, (unpublished).

Özgül, N., 1976, Toroslar'ın bazı temel jeoloji özellikleri: TJK Bull., 19,65-78.

Ricou, L.E., 1980, Toroslar'ın Helenidler ve Zagridler arasındaki yapısal rolü:TJK Bull., 23,2, 101-118.

Tekeli, O.; Aksay, A.; Ertan, I.E.; Işık, A. and Ürgün, B.M., 1981, Toros Ofiyolit Projeleri, Aladağ Projesi: MTA Rep., 6976, 133 , (unpublished), Ankara.

— ;——; Ürgün, B.M. and Işık, A., 1984, Geology of the Aladağ Mountains : Geology of the Taurus Belt, Tekeli, O. and Göncüoğlu, C.M., Ed., 143-158, Ankara.

Ünlügenç U.C. and Demirkol, C., 1987, Kızıldağ Yayla (Adana) dolayının Stratigrafisi: TMMOB Jeoloji Mühendisleri Odası Publ. (inpress).

Wilson, J.L., 1975, Carbonate Facies in Geologic History: Springer—Verlag, Berlin—Heidelberg, 471.

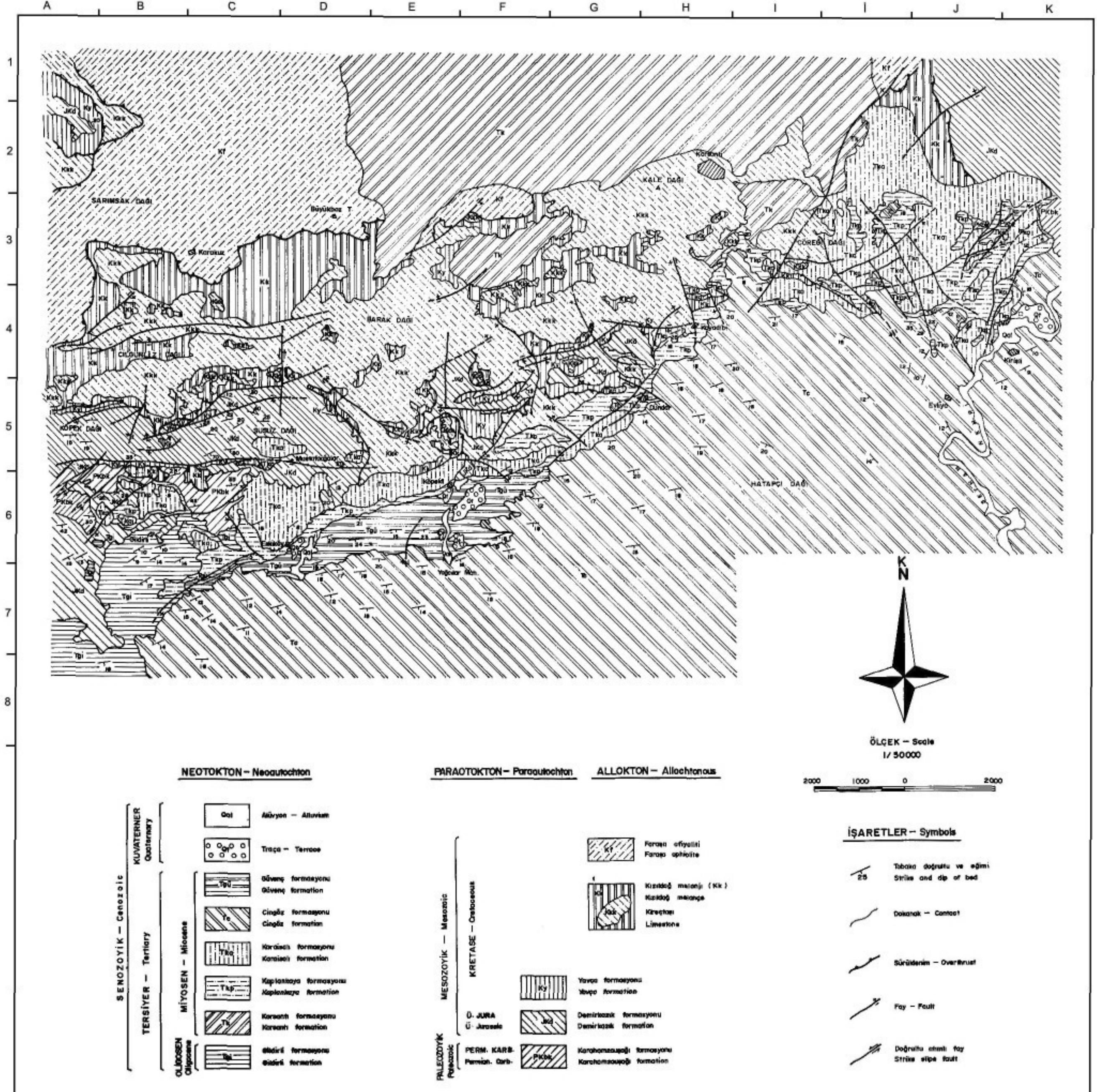
Yetiş, C., 1978, Çamardı (Niğde ili) yakın ve uzak dolayının jeoloji incelemesi ve Ecemiş Yarılım Kuşağı'nın Maden Boğazı—Kamışlı arasındaki özellikleri: İst. Üniv. Thesis, 164 (unpublished).

———and Demirkol, C., 1984, Adana baseni kuzey—kuzeybatı kesiminin temel stratigrafisine ilişkin bazı gözlemler : TJK, 38.Bilimsel ve Teknik Kurultayı Bildiri Özetleri, 59-61.

———and —, 1986, Adana baseni batı kesiminin detay jeoloji etüdü : MTA Rep., 8037, 187, Ankara.

Yılmaz, Y., 1984, Amanos Dağları'nın Jeolojisi: TPAO Arama Arşiv Rep.nu: 1920, 531 (unpublished).

Yurtmen, S., 1986, Çukurova baseni Karsantı yöresi kırıntılı kayaçlarının petrografik ve petrolojik özellikleri: CO Fen Bilimleri Enst., 95, 80 , Adana.



Appendix 1 : Geological map of the Eastern Toros carbonate platform on the northern Adana basin