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CryptoTEPHras in the ICDP Dead Sea deep core to synchronise past eastern MEditerranean hydroclimate (TEPH-ME)

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The hypersaline Dead Sea is a key palaeoclimate archive in the south-eastern Mediterranean region, situated at a critical position between more humid Mediterranean climate and the hyper-arid Saharo-Arabian desert belt. The ca 450 m long ICDP drill core 5017-1, recovered from the deepest part of the Dead Sea, spans the last ~220,000 years as constrained by radiocarbon, U-Th dating and floating $\delta^{18}O$ stratigraphy methods. Nevertheless, an independent dating method is much needed because (i) radiocarbon dating is limited to the last ~40,000 years; (ii) U-Th dating of authigenic carbonates requires a complex correction procedure leading to large age uncertainties; and (iii) wiggle matching of oxygen isotope data is not independent and, hence, does not allow the identification of lead- and lag-phase relationships of changing hydroclimate in comparison to other palaeoclimate records.

Tephrochronology has been demonstrated a powerful tool for dating and synchronisation of palaeoclimate records for regional and global comparison. Due to a lack of visible tephra layers in the Dead Sea sediment record, direct links with the eastern Mediterranean tephrostratigraphical lattice are still absent. Recently, the first cryptotephra ever identified in Dead Sea sediments has been associated with the early Holocene S1-tephra from central Anatolia. This discovery encouraged a systematic search for tephra time-markers in the ICDP deep-basin core 5017-1, with the aim of improving the chronology of the deep record significantly and providing a tool for precise regional synchronisation of proxy records.

In the first phase of the TEPH-ME project focusing on the early last glacial (ca 100-110 ka) and lateglacial (ca 11-15 ka) time intervals in the ICDP core, we have identified more cryptotephra layers than expected. First glass geochemical data suggest that the majority of volcanic ash in the Dead Sea sediments originates from Anatolian volcanic provinces. Even though proximal Anatolian tephra data for comparison are still limited, the identification of cryptotephra in the long Dead Sea record provides novel opportunities to advance the tephrostratigraphical framework in this region, e.g. through synchronising the Dead Sea and Lake Van (eastern Anatolia) sediment records, but also with archaeological and palaeoenvironmental sites that are currently investigated in the

Levant and in Arabia.