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Organic-rich sediments in brine-filled deeps, Red Sea

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Up to 10 m long gravity cores were recovered from two brine-filled deeps (Kebrit and Shaban) in the northern Red Sea. The sediments consist of individual, up to tenths of centimeter thick, laminated organic-rich deposits intercalated with light grey to brownish carbonate mud. These light carbonate deposits usually contain reworked olive to dark grey sediments. Sediment ages were determined by ^{14}C-dating (AMS). Based on AMS data it is inferred that the intercalated carbonate horizons are often redeposited turbidites. ^{14}C-dating of carbonate-poor sediments, however, delivered a meaningful stratigraphy for the various sediment cores. In the Shaban Deep the sediments covered a time span of 21.000 years BP. An approximately 80 cm thick organic-rich laminated sapropel-type sediment with a maximum TOC value of 8.4 % was deposited in the Shaban Deep around 12.500 years BP. Sediment samples of both deeps have similar characteristics in alkanes, fatty acids and alcohols, which basically indicates a similar origin of sedimentary organic substances in the deeps. GC-MS analysis of n-alkanes suggests an algal and bacterial origin of the organic matter. Rock Eval pyrolysis data (kerogen type II according to HI-index) and the TOC-normalized amounts of extractable organic matter indicate some minor differences between the Kebrit and Shaban deep in regard to early anaerobe degradation of organic matter in course of sulfate reduction. Pristane/phytane ratios of Shaban and Kebrit sediments are usually low and vary around one. This suggests the occurrence of reducing brines in the Shaban and Kebrit deeps for the whole time span covered by the sediments. Similarily, the occurrence of the ketone 22,29,30-trisnorhopan-21-one in all samples down-core reflects the existence of a hypersaline brine/sea water interface for the last 21.000 years (Shaban Deep). This supports the idea that the organic-rich deposits formed around 12.500 years BP are the result of relatively high bio-production in Red Sea surface water and/ or the brine/sea water interface rather than just a high degree of preservation of sedimentary organic matter.