

The flexure area as the gateway between shallow and deep marine sediment dynamics: NW Black Sea case study

Gabriel Ion¹, Adrian Popa^{1,2}, Constantin Lazăr^{1,2}, Andrei-Rareș Stoian¹, Andrei Briceag¹ and Mihaela-Carmen Melinte-Dobrinescu¹

1 National Institute of Marine Geology and Geo-ecology, 23-25 Dimitrie Onciul Street, Bucharest, Romania.
gion@geoecomar.ro

2 Doctoral School of Geology, University of Bucharest, 1 Blvd. Nicolae Bălcescu, Bucharest, Romania

Abstract: *In any marine basin, the flexure area is the gateway between shallow and deep marine sedimentation processes and is usually the key clue for deciphering the slope and deep marine clastics. The main goal of the research has been to find out and characterize the testifiers regarding the main pathways of sediment supply from the shelf area towards the slope and deep sea domain. We also tried to see how the sea level variations interplayed with the local tectonics in controlling erosion, transport and deposition of sediments coming from land or shallow waters. The main tools used were multibeam echosounding (MBES), high and very high resolution reflection seismics (HRS and VHRS), and sediment coring. The Digital Terrain Model (DTM) of the northwestern Black Sea shows that the main pathway for deep water sedimentation have been the paleo-Danube submarine canyon, but also other secondary canyons located to the SE and NE of this main underwater geomorphologic feature. By means of these canyons, large quantities of sediments were transported and deposited as a complex edifice – the Danube Deep Sea Fan (DDSF). The DTM and high-resolution seismic cross-sections allowed us to map and characterize the outer shelf sea floor features as relic paleo-shorelines, dune fields and more important incised valley that facilitated the transport of terrestrial sediments to the slope and deep sea. Large quantities of sediments have been accumulated as channel-levee systems and mass-transport complexes (MTC). High resolution seismics allowed us to discover and put in evidence vertically stacked Bottom Simulating Reflectors (BSR), strange seismic features that witnesses the accumulation of large quantities of biological methane, the result of organic matter processing. Where the methane was produced and/or accumulated in excess to the water capabilities to store it as a dissolved gas, methane hydrates have been formed and produced the BSRs seismic features. There are clear seismic evidences that indicate the sea level was about 150 m below the present level and also that local tectonics played an important role in water/sediment transport and accumulation. As a conclusion we could argue the MBES, VHRS and coring triplet is very effective to study deep water clastics.*

Key words: *multibeam echosounding, very high-resolution seismics, submarine canyons, methane accumulation.*