SHP10

Dacian Basin: basin margin clinoform analysis and infill architectures

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The main objective of this research is to investigate the western Dacian Basin evolution between 7-4 Ma, (Meotian-Dacian) through the study of stratigraphic architectures and its structural context. The basin has been through a period of being hydrologically open and closed. The focus will be on large scale, approximately 400 m high, upper Miocene clinoforms that have been documented in 3-D seismic data. An integration of outcrop, well logs as well as 3-D and 2-D seismic data have been used to document clinoform geometry and to interpret depositional settings and filling mechanisms

3-D seismic data reveal clinoforms that infer basin-margin progradation for 20-25 km from at least two directions: NE to SW and E to W. Some of these clinoform sets show an unconventional way of filling the basin by featuring thick foresets and bottomsets while the topsets appear to be thin or absent. This character is associated with abundant slope gullies varying in size from 300 to 1,500m wide on the clinoform foresets that might imply erosion on the shelf and large amount of sediment bypass to the slope and basin floor.

A typical motif of well logs in the study area is a thousand-meter vertical stacking of, previously interpreted, thick sandstone beds (Meotian), mudstones with rare sandstones (Pontian), and thick coarsening-upward sandstone successions (Dacian). From field observations, Meotian deposits are interpreted to be delta front and prodelta turbidites associated with deformed remobilized bodies downdip. Pontian deposits are mud dominated with mollusc fossils occasionally interbedded with cm-thick fine sandstones representing low energy shelf to outer-shelf environments. Dacian time is characterized by shallow water and fluvial deposits with coal fragments and thin coal seams. The overall succession may represent the bottomsets-foresets-topsets of the aforementioned large clinoforms on seismic data. The idea that Meotian-Pontia-Dacian deposits are genetically linked is departing from the conventional layer-cake stratigraphy of the basin.

In addition, we are working further with a hypothesis of thick turbidite deposits at the clinoform toes and a link between hydrology of the basin and the clinoform architecture. An application of clinoform concepts and a more rigorous depositional model we aim to develop for the Dacian Basin could shed light on the unique basin filling style and lead to better understanding of sediment transfer from the Carpathians (source) into a deeper water setting (sink).

Keywords: sedimentology and stratigraphy, clinoforms, turbidites