



Geodynamics of the South Caspian Basin southern margin now inverted in Alborz and Kopet Dagh (Northern Iran)

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The age of the oldest sediments of the South Caspian Basin (SCB) is unknown as they are inaccessible because of their great depth. Accordingly, to understand the geodynamic and tectonic context of the formation of this basin and its evolution, it is necessary to consider the geology of the surrounding areas. We consider the Alborz chain as the inverted southern margin of the SCB and we search in the Binalud-Kopet Dagh area for the eastward extension onshore of the SCB.

In the frame of the MEBE Program, we reconstructed the tectonic evolution of Northern Iran since the end of Triassic, subsequently to the collision of the Cimmerian blocks with the Eurasian margin in middle-late Triassic, from field investigations, including fault tectonic analysis, biostratigraphy, and the analysis of subsidence. As no deep exploration well or seismic line is available in Alborz-Kopet Dagh belts, the only way to draw subsidence curves is to construct synthetic columns from field data in areas exhibiting the most complete and thickest series. We chose 10 areas: 7 in Alborz, main aim of the study, and 3 in Kopet Dagh.

We evidenced the following phases: (1) the closure of the Paleo-Tethys, associated with the Eo-Cimmerian orogeny, marked in Alborz and Kopet-Dagh by a regional unconformity associated with a drastic change in sedimentation;

(2) the deposition of the Shemshak formation (late Triassic to lower Bajocian), comprising up to 4 km of siliciclastic deposits, associated with a N-S extension related to the rifting of the future South Caspian oceanic domain. It resulted in the most important peaks of tectonic subsidence of the margin evolution.

(3) We interpret the abrupt change of tectonic subsidence rate in the middle of Bajocian accompanied by compression in NE Iran, as a sign of beginning of oceanic spreading in the SCB. The extension/crustal thinning slow down or even stop in the southern continental margin of the SCB included in Alborz, inducing a continuous thermal subsidence during Late Jurassic and Cretaceous, while the SCB expands by accretion (present offshore). But in the Kopet Dagh, eastern extension of the SCB the continental crust thinning continues with an important subsidence during Mid-Late Jurassic and Early Cretaceous.

(4) During Cretaceous syndepositional normal faults and volcanic dikes showed a N-S to NNE-SSW extension in Northern Alborz.

(5) The Cretaceous-Paleogene formation is marked by a major inversion of the southern margins of the SCB observed in the Alborz-Binalud range.

(6) The middle Eocene volcanogenic series of the Karaj formation is associated with syndepositional E-W to ENE-WSW trending normal faults, related to a N-S to NNW-SSE extension. We assign this event to the opening of a back-arc basin that developed behind the northward subduction of the Neo-Tethys oceanic lithosphere beneath the Eurasian margin.

(7) From late Eocene to present developed the Arabia-Eurasia collision resulting in the last inversion of the South Caspian margin and in the Alborz orogeny.