

## GEOPHYSICAL INVESTIGATIONS AT BOSPHORUS OUTLET

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### Abstract

Ongoing arguments about the origin of the reconnection of Black Sea and Mediterranean Sea with the rising sea level after the last glacial period raised scientific interest at Black Sea and Marmara Sea. The opening of Bosphorus played an important role on the present day sea level of Black Sea. There are many scenarios about the history of Bosphorus. Relative sea level changes in Black Sea are affected by Bosphorus Strait passage, exchanges in fresh water supply and neotectonic factors so it is important to investigate the connection point of Bosphorus and Black Sea both geologically and geophysically.

*Keywords : Bathymetry, Continental Slope, Mud Volcanoes, Bosphorus.*

In recent studies, it is assumed that a rapid flood could occurred in Holocene [1]; [2]. In 1997 Pitman and Ryan suggested that the Black Sea became a giant fresh water lake during the last glacial maximum, with water level standing at -150 m, and that during the post-glacial sea level rise at 7.15 ka and Mediterranean Sea breached the strait of Bosphorus catastrophically re-filling the Black Sea basin [3]. This hypothesis is contradicted by Aksu et al., who suggested that it was instead the Black Sea that first breached the Bosphorus and overflowed into the Marmara sea during early Holocene [4]. The most prominent physical evidence of the controversial Outflow hypothesis is the existence of 9-10 ky aged delta lobe at southern exit of Bosphorus in Marmara Sea [5].

In August 2002 on board R/V Le Suroit a survey provided bathymetric data (Figure 1) using EM 300 multibeam echosounder and 3.5 kHz Triton Elics Chirp Sonar data. The purpose of the survey was the investigation of the effects of Bosphorus strait, changes in fresh water supply and neotectonic factors on sediments depending on relative sea-level changes. Acoustic imaging of sea floor allowed to identify continental shelf incision and continuation of the Bosphorus strait to the Black Sea. A tributary canyon system, composed of many feeder canyons merging with one or two main canyons, was revealed. Two or more recent canyon heads can be traced landward on the shelf which are trending in W-E direction probably following tectonic direction.

A prominent retrogressive submarine canyon dissects the continental slope together with numerous smaller canyons and gullies, giving the impression that it was once linked to the Bosphorus (Figure 1). Two or more recent canyon heads can be traced landward on the shelf. Erosional surfaces at the upper parts of the canyon walls indicate recent activity. Retrogressive erosion on the steeper V-shaped sections of canyon head cause landward expansion of the canyon head. The canyon heads are directed west-east and the paths of canyons are probably guided by local tectonic structures. Chirp Sub-bottom Profiler profiles demonstrate paleochannels which indicate that the canyon heads were located in an area of high sediment supply during the last low levelstand of Black Sea. In the northwestern part of the study area profiles show some interesting features which have been interpreted before as mud volcanoes [5]. They exist only on the western shelf at 100 m waterdepths. Gas and fluid-related features observed on the shelf, include acoustic turbidity, acoustic columns. First 6m of the piston core, that was taken from the northwestern part of the same canyon area during Assemblage survey on board R/V Marion Dufrenoy was totally deformed by gas existence. Besides, gas and fluid-related features observed on the shelf.

Also TTR 15 cruise in June provided 5.1 kHz Sub Bottom Profiler data and 9.5 kHz Long Range Sonar data (Okean) acquired at northwestern toe of the canyon system of the previous study. An unnamed new mud volcano was discovered. And for the first time at Bosphorus outlet gas hydrates were recovered in the cores. High backscattering lineaments indicate the canyon axes which are the continuation of the canyon system in the previous study. In addition, some high backscattering zones are interpreted as recent mud breccia. Also mud breccia recovered in the cores indicate that the feature is a mudvolcano.

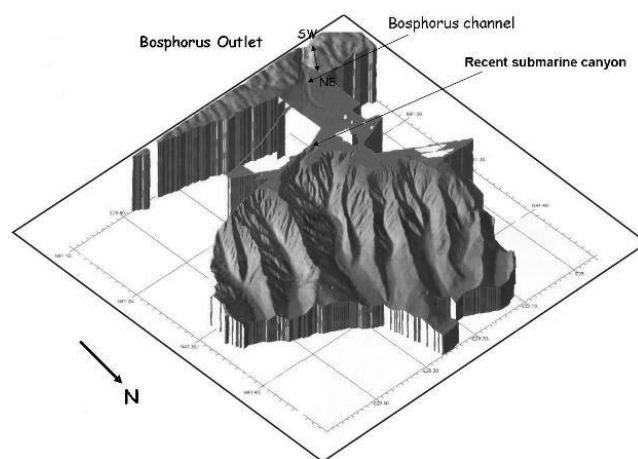


Fig. 1. 12 kHz Multibeam Echosounder data showing 3D bathymetric map of continental slope.

### References

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