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THE GEOLOGY OF THE BLACK SEA REGION
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ULUSLARARASI SEMPOZYUMU
KARADENİZ BÖLGESİ JEOLojİSİ

**À Geotraverse
across Tethyan Suture Zones
in NW Anatolia**

Excursion Leader
Kamil ŞENTÜRK

Excursion Co-Leaders

Ahmet ÖZCAN
Necati TURHAN
Cengiz KARAKÖSE
Şükrü GENÇ
M.Cemal GÖNCÜOĞLU
Emin ELİBOL



STRATIGRAPHY OF THE KÜTAHYA REGION

M.Cemal Göncüoğlu*, Ahmet Özcan**, Necati Turhan** and Ahmet Işık**

* ODTÜ Jeoloji Mühendisliği Bölümü, 06531 Ankara - TURKEY

** MTA Jeoloji Etütleri Dairesi, 06520 Ankara - TURKEY

INTRODUCTION

Kütahya Region is located in NW-Anatolia, on the northern edge of Anatolites. It represents one of the type-localities of Kütahya-Bolkardağı Belt (former Afyon Zone of Okay, 1985). This belt, however, characterizes the northern passive margin of the northwards facing Tauride-Anatolide Platform, which had been emplaced by ophiolitic melanges and ophiolites of İzmir-Ankara Ocean. Kütahya area is therefore a key region to study the events related to the opening and closure of the northern branch of Neotethys.

MTA geologists mapped the area in 1982 and 1983 in detail (Fig. 1) and reported their preliminary data (Özcan et al, 1984, 1988, 1989, Göncüoğlu, 1990, Göncüoğlu et al, 1990-1992). The present work is an introduction to the stratigraphy of the area, with special emphasize on Mesozoic units.

STRATIGRAPHY

In Kütahya region Kütahya-Bolkardağı Belt constitutes (Fig. 2):

- A- Low-grade metamorphic basement rocks (İhsaniye Metamorphic Complex) of Carboniferous-Permian age.
- B- Mesozoic platform sequences.
- C- Ophiolitic Olistostrome (Çöğürler Olistostrome) and Ophiolites of Upper Cretaceous age.
- D- Tertiary Cover Units.

A. İhsaniye Metamorphic Complex

The lowermost lithologies observed in the region are garnet bearing micaschists, actinolite-epidote schists, chlorite-schists with rare bands and lenses of chloritoide-albite schists, marbles and metatuffs. Microgranitic dikes intrude this lower part. The upper part of the sequence starts with a metaclastic unit, containing micro pebbles of greenschists. This unit indicates to a para-conformity between lower and upper sequences of the complex. The upper sequence is characterised by quartzite-marble alternation, grading into dark grey dolomitic recrystallized limestones. The carbonates of the lower sequence contain in Afyon area: *Protriticites* sp., *Schubertella* sp., *Endothyra* sp., *Tuberitina* sp., *Divinella* sp., *Ungderella* sp. of Upper Carboniferous, whereas the dolomitic carbonates of the upper sequence yield ghosts of upper Permian alga (Özcan et al, 1989). The lower sequence of the unit is interpreted as a Hercynian back-arc basin complex (Özcan et al, 1989, Göncüoğlu et al, 1992).

B. Mesozoic Platform Sequence

An almost complete sequence of Triassic-Cretaceous age is the characteristic feature of this unit.

Kıyır Formation

Red beds of varying thickness unconformably overlying the metamorphic basement is named as Kıyır Formation. The basal beds consist of red-grey, carbonate cemented or clast supported conglomerates with well rounded pebbles of metamorphic rocks. Above come a several meters thick, variageted, graded-bedded cycles

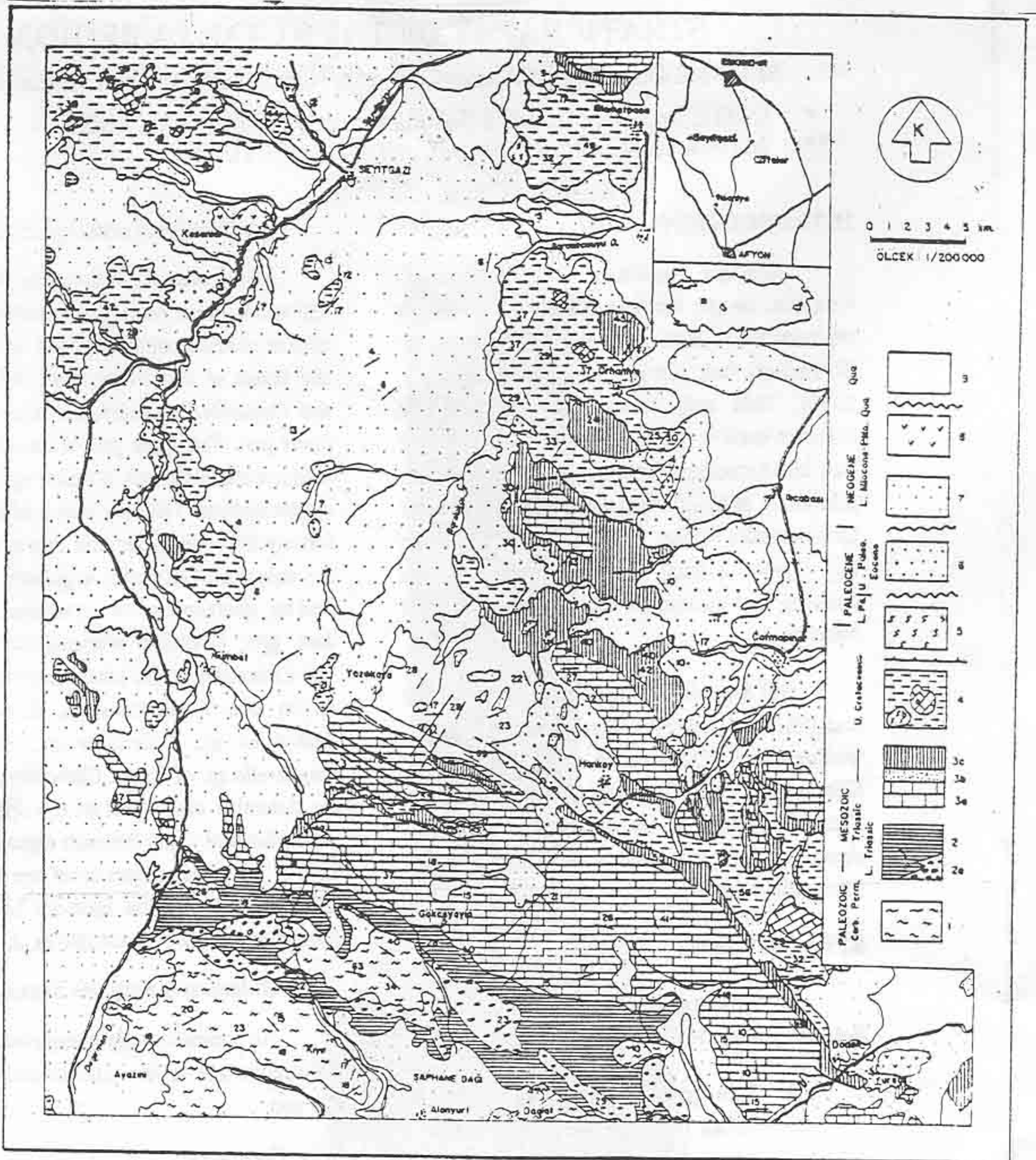


Fig. 1- Geological Map of Eastern Kütahya region. Explanations: 1-Ihsaniye Metamorphic Complex, 2-Kayır Formation: a) Dolomitic Lmst member, b) Shaly-sandy clastics, c) Cherty limestones-cherts 4-Çöğürler Olistostrome, 5-Kınık Ophiolites, 6-Hanköy Formation, 7-Fluvial-lacustrine sediments, 8-Volcanics-volcanoclastics, 9-Alluvium simplified after Özcan et al, 1989.

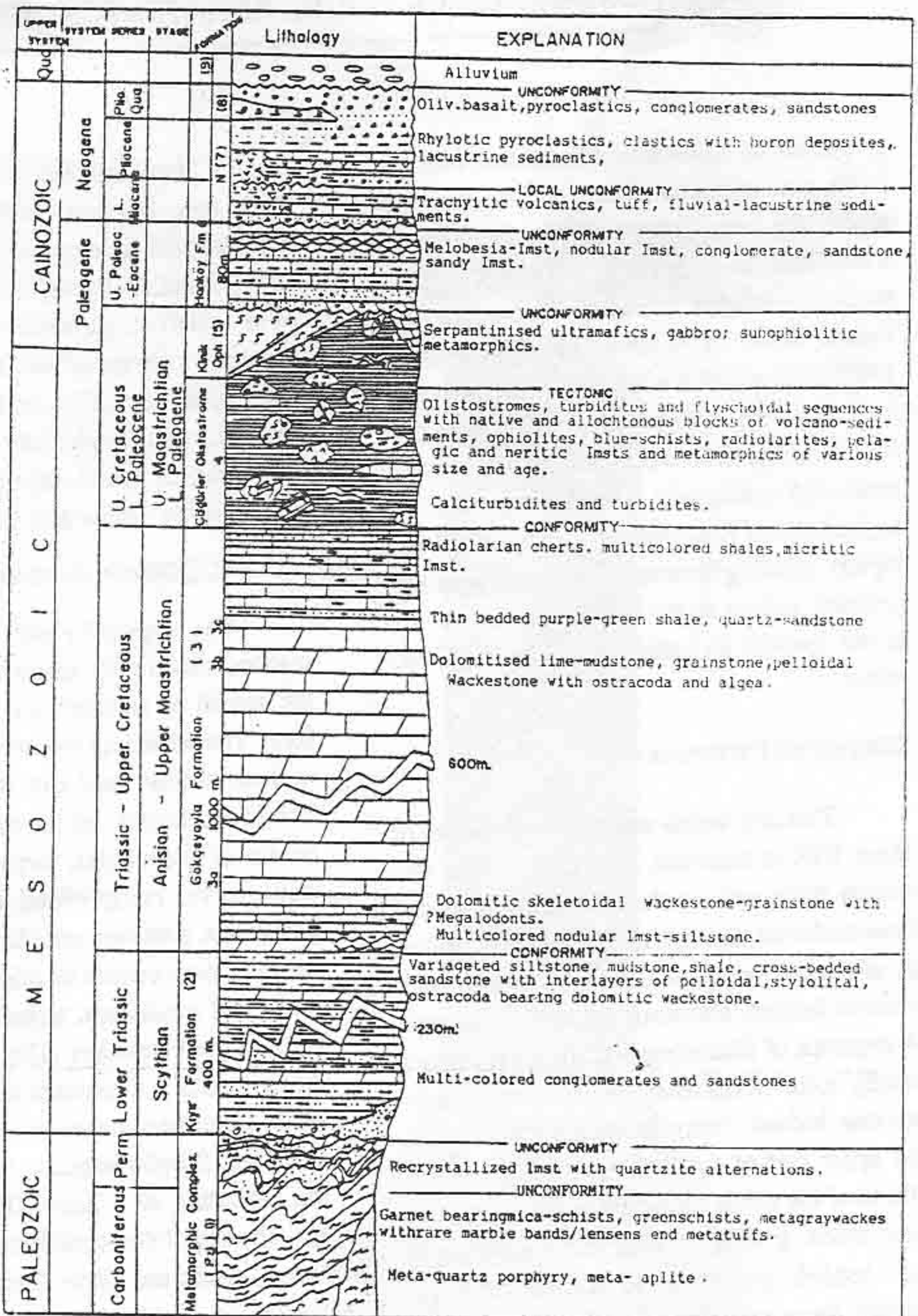


Fig. 2- Generalised columnar section of Kütahya region.



composed of sandstones, interbedded with siltstone and mudstone. Worm tracks and mudcracks are very common. The uppermost part, transitional to Gökçeyayla Formation contains mudstone-nodular limestone alternations with marine fauna of Scythian age (Özcan et al, 1989). The unit as a whole is interpreted as a sequence starting with proximal aluvial fans grading into meandering stream and coastal plain deposits and ending with intertidal sediments. It is suggested that Kıyır Formation is deposited on a rapidly uplifting basement. This uplifting is very probably related to the rifting, which gave way to the opening of İzmir-Ankara branch of Neotethys.

Gökçeyayla Formation

This unit mainly consists of carbonates of about 1000 m thickness. Lowest part of the formation starts with an alternation of thin-bedded lime-mudstone and limestone. The main lithology of the sequence consists of grey-beige colored, medium bedded, commonly dolomitic limestone. A sequence of discontinuous shaly-sandy clastics locally occur on dolomites. White colored, medium-thin bedded cherty limestones characterises the upper part of the sequence. The uppermost 100 m of the unit is characterised by 1-2 m thick limy cherts, grading upwards into a sequence of thin bedded, green-pink-red colored chert and micritic limestone with shaley interlayers. Calciturbidic beds at the top of the sequence represent the transitional zone to the Çöğürler Olistostrome. Fossil data indicates that the deposition lasted without any major break from Late Scythian to Early Maastrichtian (Özcan et al, 1990, for the fossil-list see appendix). Depositional features, fauna and textural data indicates that the deposition has started in restricted shelf. Lagoonal, intertidal, supratidal, tidal-bar, and tidal-

channel deposits are common features. The upper part, however, is characterised by open shelf deposits, grading into basin and lower slope environment. Gökçeyayla Formation is interpreted as a platform sequence on the northwards facing passive margin of the Tauride-Anatolide platform. It is interesting to note that there is no indication in these platform deposits for a Jurassic rifting of İzmir-Ankara Ocean which was postulated by Şengör and Yılmaz (1981).

C. Çöğürler Olistostrome and Ophiolites

The uppermost part of Gökçeyayla Formation, comprising calciturbidites indicates to the arrival of allochthonous units onto the platform. The product of this event is an almost 3000 m thick olistostromal unit with huge olistoliths. The exotic blocks, emplaced by gravity sliding, consists of radiolarites, serpentinite, gabbro, basaltic rocks, recrystallised neritic and pelagic limestones, andesites and blueschists. The matrix between them consist of olistostromal conglomerates and sandstones, turbidites and native pelagic shales/limestones. The lowermost part of the unit contain: *Orbitoides media* (d Arc), *Orbitoides opiculata*, *Lepidoorbitoides* sp., *Siderolites* sp., *Semplorbitoides* sp., *Omphalacyclus* sp., indicating to a Early Upper Maastrichtian age. The age of the fossiliferous blocks range between Triassic and Upper Cretaceous. The age of the unconformable cover unit (Hanköy Formation) is Upper Paleocene. Thus we suggest an Early Upper Maastrichtian to Lower Paleocene age for this unit.

Çöğürler Olistostrome is overthrust by Upper Jurassic-Lower Cretaceous ophiolites (Kıyır Ophiolite) representing the oceanic crust of İzmir-Ankara Ocean. A thin sliver of sub-ophiolitic metamorphics (Göncüoğlu, 1990) is observed at the base of the ophiolitic nappe. Kı-



nik Ophiolite consists of a thick sequence of serpentinitised peridotites and gabbros. Lithologies of sheeted dike complex and volcanics are only found within the Çöğürler Olistostrome.

D. Tertiary Cover

Hanköy Formation of Upper Paleocene-Lower Eocene age unconformably covers all the pre-existing units. The basal beds are represented by *Melobesia* bearing limestones, which rapidly grade into continental red beds. Above come a sequence of beige to green colored siltstones, fossiliferous marly limestones and neritic limestones.

Neogene deposits in Kütahya region are characterised by fluvial-lacustrine sediments interstratified with Miocene volcanics and volcanoclastics. Because of its spectacular boron and lignite occurrences the Neogene of Kütahya region is very well studied (eg. Sunder, 1980; Gök et al, 1980, Baş, 1986)

CONCLUSIONS

The geology of Kütahya region comprises of a metamorphic basement of Carboniferous-Permian age indicating to a poorly known Hercynian orogenic event; a back arc basin development during Carboniferous and a Permian stable platformal deposition. Lower Triassic continental red-beds indicating to a rapid uplifting is interpreted as a rift related phenomena, which resulted to the opening of the northern branch of Neotethys between the Tauride-Anatolide Platform and the Pontides. Anisian-Lower Cretaceous shelf deposits (Gökçeyayla Formation) is assigned to the stabilization of the northwards facing passive margin. Upper Cretaceous slope sediments (upper sequences of Gökçeyayla Formation) indicates to a deepening of the platform in front of the southwards advancing

nappes. These ophiolitic nappes must have arrived the area during Maastrichtian, which is represented by Çöğürler Olistostrome. The emplacement of the nappes further to the south is accompanied by south-vergent reverse faults and basement thrusts in the region. Hanköy Formation of Upper Paleocene-Lower Eocene age, unconformably overlying the units represents the termination of the nappe-emplacment. Neogene units in the area are related to Neotectonic extensional regime in Western Anatolia.

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