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SEDIMENTARY PROCESSES OBSERVED ON OFFSHORE of ZONGULDAK-KOZLU REGION, CENTRAL BLACK SEA*

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The Black Sea has a narrow shelf and steepy continental slope at southern side. Recent studies show the active sedimentary processes sediment transportation from shelf to abyssal depths. Study area is located in the central Black Sea Turkish continental slope and is under compressional tectonic regime of Western Pontides. A total of 1950 km of high resolution multichannel seismic reflection, Chirp sub-bottom profiler and multibeam bathymetry data were collected offshore of Zonguldak from continental shelf to abyssal plain of Black Sea along the margin. We used 216 channel 1350 m long digital streamer and a 45+45 cubic inch Generator-Injector (GI) gun fired at every 25 m. Chirp sub-bottom profiler system has 9 transducers operating at 2,7-6,7 kHz frequency band with 3,5 kHz central frequency. Side mounted multibeam bathymetry system has 50 kHz transducers with 153 degrees max. swath width.

Southern Black Sea has a very narrow shelf and a very steep continental slope. Both seismic and bathymetry data show that the shelf break in the study area is located at a water depth of about 100 m and continental slope deepens to 2200 m maximum water depths of the abyssal plain with a maximum slope of about 27 degrees. The acoustic data also show that there are significant erosional structures along the margin especially on the continental slope and rise offshore of Zonguldak. An unstable area in the NW consisting of relatively larger slides and buried debris lobes is named Amasra mass failure zone. Different type of sliding with varying sizes including sliding in the steep slope zones, smaller–scale slides on the canyon walls, and relatively larger slides exist in the Amasra mass failure zone. We suggest that the slides in the Amasra mass failure zone is possibly triggered by excess pore pressures in shallow sediments due to the submarine fluid flow possibly produced from gas hydrate dissociation. Warmer Mediterranean water transportation during the rapid transgression period after the last glacial maximum in the Black Sea together with the rapid sedimentation possibly resulted in a destabilization of gas hydrates, which caused excess pore pressures in shallow sediments followed by sediment failures. A conceptual model together with phase curves for the gas hydrate stability in the area is produced to explain the formation of larger slides in the Amasra mass failure zone by excess pore pressures due to local gas hydrate dissociation and fluid flow.

Small-scale normal faults around these type of sedimentary structures are also observed and we suggest that these faults are also secondary factor promoting the failures providing the suitable pathways for fluid flow as well as the suitable weak surfaces for the sliding. Several small-scale debris lobes are observed on the apron side and abyssal plain of the study area. Seismic data also show slab-type sliding on the upper continental slope to the south, whereas block-type sliding is formed by rotational faults on the canyon walls. Both types of mass wasting occur in the area due to gravitational loading on the steep slope zones possibly triggered by local seismic activity.

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