Preliminary results from high resolution seismic study in the Kozlu High, central Black Sea

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The Black Sea is a semi-isolated extensional basin surrounded by thrust belts and is considered to be a Mesozoic–Early Cenozoic marginal back-arc basin generated by the northwards subducting Tethys Ocean. It was found from the interpretation of seismic reflection data (Finetti et al., 1988) that it is quite evident that the lower part of the southern margin of the W-Black Sea basin generally preserves the extensive tectonics associated with the rift process that generated the Black Sea. On the contrary, the middle-upper margin is affected by fully evident compressive tectonics accompanied by overthrusts. Frequently the compressive deformation was superimposed on pre-existing distensive faults (in many cases evidently of listric type) which commenced their activity in the Upper Cretaceous or at the end of the Mesozoic and frequently continued into Paleocene.

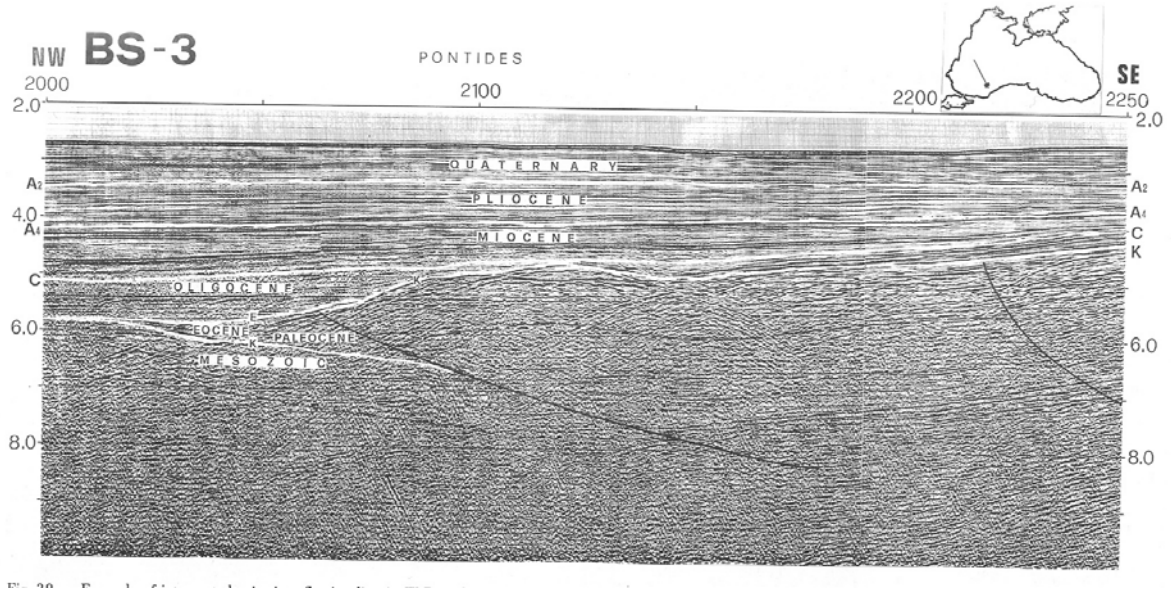

Figure 1. Deep seismic section in front of the Zonguldak area (from Finetti et al., 1988).

Recent studies concerning the shallow structure and shallow gas/gas hydrate accumulations indicate the potential geo-resources in the Black Sea. In the central Black Sea offshore of Kozlu, multichannel seismic data were collected along with very high resolution CHIRP subbottom profiler data in order to define:

(i) Downslope sediment transport pathways and erosional processes,

(ii) Shallow gas accumulations, and

(iii) Possible gas hydrate occurrences such as BSR reflections.

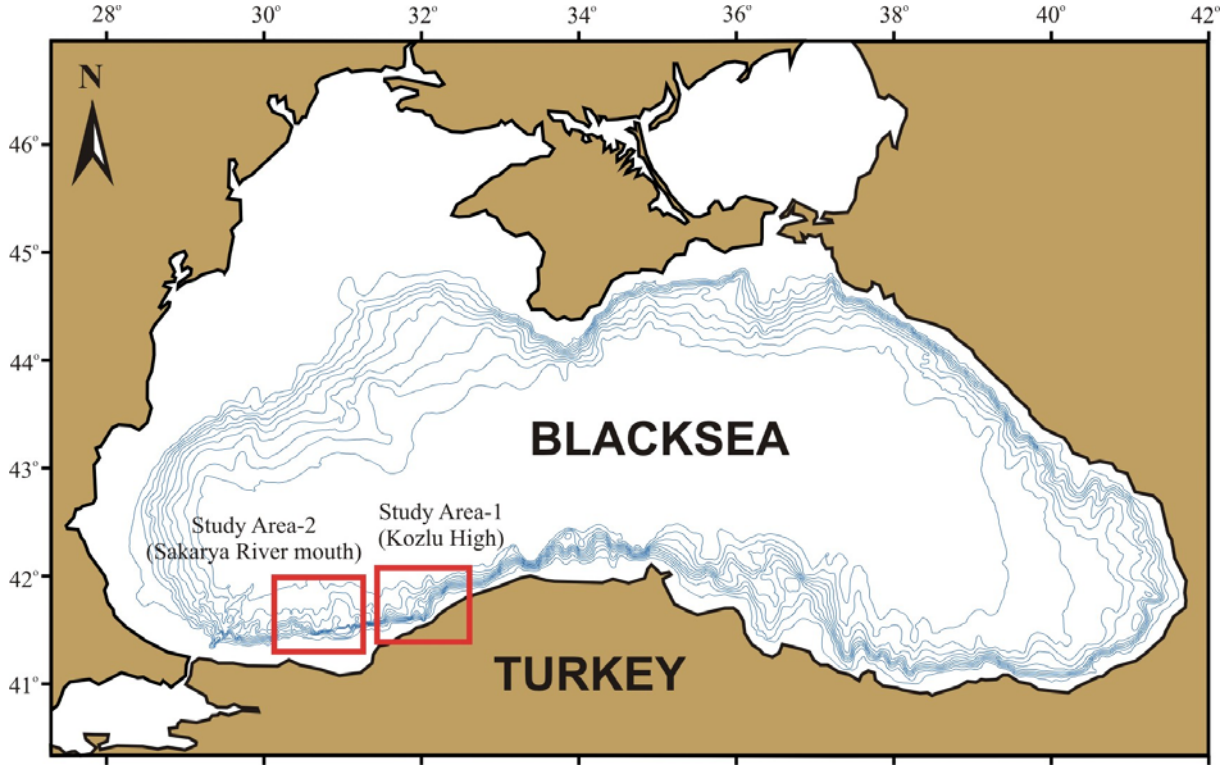

Figure 2. The study areas.

Shallow sedimentary structure mainly consists of pelagic to hemipelagic sediments and turbiditic sequences in the area. A distributary channel system also exists in the study area, which possibly plays an important role in downward re-distribution of the sediments. Underwater mass movements (slides, slumps and growth faults) effects the sedimentary sequence and the tectono-sedimentary small scale sedimentary basins have been formed over the continental slope and continental rise areas. These features create a very uneven topography. From the vertical particle studies (Honjo et al., 1987) it is now well understood phenomena that the rates are higher in traps moored in deeper parts of the water column than the ones at shallower depths. At locations adjacent to the shelf, it was suggested, there is an additional input of material to deep ocean which did not originate at surface. Instead, it could arise from lateral transport of resuspended bottom sediments or land-derived materials (i.e. turbidites).

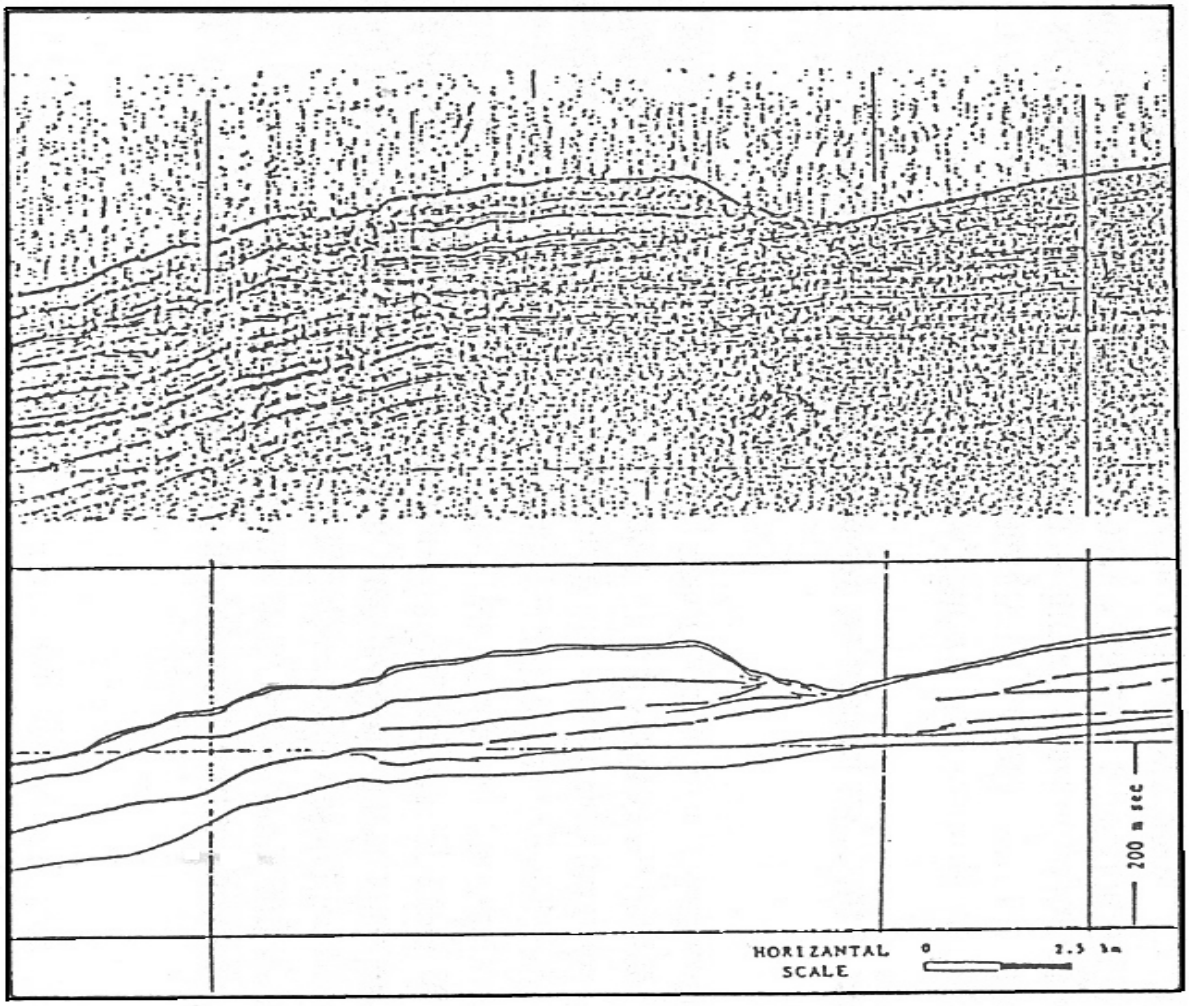

Figure 3. An example of the sliding feature (Konuk et al, 1991).

Preliminary interpretation of the acoustic data showed that the study area has abundant shallow gas accumulations mainly below the small-scale ridge structures. Several BSR reflections have also observed 100 to 200 ms below the seabed, which crosscut the sedimentary layers. Most of the BSRs have free gas below acting as a cap rock. The gas in the gas hydrate accumulations are possibly from the deeper HC reservoirs located in the Pliocene and Miocene fan systems. Productive Akçakoca-1 well near the study area currently produces gas from the Eocene turbidites.

References

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