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Compaction history of Upper Cretaceous shale (Al-Khod Formation) and its relationship to plate margin tectonics, Arabian Plate, Sultanate of Oman

Musaab AL-Sarmi (1), Frank Mattern (2), Andreas Scharf (2), Bernhard Pracejus (2), Amira Al-Mamari (2), and Al-Shima Al-Hinaai (2)

(1) Earth Sciences Department, Sultan Qaboos University, Al-Khod, Oman (musaabs@squ.edu.om), (2) Earth Sciences Department, Sultan Qaboos University, Al-Khod, Oman (frank@squ.edu.om)

Conglomerates of the late Cretaceous Al-Khod Formation have been intruded by older shale of the same formation along faults, which were opened/widened by extension, thus, resulting in shale dike formation. Following intrusion the shale was behaving plastically as its fissility follows the contact contours of the conglomeratic host rock and as stoped sandstone blocks are floating within the shale. Vertical calcite veins were ptygmatically folded with subhorizontal fold axial planes. All these aspects show that the shale contained a high water content in the beginning. The ptygmatically folded calcite veins display vertical shortening amounts of $\sim$ 40 % corresponding to 35 % to 45 % of water loss during compaction. Incalculable numbers of calcite veins of different orientations and thicknesses within the conglomerate along the shale contact indicate that the fluid was expelled from the shale into the conglomerate host rock under high pressure (overpressure?). Shale dyke formation took place after the late Cretaceous obduction of the Semail Ophiolite, before the deposition of early Tertiary carbonate rocks, and during the latest Cretaceous doming of the Saih Hatat area which was caused by deformation and slab breakoff, likely associated with gravitational collapse and elastic rebound. Shale intrusion was followed by deposition of 100 to 200 m thick sediments of the upper part of Al-Khod Formation, leading to compaction and water loss. The shale retained much of its water during the uppermost Cretaceous-late Paleocene stratigraphic hiatus as this interval is marked by erosion and a reduction of overburden, which was probably due to the elastic rebound. Folding of calcite veins together with a high amount of water loss was a consequence of compaction caused by the overburden of 1000 m thick shallow marine limestones which were deposited from the Eocene to Oligocene.