

MULTIPLE SEISMIC STUDIES IN THE MARMARA SEA FOR HIGH RESOLUTION MAPPING OF THE NORTH ANATOLIAN FAULT

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Abstract

Fault motion and basin evolution in the Marmara Sea are 4 dimensional. The Sea of Marmara developed along the highly active, right-lateral North Anatolian Fault, which produced devastating historical earthquakes along its 1600 km length. A cruise took place in July 2008 of high-resolution MCS data throughout the Marmara Sea under TAMAM (Turkish-American MARMARA Multichannel) Project. Seismic sections across the Western Ridge, a transverse ridge separating the Tekirdag and Central Basins, show folding of strata above a blind thrust. Growth structures show that the eastern anticline of these folds is active and rapid subsidence and tilting in the Marmara Trough are responsible for widespread gravitational collapse.

Keywords: Tectonics, Seismics

The Sea of Marmara developed along the highly active, right-lateral North Anatolian Fault (NAF), which produced devastating historical earthquakes along its 1600 km length. A cruise took place in July 2008 using the *RV K. Piri Reis* collecting >2700 km of high-resolution MCS data throughout the Marmara Sea under TAMAM (Turkish-American MARMARA Multichannel) Project. TAMAM was supported by NSF and used the facilities of Seismic Laboratory at Institute of Marine Sciences and Technology (Fig.1). The seismic source was 45-45 cubic inch GI gun, - fired every 12.5 m and sometimes 18.75 m. The streamer had 72 channels with a group spacing of 6.25 and a - maximum offset of 55 m. The North Branch of the NAF accounts for most of the current plate motion and is associated with all three main basins in the Marmara Sea. Seismic sections across the Western Ridge, a transverse ridge separating the Tekirdag and Central Basins, show folding of strata above a blind thrust. Growth structures in the sediments show that the eastern anticline of these folds is active and probably propagating eastward above the blind thrust. Some profiles show that rapid subsidence and tilting in the Marmara Trough are responsible for widespread gravitational collapse. One of the major regions of geological interest is the area close to the North Anatolian Fault (NAF) where evidence of gas hydrates and fluid escapes have been observed during previous scientific cruises (Géli, L., et al., 2008). Helium gas, gas hydrate and oil leaks on western high and biogenic gas have been sampled in Çınarcik basin. Most of the gas appears to be focused on the Western and Central Highs and in the Imrali Basin. The near future goal of the demonstration mission project (MARMARA-DM) is to contribute to the establishment of optimized permanent seafloor observatory stations for earthquake monitoring in the Marmara Sea, as part of European Seas Observatory Network (ESONET) of Excellence Project (6th FrameWork Program of European Union) and includes high-resolution seismic surveys to image the fluid conduits in the upper (1 km) sediment layer.

References

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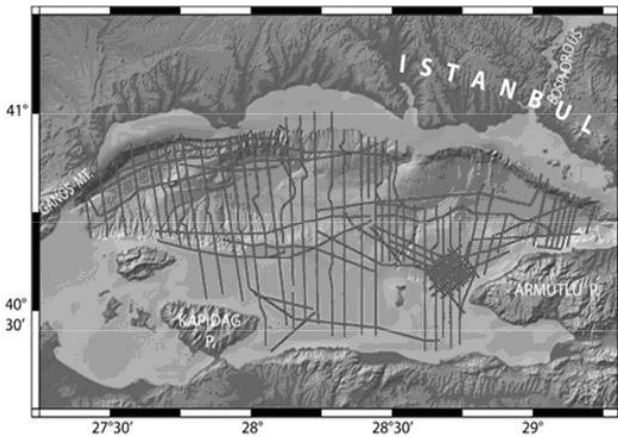


Fig. 1. A cruise took place in July 2008 using the *RV K. Piri Reis* collecting >2700 km of high-resolution MCS data throughout the Marmara Sea under TAMAM (Turkish-American MARMARA Multichannel) Project