

# THE SHALLOW SEISMIC INVESTIGATION IN THE IZMIT BAY, TURKEY

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## Abstract

The North Anatolian Fault System plays a significant role on the neotectonic structure of Anatolia. The system causes changes on the morphology of the Anatolia as well as intensive earthquakes with large magnitude during these movements. The shallow seismic investigation was done in Izmit Bay in 1994 and the high resolution seismic cross-sections were obtained on the same profiles following 17 August 1999 Kocaeli earthquake for obtaining tectonic differences. According to the seismic evaluation, new broken fragment enters from the eastern end of the Bay and passes along the southern Coastline of Izmit Bay end terminate around Karamürsel area on the sea.

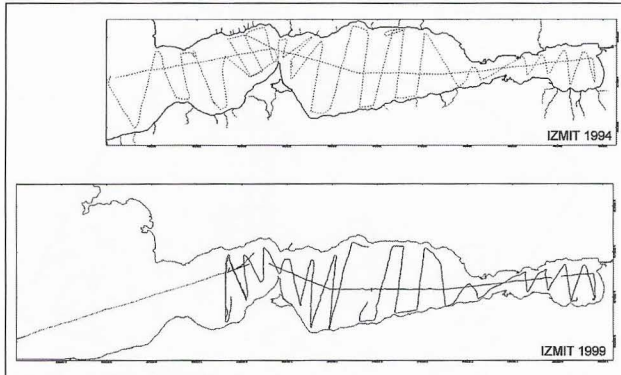
*Key words: Kocaeli earthquake, shallow seismic, neotectonic, Izmit Bay, North Anatolian Fault*

## Introduction

The northern branch of the NAF system which starts from Erzincan Karlıova at east passes through the Marmara Sea at west and ends at the Aegean Sea. The north Anatolian Fault has a right lateral strike-slip fault activity (1; 2; 3). This situation was caused by pushing of the Anatolian block to the west route by the Arabic plates. However, the Avrasiatic plate blocks this westward, furthermore, forces this movement to slide towards south-west contributing affection of the earth at the north-south expansion today (2; 4; 5).

This southwestward route of the fault system caused branching of the north Anatolian Fault starting from Sapanca. The northern strand passes the Izmit Bay and the Marmara Sea and then finally enters into the Aegean Sea from Saros Bay. Therefore, the Izmit Bay is affected both by the transform movement to the West and the expansion tectonism.

Following the earthquake of August 17, 1999 broken segment of NAF was developed in the Izmit Bay. It continues with a line route starting from the eastern of the Bay (Fig. 1).



## Material and methods

After the Kocaeli 1999 earthquake, the shallow seismic investigations were repeated on the very same seismic profiles satellite navigation system was used for positioning Tectonic changing has been observed by comparing the both seismic studies.

During both of shallow seismic studies (1994-1999), 0.65 lt of air gun were used as an energy source and 1 sec. were chosen as a record time on profiles (Fig. 2). A single-channel streamer with 10 elements was used as a receiver. Thermal analogue recorder was used for hard copies and the analogue data were stored on the magnetic band.

## Results and discussion

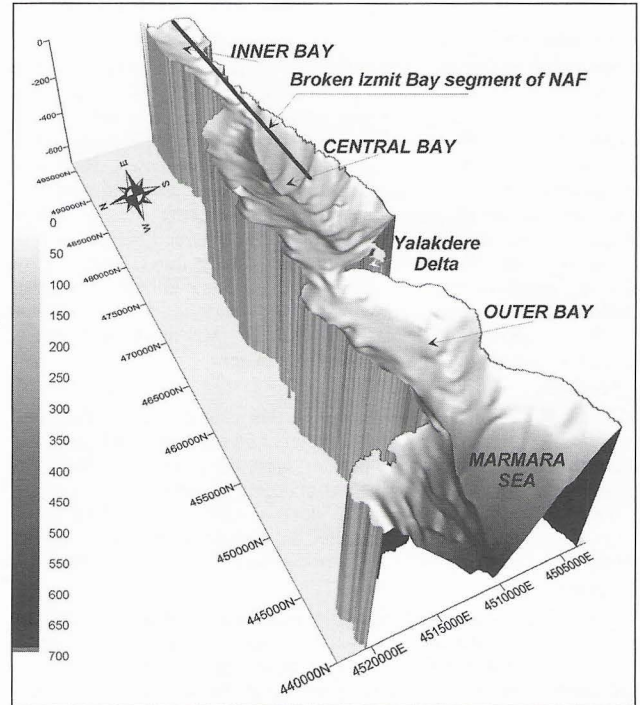
According to this study, these findings are determined as below :

a) The Sapanca-Karamürsel segment which was ruptured at Kocaeli 1999 Earthquake between Karamürsel and Ulaşlı.

b) The new segments of the north Anatolian Fault partly pass through the south shoreline of the Izmit Bay, therefore, this phenomena caused opening and expanding the south route of the Bay.

c) If it is considered that the fault segment movement still continues west word at the Karamürsel and Cınarcık basins, there is a new earthquake risk between Karamürsel and Yalova.

d) It can be considered that the pull-apart structures at the surface and their basins were developed as negative flower structures which were formed by the deep strike slip fault. Since there is no deep seismic records available yet, it is difficult to correlate these phenomena.



## References

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