Holocene coastal regression and facies patterns in a subtropical arid carbonate environment – The sabkha of Al-Zareq, Qatar

Max Engel (1), Kim T. Peis (2), Christian J. Strohmenger (3), Anna Pint (1), John M. Rivers (4), and Helmut Brückner (1)

(1) University of Cologne, Institute of Geography, Zülpicher Str. 76, 50674 Cologne, Germany (max.engel@uni-koeln.de), (2) University of Bremen, Institute of Geography, Bibliothekstr. 1, 28359 Bremen, Germany, (3) ExxonMobil Production Germany GmbH, Riethorst 12, 30659 Hannover, Germany, (4) ExxonMobil Research Qatar, Qatar Science and Technology Park, P.O. Box 22500, Doha, Qatar

The Arabian Gulf is a semi-enclosed, shallow sea, which became flooded some 12,500 years ago. Current relative sea level was first reached c. 7000 to 6500 years ago, while a relative sea-level highstand of c. 2–4 m dates to around 6000–4500 years ago. Supratidal coastal sabkhas (former lagoons), stranded beach ridges and foredune sequences as well as abandoned tidal channels along the coasts of Qatar and the UAE witness this mid-Holocene peak in sea level. Regression since then triggered shoreline migration of up to several kilometers along the low-lying coasts of Qatar, for which, however, detailed reconstructions in space and time are scarce.

This study presents facies changes and a scenario for the spatio-temporal evolution of the coastal area of Al Zareq in the inner Gulf of Salwa (SW Qatar), thereby also contributing to a better understanding of reservoirs that formed under arid climatic conditions. Ten vibracores (up to 8 m), two deep drillings (up to 20.5 m) and two trenches covering the entire transgression-regression cycle were investigated. In order to characterize and interpret facies types at Al-Zareq as well as to reconstruct sabkha formation in space and time, grain size and shape distribution (laser diffraction, camsizer), XRD, micro- and macrofossil contents and thin sections were analysed by applying qualitative interpretation, descriptive and multivariate statistics (PCA, MDA, end-member modelling), and RIR (XRD). Thirty-seven samples were radiocarbon dated and four samples were dated by optically stimulated luminescence (OSL). Depositional environments include the following types: eolian dune and interdune (in-situ or reworked), coastal sabkha (diagenetic), saline lake (salina), protected lagoon (sand- or carbonate-dominated), beach and beach spit, tidal channel and tidal bar, as well as open lagoon (low-energy, shallow-subtidal lagoon and low-energy deeper-subtidal).