Tectonic evolution of Alborz since Mesozoic (Iran)

A. Shahidi (1,2), E. Barrier (1), M.-F. Brunet (1), A. Saidi (2), C. Muller (3)

(1) University P. & M. Curie, Paris; (2) Geol. Surv. Iran, Tehran; (3) Rueil Malmaison, France, alireza.shahidi@yahoo.fr

Iran mainly results from the so-called Cimmerian Microcontinent Collage. The deposition of the thick pile of the Shemshak formation (up to 4 km) is associated with distensive tectonics. Syndepositional normal faults are commonly observed in the Shemshak formation, in all Alborz as well as in Binalud. They are mainly WNW-ESE and NE-SW oriented. This regional extension affected the Northern and probably Central parts of Iran, originating important thickness variations within the Shemshak formation. The age of normal faulting is not yet clearly established within the late Triassic-Liassic period. We associate the deposition of the thick sequence of the Shemshak formation to the activity of major syndepositional normal faults. In Alborz, the boundary between the late Jurassic to lowermost Cretaceous carbonates and early Cretaceous deposits is marked by a regional unconformity (the so-called late Cimmerian phase). This event has affected the formations older than Barremian, which are unconformably overlain by the Tizkuh formation, early Barremian to Aptian in age. This latter formation, mainly constituted of shallow water carbonates (Orbitolina limestone), exhibits clastic red layers of conglomerates and sandstone at its base. Albian to Turonian deposits are still poorly known in Alborz. They probably partly consist in thick limestone bars, intercalated with volcanics, widespread in northern Alborz. The Senonian sequence is constituted of limestone and marly-limestones (Coniacian to early Campanian), overlain by Campanian to Maastrichtian marls, suggesting a deeper marine environment. The lower part of the Cretaceous sequence is associated with E-W to WNW-ESE trending normal fault systems. These observations suggest a N-S to NNE-SSW extensional event during this period associated with magmatism. In central Alborz the orientation of the majority of the volcanic dikes (N80E to N100E) associated with the early to late Cretaceous magmatism (trend N 80° E to N 100° E) are compatible with this sub-meridian extension. During the early-middle Eocene, southern Alborz is marked by an extensional tectonic event. The middle Eocene vol-

canogenic 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 extensional event to the opening of a back-arc basin that developed behind the subduction of the Neo-Tethys oceanic lithosphere beneath the Eurasian margin. (1) the closing of the Paleo-Tethyan ocean associated with the Eo-Cimmerian orogeny, marked in all Alborz and Kopet-Dagh by a major regional unconformity associated with a drastic change in sedimentation, (2) the deposition of the Shemshak formation comprising up to 4000 m of siliciclastic deposits, associated with a N-S extension, that we associate to the rifting of the future South Caspian oceanic domain in mid-late Jurassic; (3) During the middle Jurassic, a phase of compression, that developed in NE Iran, is marked by the unconformity of the Bajocian deposits (formations of Dalichai and Kashafrud), (4) During the Cretaceous (early and late), syndeposisional 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 South Caspian basin observed in the Alborz-Binalud range, (6) During Eocene, the tectonic evolution shows an important N-S to NNE-SSW extension associated with the deposition of the thick Karaj formation in back arc basin, (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.