EURASIAN-AFRICAN PLATE BOUNDARY IN SOUTHERN TURKEY AND EASTERN MEDITERRANEAN

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SUMMARY

The Eurasian-African plate boundary consists of a subduction zone around the Gulf of Antalya, a fracture zone of normal faultings off the southwest coast of Cyprus. The earthquake foci are deepening from the southeast corner of Cyprus to NNW beneath Central Anatolia. There exists a zone of normal faultings with a small strike-slip component around Iskenderun-Antakya-Adana and at northern part of this area where the lateral movement is toward south. Further east, the East Anatolian fault zone and Southeast Anatolian thrust zone follow. The latter one continues to west, intersects the East Anatolian fault zone at 38°N; 38.5°E and stops there. A second thrust zone is also observed further south.

SCOPE OF THE STUDY

The main purpose of this work is to investigate the nature of the Eurasian-African plate boundary in Southern Turkey and Eastern Mediterranean. This study is based on seismic data. The earthquakes that occurred within the region bounded by 33°-39° N and 30°-41°E from 1900 to the end of 1976 were used. From the epicentral distributions, fault-plane solutions and distribution of the earthquake foci in the vertical planes along different profiles, it was concluded that the plate boundary under consideration is not as simple as it was thought.

INTERPRETATION OF THE RESULTS

The results show the existence of a subduction zone around the Gulf of Antalya. This zone starts just west of the gulf and continues to the south of the SW coast of Cyprus dipping about 47° to NE, "Fig. 2". This zone is marked by (A) on the map of "Fig. 9".

There is also a narrow thrust zone off the southeast coast of Cyprus where the Mediterranean lithosphere slides beneath the Anatolian block in NE direction. This zone is shown by (B) in "Fig. 9". This result was obtained from the focal mechanisms of only two earthquakes. Therefore, the dip direction and the boundaries of this zone may be inaccurate. But the existence of a such zone is doubtless. From the vertical distribution of the earthquake foci along a profile taken from the SE corner of Cyprus to NNW, it is found that the foci are deepening along a plane that dips 20° and reaches

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a depth of about 220 km beneath Central Anatolia, "Fig. 3". This zone is shown in "Fig. 9" as a zone of deep earthquakes.

It becomes also evident that there is a fracture zone of normal faultings off the SW coast of Cyprus, "Fig. 9" This zone (D) is located between the zones (A) and (B) with an average trend of NNE and western side going down and sliding to south with respect to eastern side, "Fig.4". At the west of the zone (D) there is also a subduction zone, but this is not as clear as the zone (A). This zone could be taken as a transition zone between the zones (A) and (D). It is shown by (C) in "Fig. 9".

There is a zone of normal faultings with small strike-slip component around Iskenderun-Antakya-Adana and in the area north of the gulf. This zone which is shown by (E) in "Fig. 9", lies in N 8°E direction and moves to the south. The vertical distribution of the earthquake foci along a profile taken in NW-SE direction that lies just NE of the gulf, shows that the hypocenters are confined in a V-shaped zone, "Fig. 5". Detailed seismological work needed to find the accurate boundaries, especially the western one. Although this zone looks like a graben, it may well be called a rift like structure. In order to clearify this question further research from the geological point of view is necessary.

The East Anatolian fault zone extends from the east within the area of interest, continues to SW, passes through Malatya and Adıyaman and seems to stop there, "Fig. 1". This zone is marked as (F) in "Fig. 9". Fault-plane solutions show a left lateral strike-slip movement.

The zone indicated as(G) in "Fig. 9", is the Southeast Anatolian thrust zone. In this area the fault-plane solutions of only two earthquakes were made. There is close relation between the strikes of these two earthquakes. The boundary that is obtained by connecting the strikes of two earthquakes is thought to be the boundary of the Southeast Anatolian thrust zone. The boundary is shown by broken line and thrust zone is represented by dotted area in "Fig. 9". From the investigation of the distribution of the earthquake foci along three profiles, it is found that there is a second thrust zone further south, "Fig. 6, 7, 8". These two thrust zones extend from east within the area of interest and continue to west, intersect the East Anatolian fault zone at 38°N; 38.5°E and stop there. Dip angles of two thrust zones are around 46°-48° at the east while they are larger at the point where two zones intersect the East Anatolian fault zone.

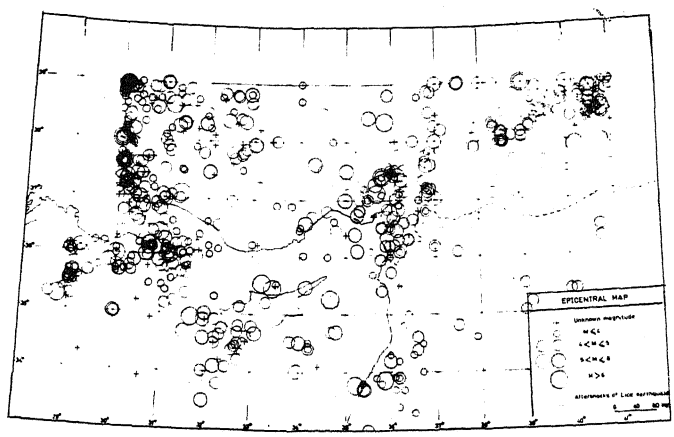
According to the results obtained, it can be stated that the zone of the normal faultings (E) is not the extension of the East Anatolian fault zone. This zone take place by the effects of the motions of Southeast Anatolian thrust zone, East Anatolian fault zone and as well as of the Dead Sea fault zone where left lateral strike-slip faultings exist. The zone (E) can be supposed to be a complex triple junction.

ACKNOWLEDGEMENT

The author is indepted to Prof.Dr. Kazım Ergin of the Technical University of Istanbul, for reading the manuscript critically and making helpful suggestions.

REFERENCE

Büyükaşıkoğlu,S., (1979); "Sismolojik Verilere Göre Güney Anadolu ve Doğu Akdenizde Avrasya-Afrika Levha Sınırının Özellikleri" (Doçentlik Tezi), İ.T.Ü. Maden Fakültesi, (in Turkish).



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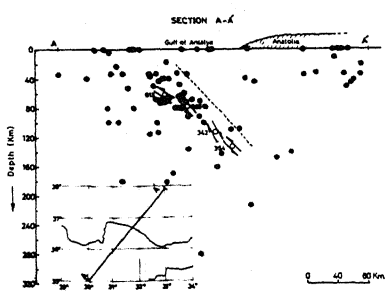

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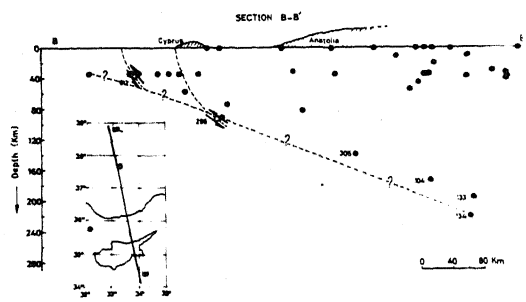

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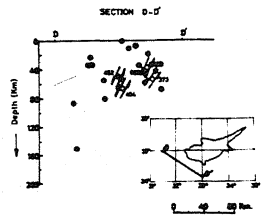

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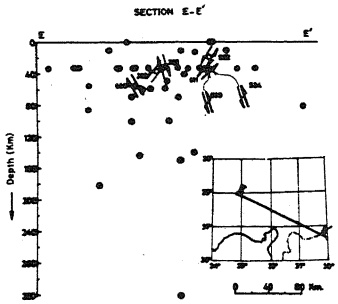

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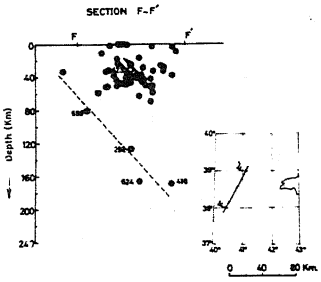

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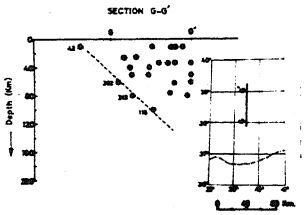

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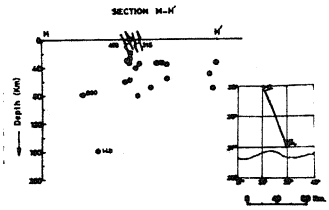

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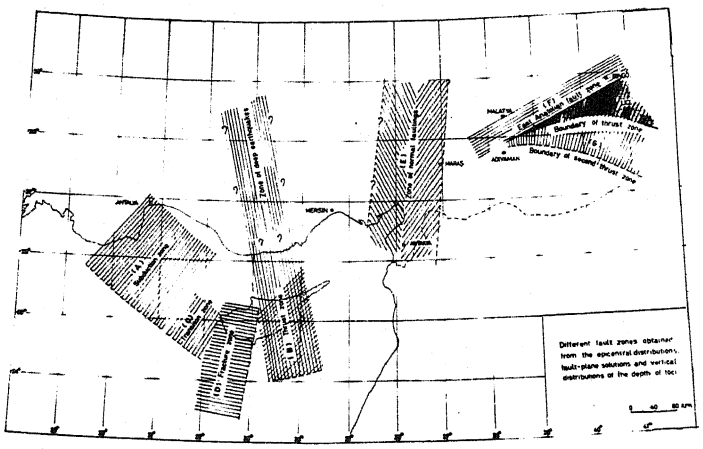

Figure 9