Comparison of shallow-water and deep-basin sediment cores from the hypersaline Dead Sea, Israel

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An important and usually most difficult aspect to document and characterize the changing climates is the variance of the mean conditions and the associated extremes. This is commonly a challenge in intervals preceding the modern and historical records, as proxies are rare. The hypersaline Dead Sea, currently at ~424 m below sea level and hence the lowest point on continental Earth, provides such a rare opportunity.

The Dead Sea (31°30'N, 35°30'E) is a terminal lake draining one of the largest hydrological systems in the Near East. The lacustrine sediments of the Dead Sea Basin (DSB) are a unique archive of the palaeoenvironmental history of the Levantine region. Sedimentation is strongly related to precipitation, favouring alternated authigenic aragonite and detrital marl layer deposition during more humid phases, while the precipitation of gypsum layers and halite is associated to dry climatic conditions.

Within this study late Holocene sediment sequences from the shallow-water Ein Gedi (DSEn) and Ein Feshka (DSF) cores from the western margin of the Dead Sea are correlated to the new ICDP-5017-1 core from the deep northern DSB and compared regarding different sedimentation processes at the same water body. The investigated sites represent three distinct depositional environments. The shallow water sections in core DSEn show predominantly lacustrine sediments, whereas the DSF site is alongside one of the most extensive springs system that drain the aquifers of the Judean Mountains. Evidence for low lake level stands during the Holocene is given either by hiatus in sedimentation, beach like sedimentation and sand layers in near shore locations (DSEn and DSF) or by massive gypsum or salt precipitation in deep lacustrine sediment sequences (ICDP core 5017-1).

In the study presented here, the multi-proxy approach of micro-facies analyses from thin sections, µXRF element scanning and further magnetic susceptibility measurements allowed detailed analyses of a section from the DSEn composite profile as well as the DSF composite profile spanning the time from approximately 2 to 4 ka BP. Both analysed sequences of the Dead Sea margin are characterised by a continuous succession of evaporitic varves, composed of alternating detrital and aragonite and/or gypsum layers with intercalated earthquake-induced mixed layers. In the lower part of the investigated DSEn interval a sand deposit is associated to lake-level decline around 3.3 ka BP in the Late Bronze Age. The results will be compared in detail with the DSF archive and 5017-1 deep basin core. These combined micro-facies analyses

demonstrate the great potential for depicting small-scale variability of climate and even single droughts or flood events.

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