TECTONIC EVOLUTION OF THE ARABIAN PLATFORM IN SYRIA

AL ABDALLA. A1, BARRIER. E2, MATAR. A3, KHATIB. M3, MULLER. C4

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We studied the Northwestern Arabian plate in Syria. Our objective is characterizing the tectonic evolution of the Arabian plate since Cretaceous, and more particularly during Neogene. This study is based on the detailed analysis of the brittle deformations in sedimentary formations of Syria in the Coastal Range, Baer-Basit, Lattakia Basin, Al-Ghab basin, Aleppo Plateau, Afrin, Djebel Abdelaziz and Palmyrides areas. Finally, we reconstruct the states of paleostress and the regional tectonic evolution that we integrate in the geodynamical context of the Arabian plate since Cretaceous.

The analysis of brittles deformations is based on the study of tectonic markers. It interests millimetric to kilometric structures. The studied tectonic features are essentially faults and, in certain cases, folds and joints. It relies on the support of a detailed stratigraphic control. The fieldwork is based on the study of structural elements, their orientations, geometrical attitudes with respect to the bedding planes, and relative displacements and chronology. Regional paleostress tensors were reconstructed on the basis of analysis of fault populations and of sets inversion methods of fault-slip data (Angelier, 1990).

We reconstruct the tectonic evolution of the Northwestern Arabian platform since Cretaceous. We evidenced the following succession of tectonic events:

- The Early Cretaceous period is characterized by extensional tectonics. In Albian, a NW-SE oriented extension affected the NW Arabian platform in Syria. In the Coastal Range this event was evidence by syndepositional normal faults and magmatism in Aptian-Albian. Such an extensional tectonic event is also known in Lebanon as well as in the eastern Northern African plate in Libya and Egypt. We assign this period of extension to a rifting event in the East Mediterranean Basin;
- In Campanian, a NE-SW regional extension developed in the Coastal Range and Aleppo Plateau as showed by the abundant normal fault populations. It is a major regional extensional event at the scale of the northern Arabian plate. This extension is associated to the opening of NW-SE trending grabens: the Azraq graben in Jordan, and the Euphrate graben in central Syria. Pre-existing structures, like the Permian-Triassic grabens of the Palmyrides reworked during this period. In the Palmyrides and Sinjar developed a significant subsidence related to this extensional event;
- In Maastrichtian, the Arabian platform is flexed due to the overload of the Ophiolites obducted onto the Northwestern margin of the Arabian plate. It caused the subsidence of the NW fringe of the Arabian platform. The NW-SE extension observed in the NW Syria is probably related to this event. In Baer-Bassit and Afrin regions the late Maastrichtian-Paleocene marly sequence unconformably overlay the Ophiolitic nappe. The obduction of the Ophiolites on the platform is marked in the Maastrichtian sequence by intra-formational unconformities;
- The Eocene-Oligocene period in Syria is characterized by a regional N-S to NNE-SSW extension also described in Lebanon. Syndepositional structures are commonly observed in the Eocene-Oligocene deposits of Baer-Basit, Coastal Range, Aleppo Plateau, and Palmyrides. This extensional event reactivated Cretaceous normal fault in the Euphrate graben and Djebel Abdelaziz. It is a major extensional regional event at the scale of the NW Arabian plate. This extensional context suggests that the Africa-Eurasia collision did not initiate in the Northern Arabian promontory before the end of Oligocene;
- The Early Miocene period marks the beginning of the collision between Arabia and Eurasia. A major NE-SW trending intra-continental thrust associated with a NW-SE trending compression developed in NW Syria. Because of the flexing of the platform following this Early Miocene thrusting, a narrow NE-SW elongated through developed during Middle-Late
Miocene forming the Lattakia basin. Second order extensional tectonics occurred in this basin and surroundings during Middle Miocene as indicated by syndepositional features (slumps, syndepositional normal faults, intraformational unconformities). This lower Miocene phase (120°-135° compression) is associated to a regional NE-SW folding in Palmyrides, Baer-Basit and Afrin regions. This phase is associated with a significant uplift and the erosion of the series of the platform in the whole area. In the Palmyrides, piggy-back basins developed in the main synclines, filled up with continental deposits;

- In Late Miocene, a 150°- 165° oriented compression dominated in the NW Arabian platform. This compression is contemporaneous with the initiation of Dead Sea Fault and the opening of the Red Sea. In the vicinity of Dead Sea Fault, local stress field, characterized by σ₁ trajectories sub-perpendicular (E-W) to the Fault has been evidenced, while this direction of compression is almost absent in the other regions of Syria. This E-W compression is contemporaneous with the folding of the Coastal Range (N-S axis) and the tilting towards the west of the whole Middle Miocene sedimentary sequence of the Lattakia Basin, as well as of the Mesozoic-Cenozoic platform. The E-W compression is interpreted as a reorientation of σ₁ trajectories in the Dead Sea Fault zone.

- From Pliocene to present, the Dead Sea Fault cut the pre-Late Miocene structures (major thrust, Lattakia basin). The left laterally displaced along the DSFS is about 45-50 km toward the North with respect to the African plate. This value is in agreement with the estimation of the total displacement along the DSFS. Since this period, the regional compression is 160°-180° oriented, as shows by the recent deformation pattern.

Tectonic evolution of the NW Arabian platform since Cretaceous