

South Caspian Basin opening from subsidence analysis in Northern Iran

Marie-Françoise Brunet¹, Alireza Shahidi², Eric Barrier¹ and Carla Muller³

¹ ISTEP, Université Pierre et Marie Curie-CNRS, case 129, 4 place Jussieu, 75252 Paris cedex 05
France ; e-mail : marie-francoise.brunet@upmc.fr

² Geological Survey of Iran, Tehran, Iran

³ Rueil Malmaison, France.

In the frame of the MEBE Programme, we reconstructed the tectonic and subsidence evolution of Northern Iran since the end of Triassic to characterize the first steps of the South Caspian Basin (SCB) opening, considering the Alborz as its inverted southern margin and searching in the Binalud-Kopet Dagh for its eastward extension.

Geodynamics of the area is closely related to the successive collisions of cimmerian blocks detached from Gondwana and docking Eurasia, inducing Eo- Mid- and Late Cimmerian unconformities but not observed everywhere.

In Carnian, a drastic change of sedimentation occurred in Alborz and Central Iran from a carbonate platform (Elika Fm. Lower to Middle Triassic) to siliciclastic rocks of the Shemshak Group (Upper Triassic to Lower Bajocian) derived from the erosion of the Eocimmerian reliefs created by the Palaeo-Tethys closure. Tectonic subsidence greatly increased with the Shemshak deposition. It is the main phase of subsidence in Alborz occurring into two steps. The first step begins with some Carnian alkaline volcanism or bauxite in south western and central Alborz. The second peak occurs from Toarcian to Early Bajocian.

No other period of important subsidence exists later in Alborz which is the southern margin of the SCB, thus we interpret the Late Triassic-Early Jurassic tectonic subsidence as the main phase of crustal thinning. We observe synsedimentary NNE-SSW extensional tectonics and alkaline volcanism in the lower part of the Shemshak.

Subsidence rate is decreasing abruptly in Late Bajocian, interpreted as slowing down or even stopping of crustal thinning in the Alborz margin, inducing thermal subsidence during Late Jurassic and Cretaceous. These layers thicken towards the north in SCB which began to expand by oceanic crust accretion. During Cretaceous, syndepositional normal faults and volcanic dikes showed a N-S to NNE-SSW extension in Northern Alborz.

In Kopet Dagh, main subsidence peaks occur in Late Bajocian-Bathonian with the Kashafrud basin formation and in Early Cretaceous. Kopet Dagh, eastern extension of the SCB but probably not underlain by oceanic crust, experienced its main rifting (increasing width of the basin) when SCB was already spreading.

The last significant subsidence event occurred during the end of Early and middle Eocene (Karaj Fm. volcanogenic series) only in the southern part of Alborz, corresponding to a back-arc N-S to NNE-SSW extension behind the northward Neo-Tethys subduction.