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Submarine slides, slumps and turbidites in relation to various tectonic and sedimentary processes in the Çınarcık Basin of the eastern Marmara Sea (Turkey)

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The main purpose of this study was to determine and understand the impacts of the climatic changes, active tectonism, slope instability and sediment mass movements in the eastern Marmara Sea (Turkey) during the Holocene. Of these, sea level changes, earth quakes, slides, slumps and turbidites were considered to be the major causes to shape the seafloor in the region. With this in mind and within a framework of a larger Project (TÜBİTAK-YDABAG 101Y071), after the major earthquake of 17 August 1999 in Kocaeli-Turkey, both sediment samples and seismic reflection profiles were obtained during the August 2000 Cruise of the Research Vessel "MTA "SİSMİK 1" at water depths between 58 and 1249 meters in the Çınarcık Basin of the eastern Marmara Sea (NW Turkey). Offshore studies covered shelf, slope and basin-floor subenvironments. Onboard, airgun and multichannel seismic reflection system was used along 7 tracklines aligned to N-S and E-W directions. At 15 sites gravity cores were deployed and from 53 to 367 cm thick core sediments were obtained. Grain size analysis, visual core descriptions, and conventional radicarbon datings were also made. To interpret seismic profiles, well-known seismic facies analysis and stratigraphic methods were applied. Fine-grained and grayish-green colored siliciclastic mud was the dominant sediment type (also called "homogenite") deposited on the floor. The coarser-grained intervals and laminations would likely suggest effects of not only turbidites from active tectonism but they can also be related to the wind-driven offshore storm deposits and river floods after heavy rain-falls. Active normal faults on the shelves, fault scarps along the slopes and negative flower structure of syntectonic sedimentation in the deep basin floor observed on the seismic profiles all must indicate the consequences of westerly extension of the North Anatolian Fault Zone in the Marmara Sea. Seismic profiles displayed sediment structures of underwater landslides, slumps and deformation. At the present shelf edges of the Çınarcık Basin morphologies of sediment wedges or deltas can be recognized which could be resulted from low stands of former sea-levels during the last Glacial maxima. The radiocarbon ages from the cores dated back to about 25,000 yrs BP revealed these changes in source and depositional conditions during the late Glacial and Holocene times. We suggest that the results obtained here may reflect geological hazards and thus could well be used as data information for future offshore engineering investigations and applications in this region.