Geophysical Research Abstracts
Vol. 18, EGU2016-3974, 2016
EGU General Assembly 2016

Barnacles Tell no Lies – Bioclastic deposits and in-situ balanid colonies delineate shorelines of the Holocene palaeolake at Tayma (NW Saudi Arabia)

Max Engel (1), Peter Frenzel (2), Anna Pint (1), Michèle Dinies (3,4,5), Gerd Gleixner (6), Philipp Hoelzmann (7), Ina Neugebauer (4), Birgit Plessen (4), and Helmut Brückner (1)

(1) Institute of Geography, University of Cologne, Albertus-Magnus-Platz, 50923 Cologne, Germany (max.engel@uni-koeln.de), (2) Friedrich Schiller University Jena, Institute of Geosciences, Burgweg 11, 07749 Jena, Germany, (3) German Archaeological Institute, Scientific Department of the Head Office, Im Dol 2–6, 14195 Berlin, Germany, (4) German Research Centre for Geosciences (GFZ), Section 5.2 – Climate Dynamics and Landscape Evolution, Telegrafenberg, 14473 Potsdam, Germany, (5) Institute of Biology, Freie Universität Berlin, Altensteinstraße 6, 14195 Berlin, Germany, (6) Max Planck Institute of Biogeochemistry Jena, Hans-Knoell-Str. 10, 07745 Jena, Germany, (7) Institute of Geographical Sciences, Freie Universität Berlin, Malteserstr. 74–100, 12249 Berlin, Germany

The reconstruction of abrupt and gradual climatic changes of the recent geologic past is key to understand patterns of landscape change, prehistoric human migration and settlement, in particular within sensitive arid environments. While a considerable number of Late Pleistocene to Holocene climate records exist from the Sahara, the Levant, and the southern Arabian Peninsula, Northern Arabia is understudied. Moreover, reliable records of environmental changes are strongly required as inferences on perennial lake bodies in the wake of the early to mid-Holocene pluvial phase in Arabia have recently been challenged and the magnitude of this phase is still under debate (Enzel et al. 2015). The continental sabkha of Tayma is one of very few North Arabian sites, where substantial landscape changes are recorded in a laminated lacustrine sequence, disjunct balanid and gastropod shell accumulations (Engel et al. 2012), and pollen spectra (Dinies et al. 2015). Here, we report on a recent mapping campaign of early to mid-Holocene shoreline features of a palaeolake, supposedly fed by both groundwater and enhanced precipitation. Shoreline index points include (i) in-situ populations of Amphibalanus amphitrite, a barnacle originating from marginal marine habitats, either attached to Ordovician bedrock or parautochthonous bedrock clasts, and (ii) in-situ or parautochthonous sequences of varying percentages and taphonomic states of shell detritus from A. amphitrite, gastropods (Melanoides tuberculatus, Hydrobia sp.), marginal marine foraminifers, the brackish water ostracod Cyprideis torosa, and quartz sand. Their thickness reaches up to >2.50 m and they occur either as laterally confined pockets or more extensive sheets. Despite strong wadi dynamics, widespread aeolian deposition, and the actively retreating escarpment framing the palaeolake basin in the north, a remarkably high number of remnant shoreline features is still preserved at elevations between 808–813 m a.s.l. Based on radiocarbon data from the thickest bioclastic shoreline deposit (Engel et al. 2012) and corrections for hardwater effects, the formation of the highest shoreline overlaps with the most humid phase of maximum grassland expansion at around 8600–8000 cal BP inferred from the pollen record of sediments inside the sabkha basin (Dinies et al. 2015). During that time, the lake had a perennial regime, brackish to seasonally even hypersaline conditions, a depth of up to 17 m and a minimum area of 22 km^2, thus testifying to the profound impact the early to mid-Holocene humid phase had on vegetation, hydrography, and sedimentary environs of NW Arabia.

Dinies, M., Plessen, B., Neef, R., and Kürschner, H.: When the desert was green: Grassland expansion during the early Holocene in northwestern Arabia. Quatern. Int., 382, 293–302, 2015.

Engel, M, Brückner, H., Pint, A., Wellbrock, K., Ginau, A., Voss, P., Grottker, M., Klasen, N., and Frenzel, P.: The early Holocene humid period in NW Saudi Arabia – sediments, microfossils and palaeohydrological modelling. Quatern. Int., 266, 131–141, 2012.

Enzel, Y., Kushnir, Y., and Quade, J.: The middle Holocene climatic records from Arabia: Reassessing lacustrine environments, shift of ITCZ in Arabian Sea, and impacts of the southwest Indian and African monsoons. Global Planet. Change, 129, 69–91, 2015.