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Reprocessing and Interpretation of the High Resolution Seismic Data from Northern Marmara Continental Shelf, NW Turkey

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The Marmara Sea is an inland sea located in the NW of Turkey with a maximum depth of 1270 m, and consists of a 3 major sub-basins. The active dextral North Anatolian Fault (NAF) passes through the basins, which shapes the general morphology and forms the tectonic settlement of the Marmara Sea. The investigations for the Marmara Sea are now important since İstanbul city, which is the most populous and economically the most important city of Turkey, is located just north of the Marmara Sea, quite close to the NAF.

In order to define the morphology and structural state of the northern continental shelf of the Marmara Sea, we collected 224 km of multichannel high resolution seismic and 338 km of Chirp subbottom profiler data along the shallow shelf in 2007. A 600 m long, 96 channel digital seismic streamer, and a Generator-Injector (GI) gun was used to obtain high resolution seismic data. The Chirp data was collected a 2.75-6.75 kHz over-the-side-mount transducer system. The data have been processed using a conventional data processing flow.

The scope of the present study is to re-process and to interpret the seismic and Chirp data between Silivri and Sarayburnu on the northern Marmara shelf up to 100 m water depth. The active tectonic characteristics of the area, especially its geological connection with the terrestrial area, are investigated using acoustic data. In addition, offshore continuity of the of the Çatalca Fault zone is investigated. The Çatalca Fault enters the shelf along the B. Çekmece Lake and can be tracked in the SSE direction on the seismic data. The seismic data is tied to North Marmara-1 well located on the central part of the shelf area, and distributions and thicknesses of the pre-Miocene sediments are mapped using a jump-correlation to the well information. The seismic data located at the southernmost part of the shelf along the shelf break also indicate the presence of active sediment erosion. Behind the shelf break, the slope inclination is very high and clues of active sediment transportation along the slope can be observed. The slope canyons extend the shelf break and sediment truncation is very prominent along the canyon heads and steep canyon walls.