Tectonic Evolution of Western Part of the Moesian Platform-Implications on the Exploration of Hydrocarbons*

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Editorial Note: A closely related article is "Permian-Jurassic Tectonic and Depositional Control on Oil Fields in the Central Moesian Platform, Romania," by Aurelia Liliana Stan and Adriana Raileanu (2003).

General Setting

The Moesian Platform is bordered to the north and to the west by the South Carpathians, to the south by the Balkanides, and to the east by the Black Sea (Figures 1 and 2). The Danube River divides this platform in a Romanian side and a Bulgarian side. The geo-tectonic evolution of the Moesian Platform is mainly characterised by four main sedimentary cycles: Middle Cambrian-Upper Carboniferous, Permian-Triassic, Jurassic-Cretaceous, and Neozoic, being defined in connection with the tectonic activity.

The western part of the Moesian Platform (Romanian side) constitutes an important sector of this tectonic unit from an oil and gas perspective, some of the largest hydrocarbon pools in the Moesian Platform being situated in this area.

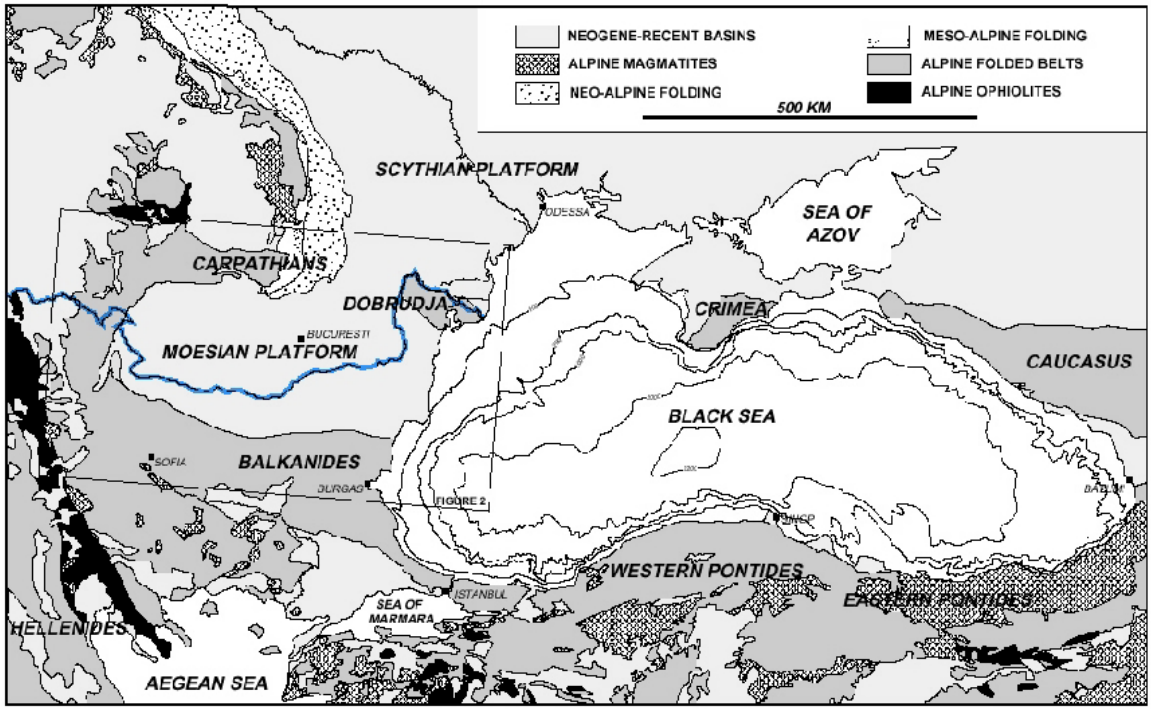

Figure 1. Tectonic map of region surrounding Black Sea, including Moesian Platform (from Tari et al., 1997).

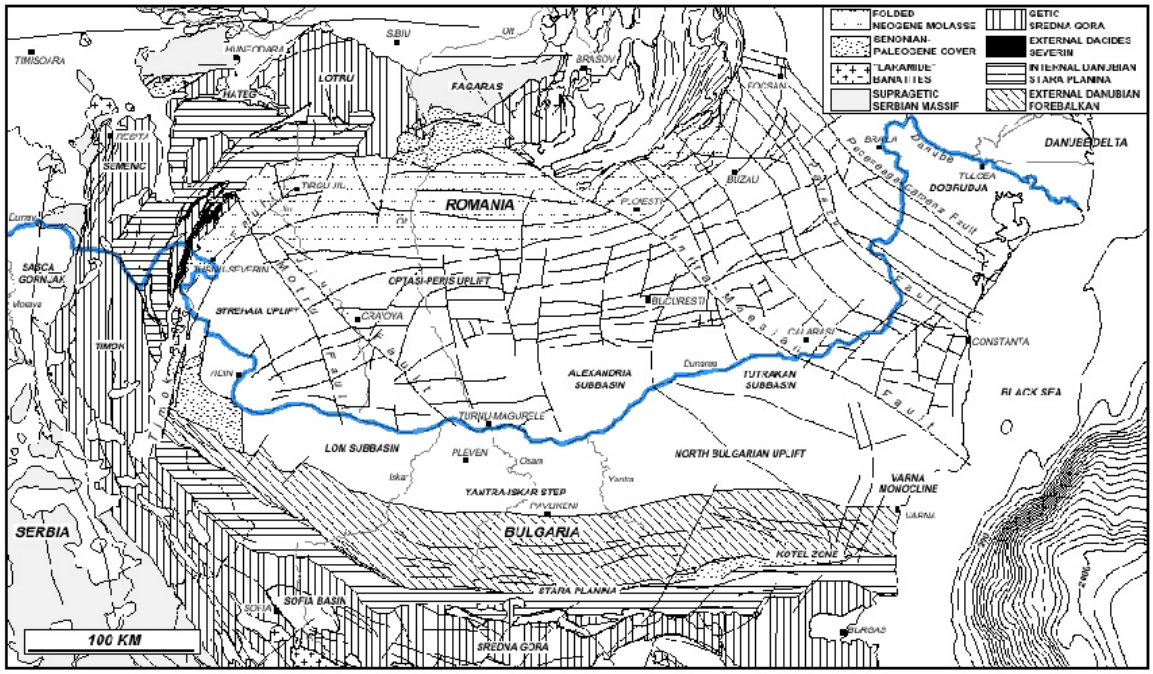

Figure 2. Tectonic elements of the Moesian Platform and environs (from Tari et al., 1997).

Analysis and Interpetation of Seismic and Well Data

The integrated analysis of the new seismic and drilling data from the western part of the Moesian Platform permitted us to obtain new information on the tectonic evolution of this region. Interpretation of more than 1000 km seismic lines has provided a complex three-dimensional image of subsurface Neozoic/Mesozoic and has offered an opportunity to identify the major tectonic events. Thus, there has been identified a series of major events during the Triassic, Cretaceous, and Sarmatian (Miocene), characterised by an Early Triassic large-scale extension (Figure 3) to a compressional regime in Late Triassic, a transtensional regime in the Upper Cretaceous (Figue 3), and two main events in the Sarmatian characterised by extensional to transpression.

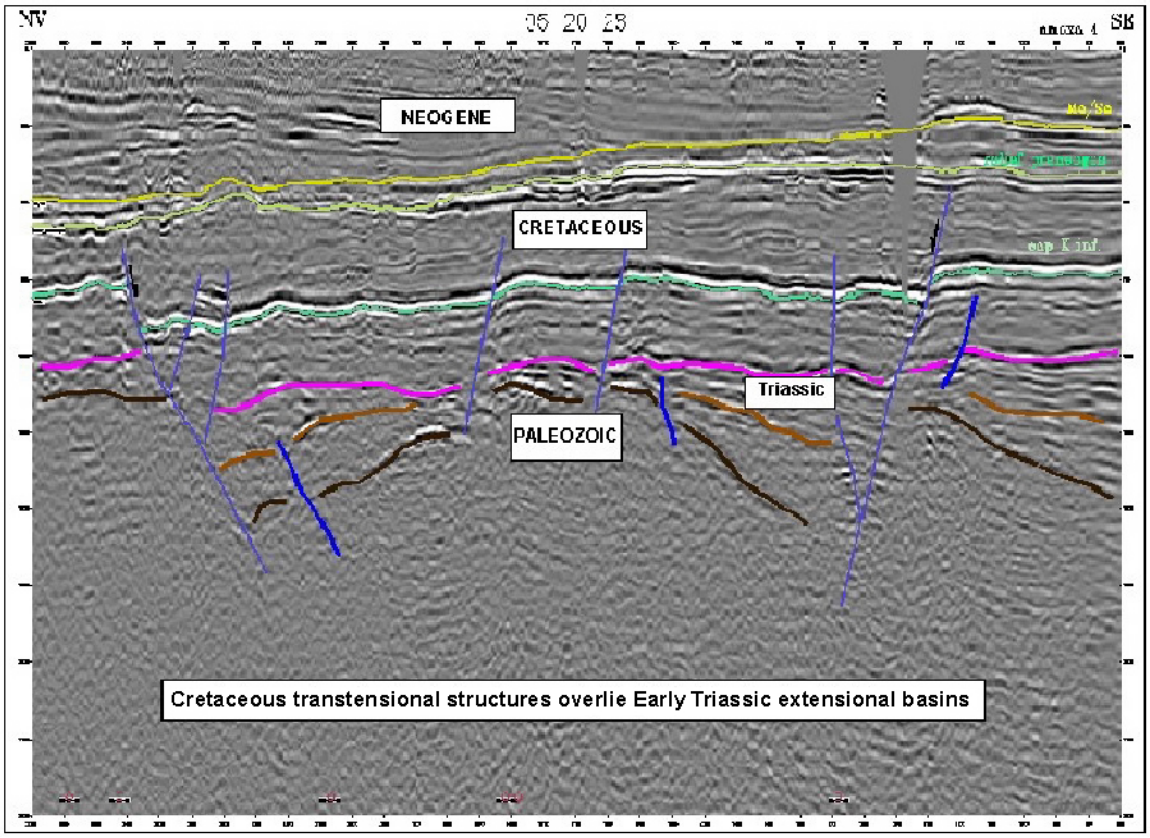

Figure 3. Seismic profile, showing Cretaceous transtensional structures overlying Early Triassic extensional basins, western Moesian Platform.

The strong extensional activity that characterised Early Triassic continued to Late Triassic, as indicated by the widespread Anisian-Carnian volcanism. This was an aborted rifting period with E-W trend. The extensional period was replaced during Late Triassic by a compressional regime. During Late Cretaceous, a NE-SW-directed transtensional basin was formed in the central-western part. Early Sarmatian, large scale extensional structures, mainly characterised by steep normal faults (Figure 4), can be identified in the whole western part of the Moesian Platform. Fault strike changes from N-S in the middle part to NW-SE in the western edge.

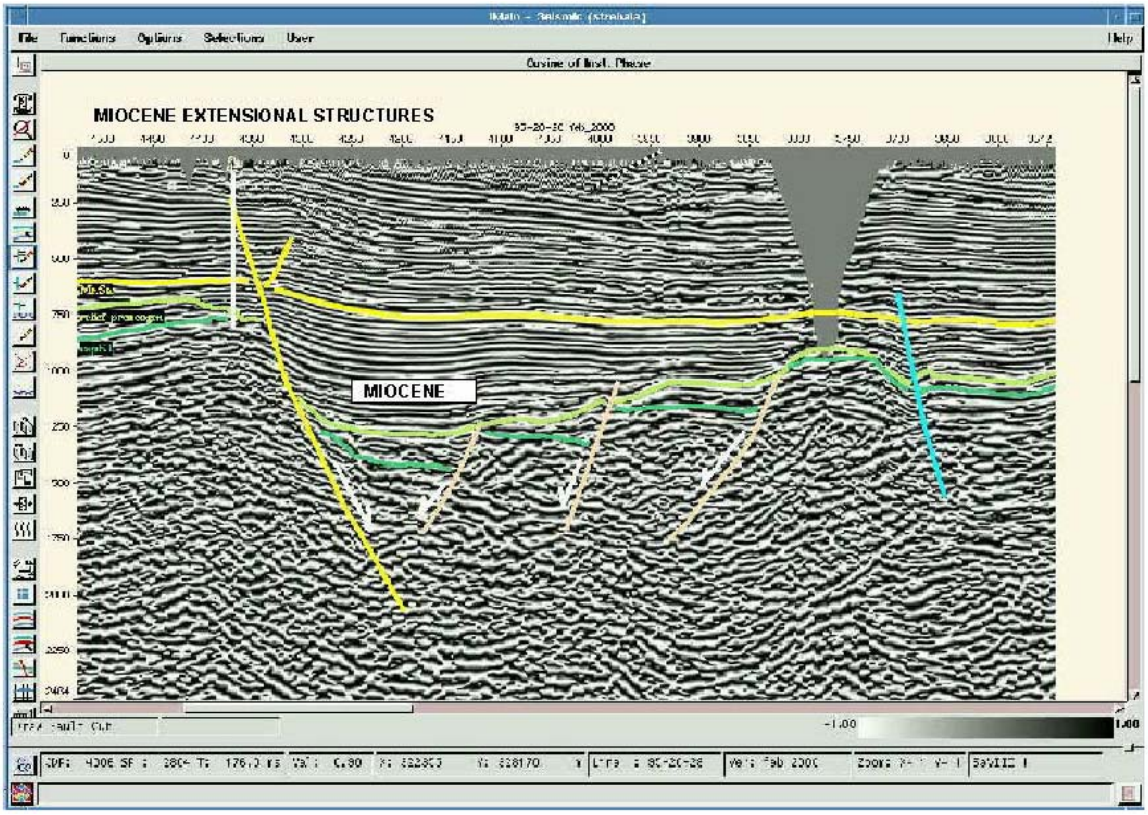

Figure 4. Seismic profile, western Moesian Platform, of Miocene extensional structures.

The last deformation episode recorded in the area is related to NNW-SSE-trending transcurrent deformation during middle Sarmatian. The associated transpressive structures are gas-bearing; they developed in closely spaced wavelike bands. The depositional environments during the evolution of this area pertaining to the Moesian Platform created the architecture and geometry of the carbonate and siliciclastic reservoir in the study area, and the tectonic processes that affected these deposits contributed to the formation of varied and complex traps over the entire area.

References

Stan, Aurelia Liliana, and Adriana Raileanu, 2003, Permian-Jurassic tectonic and depositional control on oil fields in the Central Moesian Platform, Romania: Search and Discovery Article #10046 (2003).

Tari, Gabor, Oprea Dicea, Joe Faulkerson, Georgi Georgiev, Svetlozar Popov, Mihai Stefanescu, and Gary Weir, 1997, Cimmerian and Alpine stratigraphy and structural evolution of the Moesian Platform (Romania, Bulgaria), *in* Regional and petroleum geology of the Black Sea and surrounding region: AAPG Memoir 68, p. 63-90.