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The Miocene-Quaternary evolution of NW part of Black Sea Basin and connection with Dacian Basin

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The Black Sea is the largest European back-arc basin, its evolution being controlled by processes active during the northward subduction of the Neotethys beneath the Rhodope-Pontide volcanic arc (e.g., Zonenshain and LePichon, 1986; Okay et al., 1994). Following its Cretaceous – Early Eocene opening, large-scale compressional episodes are recorded all around its western basin starting with the Late Middle Eocene collision recorded between the Istanbul and Sakarya blocks (Gorur, 1988). By Middle Miocene times the compression cease in all parts of Western Black Sea, except the Odessa shelf, were it continue up to Pleistocene times.

The upper part of the western Black Sea basin fill displays thick Middle Miocene – Quaternary passive continental margin- type of sedimentation deposited over the shelf margin (Dinu et al., 2005). A number of erosional features separating progradational geometries demonstrate the often sub-aerial exposure of shelf and continental slope areas, creating deep incisional geometries and removing large parts of the older stratigraphic sequence. Three major unconformities separate four sequences, i.e. Middle Miocene, Upper Meotian – Lower Pontian, Middle Pontian – Lower Dacian and Upper Dacian – Quaternary, separating sequences and system-tracts that distinguished on the basis of clinoforms distribution.

Wells drilled on the Romanian shelf, demonstrate that the main part of the third sequence (up to 3km thick) was deposited in a narrow time interval (Middle Pontian – Lower Dacian, $\sim$1Ma), in contrast with hundreds of metres deposited during the pre-dating $\sim$9Ma Middle Miocene first sequence and the <1km thick sediments deposited during the post-dating $\sim$4.5Ma Upper Dacian – Quaternary fourth sequence. This geometry is interpreted to be the result of sea-level variations and their relationship with a basin situated between the Black Sea and the Carpatho-Balkanic source area, i.e. the Dacian basin. As long as an accommodation space for sediments was available in the Dacic basin, it functioned as a trap for the sedimentary flux generated by the source area. When the Dacic Basin was completely filled during the large scale Messinian Salinity Crisis (MSC) sea-level drop, which took place in the Eastern Paratethys during the equivalent intra-Pontian times, large amounts of sediments were discharged into the Black Sea with typical progradational geometries. The high value of sea-level drop during this event trigger shelf and continental slope instability and collapse with the development of large gravitational landslides, well visible by normal faults, roll-over anticlines, tilted and chaotic reflectors and toe of thrust.

The large volume of sediments removed from the shelf have been transported through mass-transport or turbidity processes towards deep sea environment and deposited in mass transport complexes or/and deep sea fans. This sedimentary routing pattern being preserved in the present day rivers discharging in the Black Sea, with development of large deep sea fans in front of Danube, Diniper and Diniester.

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