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Salt lake Laguna de Fuente de Piedra (S-Spain) as Late Quaternary palaeoenvironmental archive

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This study deals with Late Quaternary palaeoenvironmental variability in Iberia reconstructed from terrestrial archives. In southern Iberia, endorheic basins of the Betic Cordilleras are relatively common and contain salt or fresh-water lakes due to subsurface dissolution of Triassic evaporites. Such precipitation or ground-water fed lakes (called Lagunas in Spanish) are vulnerable to changes in hydrology, climate or anthropogenic modifications. The largest Spanish salt lake, Laguna de Fuente de Piedra (Antequera region, S-Spain), has been investigated and serves as a palaeoenvironmental archive for the Late Pleistocene to Holocene time interval. Several sediment cores taken during drilling campaigns in 2012 and 2013 have revealed sedimentary sequences (up to 14 m length) along the shoreline.

A multi-proxy study, including sedimentology, geochemistry and physical properties (magnetic susceptibility) has been performed on the cores. The sedimentary history is highly variable: several decimetre thick silty variegated clay deposits, laminated evaporites, and even few-centimetre thick massive gypsum crystals (i.e. selenites). XRF analysis was focussed on valuable palaeoclimatic proxies (e.g., S, Zr, Ti, and element ratios) to identify the composition and provenance of the sediments and to delineate palaeoenvironmental conditions. First age control has been realized by AMS-radiocarbon dating. The records start with approximately 2-3 m Holocene deposits and reach back to the middle of MIS 3 (GS-3). The sequences contain changes in sedimentation rates as well as colour changes, which can be summarized as brownish-beige deposits at the top and more greenish-grey deposits below as well as highly variegated lamination and selenites below ca. 6 m depth. The Younger Dryas, Bølling/Allerød, and the so-called Mystery Interval/Last Glacial Maximum have presumably been identified in the sediment cores and aligned to other climate records.

In general, the cores of the Laguna de Fuente de Piedra show cyclic deposition including evaporitic sequences throughout the Holocene and Late Pleistocene, indicating higher fluxes and reworking of organic/inorganic carbon as well as other indicative proxy elements like Ti, Zr and Ca/Sr ratio during Late Pleistocene times.

In order to achieve a better understanding of the palaeoenvironmental history in the study area further studies are planned which encompass biological/palaeontological indicators (e.g., pollen, diatoms) as well as another geochemical isotopic techniques on evaporitic deposits such as fluid inclusion analysis.