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NEW DATA ON THE UPPER AGE OF THE INTRA-PONTIDE OCEAN FROM NORTH OF ŞARKÖY (THRACE)

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ABSTRACT. - Upper Eocene elastics in the southern part of the Thrace Basin north of Şarköy contain large number of olistoliths. The olistoliths are largely derived from the ophiolitic melange that forms the basement of the Eocene sedimentary sequence in this region. They comprise serpantinite, metadiabase, radiolarian chert and pelagic limestone. Some of the pelagic limestone blocks contain abundant Late Cretaceous and Middle Paleocene foraminifera. The presence of the Middle Paleocene pelagic limestone blocks derived from the ophiolitic melange indicate that the Intra-Pontide ocean was in existence at least until the Middle Paleocene.

INTRODUCTION

An alpide ophiolitic melange constitutes the basement of the southern part of Thrace Basin that is made up of Eocene and younger sediments. The ophiolitic melange outcrops north of Şarköy in the cores of small post-Miocene anticlines and is encountered in the petroleum wells below the Middle Eocene limestones (Kopp and others, 1969; Şentütk and Okay, 1984; Siyako and others, 1989). Şengör and Yılmaz (1981) interpreted this ophiolitic melange as the suture of the Intra-Pontide ocean that separated the Rhodope-Pontide fragment from the Sakarya zone. The Rhodope-Pontide fragment is a composite unit made up of three tectonic units that show distinct lithological, stratigraphic and metamorphic features: the Rhodope-Strandja massif in the west, the Istanbul zone in the centre and the Sakarya zone in the east (Okay, 1989). The Intra-Pontide Suture in Thrace separates the Rhodope-Strandja massif in the north from the Sakarya zone in the south (Fig. 1). There are very little data regarding the age of the opening and closing of the Intra-Pontide Ocean. Data will be presented here to show that the Intra-Pontide Ocean was open untill the Middle Paleocene.

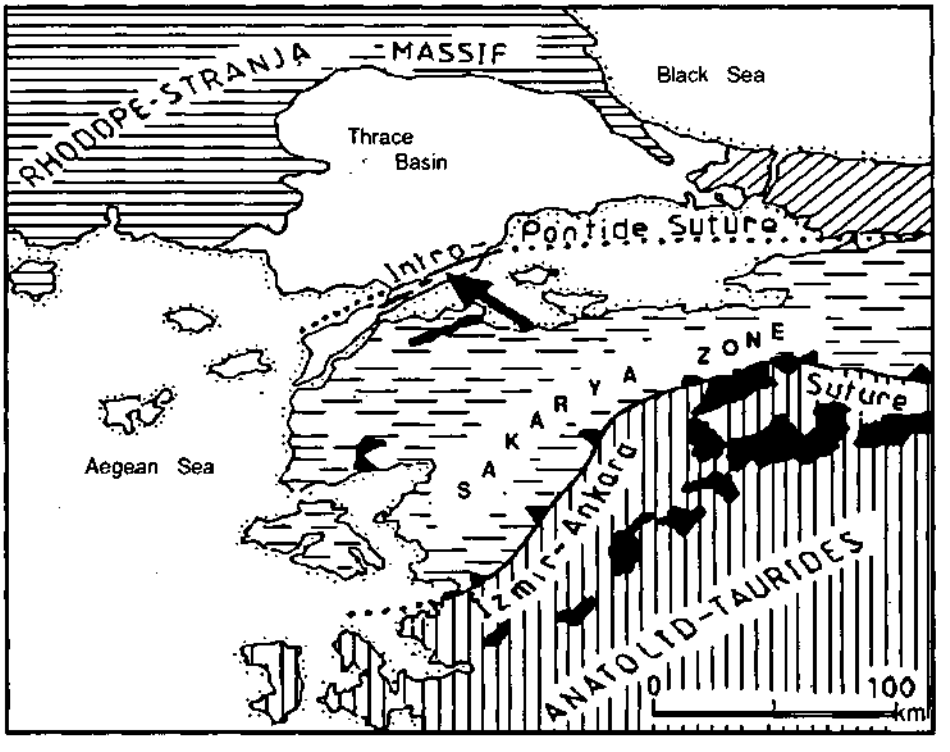

Fig. 1 - Simplified tectonic map of the region around the Marmara Sea. The studied region is indicated by the black arrow. The regions in black show outcrops of alpide ophiolite and ophiolitic melange.

GEOLOGY OF THE REGION NORTH OF ŞARKÖY

The Ganos strike-slip fault, one of the western branches of the North Anatolian Fault, divides the region studied into two geologically distinct parts (Fig. 2). North of the Ganos fault there is a thick Upper Eocene turbiditic clastic sequence called the Keşan group (Turgut and others, 1983). To the south of the Ganos fault there is an over 3 km. thick olistostromal Eocene sequence that is partly overturned to the south (Fig. 2). The lower parts of this sequence is exposed in the north in the vicinity of the Ganos fault and comprises olistostromes and grain flows with large blocks up to 500 m. in size. The blocks are made up of serpentinite, Middle Eocene reefal limestone, metadiabase, diorite and rarely gabbro, recrystallised limestone, Upper Cretaceous and Middle Paleocene pelagic limestone, radiolarian chert and quartzite. The provenance of most of the blocks is the ophiolitic melange that forms the basement in this region and the Middle Eocene limestones that unconformably overlie the ophiolitic melange. Medium to thickly bedded sandstone, calcarenite and shale occur between the olistostromes. The olistostromal sequence passes southwards and upwards through a gradual decrease in the number and size of the blocks to a turbidite sequence of intercalated sandstone and shale. Kopp and others (1969) regard this upper part of the sequence as of Oligocene age. This Eocene-Oligocene sequence can be correlated with the Karaağaç member, an Upper Eocene flysch described from the Gelibolu peninsula by Önal (1986). Variageted sandstones of the Miocene Gazhanedere formation and thickly bedded, yellow sandstone of the Kirazlı formation lie unconformably over the older units.

The ophiolitic melange that has provided blocks to the Eocene sequence outcrops in the cores of the post-Miocene anticlines 5 km. west of the studied region, where it consists of serpentinite, diabase that shows locally blueschist or greenschist facies metamorphism, gabbro, spilite, radiolarian chert and pelagic limestone (Kopp and others, 1969; Şentürk and Okay, 1984). The rocks form a complex of imbricate slices and represent with their lithological and tectonic features a sediment-starved accretionary complex in a subduction zone. Middle Eocene reefal limestones overlie the ophiolitic melange with a pronounced unconformity.

Cretaceous and Paleocene pelagic limestone blocks in the Eocene olistostromal unit

The newly described Late Cretaceous and Middle Paleocene pelagic limestone blocks outcrop along a ridge south of the Harmankaya stream, 500 m. east of the Şarköy-Gölcük road. They are associated with serpentinite, silicified serpentinite, green metadiabase and Eocene reefal limestone blocks. These up to 7 m. large blocks are surrounded by a sandstone matrix. Micritic Upper Cretaceous limestone blocks in Couches Rouges facies form a few small blocks less than one metre in size. A sample (Ş104) collected from one of the blocks contain foraminifera characteristic of Middle-Late Maestrichtian: *Rosita contusa* (Cushman), *Globotruncana* sp., *G. falsostuarti* (Sigal), *Globotruncanella* sp., Heterohelicidae. Another specimen (47) has a slightly different fauna of Maestrichtian age: *Globotruncana* sp., *G. lapparenti* (Brotzen), *G. c'. linneiana* (D'Orbigny), *G.* cf. *area* (Cushman), *Globotruncanita* sp., G. *stuarti* (D' Lapparent), *Rugoglobigerina* sp. A specimen (Ş103) from a different red micritic limestone block contains *Rosita fornicata* (Plummer), *Globotruncana* sp., *G. area* (Cushman), *G.* cf. *bulbides* (Vogler), *Heterohelix* sp., *Globotruncanita* sp. of probable Campanian age. Kopp and others (1969) describe a similar Campanian-Maestrichtian pelagic fauna from the Upper Eocene grain flows.

Paleocene limestone occurs in the same region as 1-2 m. large, blocks more common than the Late Cretaceous limestones. It consists of greenish grey, thinly to medium bedded (1-5 cm.) micrite and intercalated thinly-medium bedded dark grey calciturbidite. A specimen (Ş100) from the micritic levels contains *Planorotalites* sp., *P.* cf. *compressa* (Plummer), *Morozovella* sp., *M. angulata* (White), *M. pseudobulloides* (Plummer), *Globigerina* sp., G. cf. *triloculinoides* (Plummer) indicative of Danian-Montian (Early-Middle Paleocene). A specimen (§102) from a different block has *Planorotalites* sp., *P. pusilla pusilla, Morozovella* sp., *M.* cf. *angulata* (White), *Globigerina* sp., G. *triloculinoides* (Plummer) of Montian age. Calciturbidite lamella in the same section contain quartz grains, and fragments of echinoid tests, red algae, mollucs, bryozoa, neritic and pelagic foraminifera; the following Late Cretaceous foraminifera were identified in the calciturbidite lamella: *Globotruncana* sp., *Heterohelix* sp., Rotaliidae.

Apart from the Harmankaya ridge, pelagic limestone also occurs as small blocks and pebbles in the Eocene sandstones 100 m. north of the Gölcük-Çengelli road (Fig. 2). A small grey micritic pebble (Ş198) from this

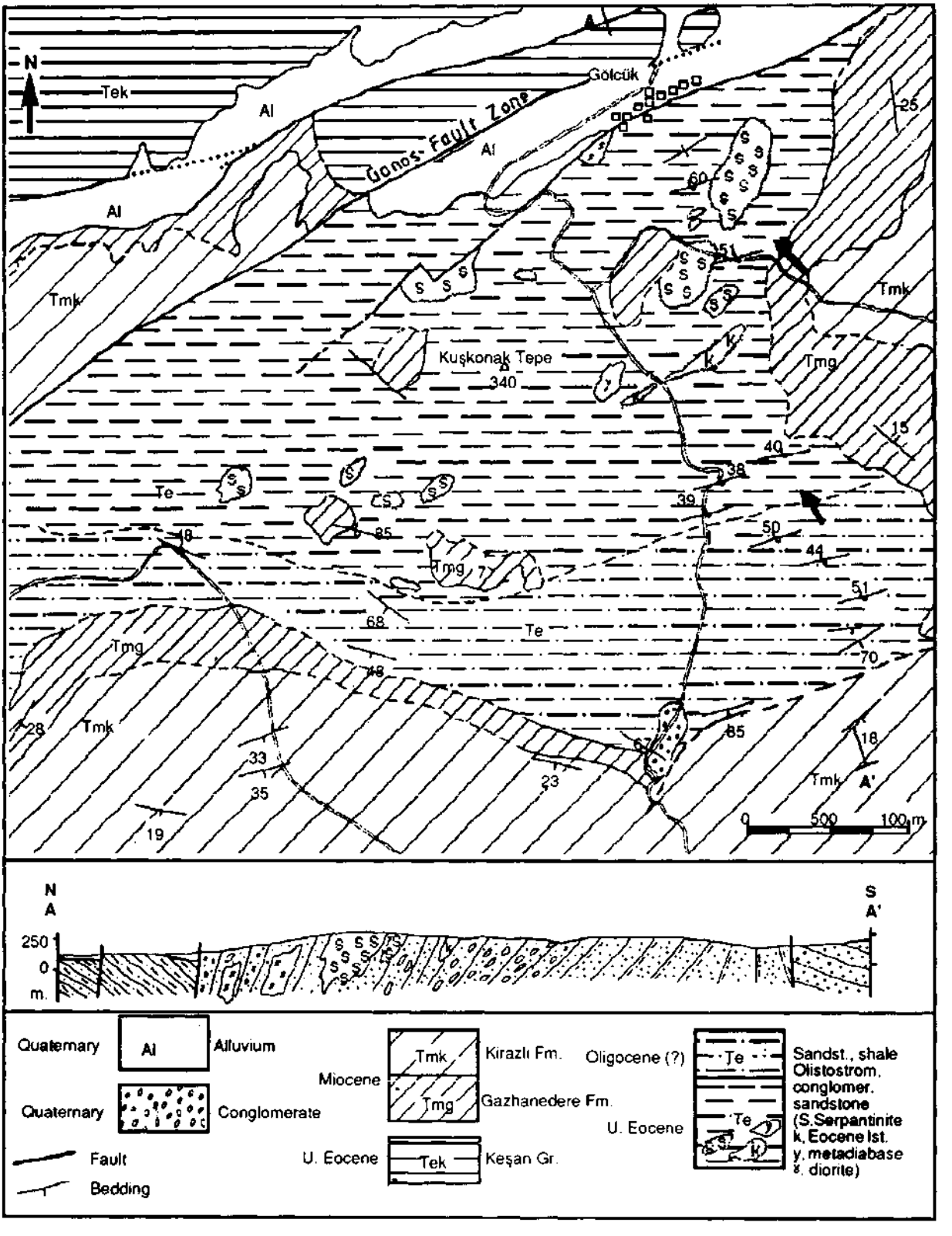

Fig. 2 - Geological map and cross-section of the region north of Şarkoy. The black arrows indicate the locations of the Paleocene and Upper Cretaceous limestone blocks.

region contains *Globotruncana area* (Cushman), *G. bulloides* (Vogler), *Globotruncanita stuaiii* (D'Lapparent), *Rosita fornicata* (Plummer), *Gansserina gansseri* (Balli) of Middle Maestrichtian age. Another yellowish grey limestone pebble (Ş199A) has a pelagic fauna indicative of Danian age: *Globigerina triloculinoides* (Plummer), *Globigerina* sp., *Morozovella pseudobulloides* (Plummer) and *Planorotalites* sp.

CONCLUSIONS

The presence of Maestrichtian and Paleocene pelagic limestone blocks, derived from an ophiolitic melange, in an Eocene olistostromal unit north of Şarköy indicates that the Intra-Pontide ocean existed as a deep and most probably oceanic basin at least until the Middle Paleocene. The thinly bedded, micritic character of the Middle Paleocene limestones and the scarcity and the fine grain size of the calciturbidites indicates that the continental collision that would have provided abundant detritus to the basin has not occurred by the Middle Paleocene. The Cretaceous and Paleocene limestones were probably deposited on oceanic crust and then incorporated along a northward dipping subduction zone to the growing accretionary complex. This view is supported by the presence of Late Cretaceous pelagic foraminifera in the Middle Paleocene calciturbidites suggesting subaques erosion of the Late Cretaceous limestones already incorporated to the accretionary complex. This also shows that the northward subduction was active at least during the Campanian-Montian interval. The closure of the ocean occurred after the Middle Paleocene, probably during the Eocene.

Middle Paleocene pelagic limestone, similar to that described here, are reported from the Gelibolu peninsula under the name of Lort Limestone (Önal, 1986). The Upper Cretaceous-Paleocene Lort Limestone outcrops in a very small area south of the Saros Bay and is regarded by Önal (1986) as the stratigraphic basement of the Gelibolu Tertiary sequence. The observations north of Şarköy suggest that the Lort Limestone is not a coherent formation but forms a large block in the ophiolitic melange or in the Eocene elastics, wells drilled in the Gelibolu peninsula has encountered below the Eocene sequence not the Lort Limestone but various lithologies that could be assigned to an ophiolitic melange.

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