

THE SEISMICITY AND ACTIVE FAULTING AROUND THE GULF OF GÖKOVA IN THE SOUTHWESTERN TURKEY

Atilla Uluğ* and Nilhan Kaşer

Baku Bulvari, No: 100, 35340 Inciralti, Izmir, Turkey - atilla.ulug@deu.edu.tr

Abstract

The Gökova region is a part of the western Anatolia-eastern Aegean Sea area, which is under the N-S regional extensional tectonic system. This tectonic framework of western Anatolia comprises E-W and WNW-ESE oriented grabens, associated with the regional north-south extension of the Aegean plate. These active faults are generating numerous great earthquakes for many thousand years. Epicentral distribution of the earthquakes extending in the Gökova region shows a relatively high seismic activity in the northern part of the Gulf. Younger active faulting, which was never mentioned before in literature except Uluğ et al. (2005), called Gökova Transfer Fault trends NE-SW direction in the central part of the Gökova Basin and records sinistral strike-slip motion broadly parallel to the convergence direction of the Aegean-Anatolian and African plates.

Keywords : Aegean Sea, Seismics, Tectonics.

Introduction

The Gulf of Gökova lies in a very important region by the reasons of the seismicity and morphotectonic features in Türkiye (see Fig. 1). The Gulf is located in one of the geologically most active parts of southeast Aegean Sea - southwest Anatolia that includes the major rifts and grabens. The Gulf of Gökova is bordered by Datça Peninsula to the south, the island of Kos to the west and Bodrum Peninsula to the north. The Gökova region is a part of the western Anatolia - eastern Aegean Sea area which is under an N-S regional extensional tectonic system [2]. The imprints of this extensional regime are clearly seen in the geology and geomorphology of western Anatolia.

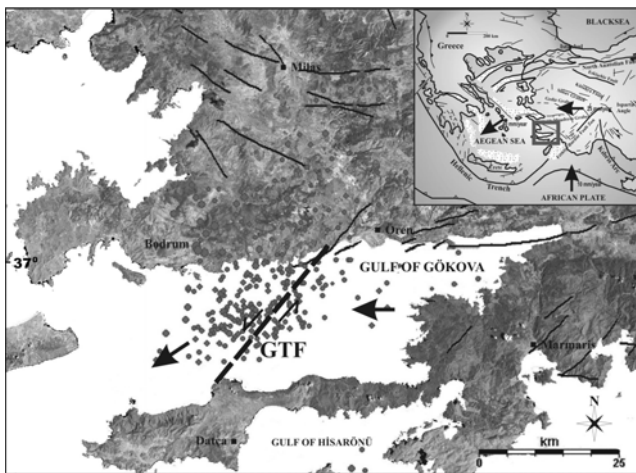


Fig. 1. Seismotectonic map of Gökova Region.

Results

High resolution seismic reflection data from the Gulf of Gökova (southeast Aegean Sea) were interpreted in this study and suggested the late Quaternary tectonic subsidence in the northeastern slope of the basin about 0.3-0.4 m/1000 yr and is probably related to basement graben structures [3]. The Gulf of Gökova is opened mainly by the E-W-oriented, buried Datça Fault located at the south and its antithetic faults located at the north. The Datça Fault might have begun to work in the Latest Miocene-Pliocene. In terms of local rather than regional effects, its activity has been decelerated, possibly since the Pleistocene. The continuing extension in the area may have initiated a second phase of faulting, e.g., WNW-ESE-oriented sub grabens in the central gulf and major WSW-ENE normal faulting at the northwest margin.

Overall fault pattern of Gulf of Gökova shows an important difference between the western and eastern parts of the basin. It is proposed that central trough and a submarine canyon are the part of a probable NE directed left lateral strike slip zone, called Gökova Transfer Fault (GTF) [3]. WNW-ESE trending central trough and E-W directed Datça fault correspond to an apparent left-lateral offset of the continental slope edge. Left lateral offset is also clearly visible in Lower Miocene rock and this is probably the continuation of NE directed GTF on land. A recent proposal is that a

series of earthquakes was produced by GTF zone.

This fault pattern convenient to seismic reflection profiles indicating the major faults can explain the occurrence of great historical earthquakes creating destruction on many ancient cities. Gökova Basin has been tectonically subsiding as a result of fault shift inside this fault zone. The seismic risk of Gökova Gulf in the northern part is higher than in the southern part and this active basin associated with strong earthquakes may continue producing widespread destruction and coastal subsidence.

By now, about 70 serious earthquakes in the southwestern Anatolia occurred beginning at 2100 BC. Some of these earthquakes occurred between Kos and Rhodes Islands. Likewise, earthquakes may have been responsible for the final abandonment of the Cnidus city lying in a seismically active area [1]. Over 25 earthquakes causing damage occurred in the area between 1400 and 1990; in addition, 1493 earthquake destroyed Bodrum town. It was assumed that earthquake activity of the Gulf of Gökova and surrounding region occur on the E-W oriented faults. On the contrary, earthquake activity began at 03/04/2006 developed NE-SW oriented Gökova Transfer Fault zone and not on the E-W direction fault system.

The continuous tectonic movement of the southeastern Aegean Sea and its surrounding area was always important and it is necessary to keep on research on the subject to determine characteristics of the area.

References

- 1 - Altunel, E., Steward, I.S., Barka, A., Piccardi, L., 2003. Earthquake Faulting at Ancient Cnidus, SW Turkey. *Turkish Journal of Earth Sciences* 12, pp. 137-151.
- 2 - Le Pichon, X., Angelier, J., 1981. The Aegean Sea. *Philos. Trans. Soc. London A* 300, pp. 357-372.
- 3 - Uluğ, A., Duman, M., Ersoy, Ş., Özel, E., Avci, M., 2005. Late Quaternary sea-level change, sedimentation and neotectonics of the Gulf of Gökova: southeastern Aegean Sea. *Marine Geology* 221, pp. 381-395.