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Trace elements records from vermetids aragonite as millennial paleo-oceanographic archives in the South-East Mediterranean

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The Mediterranean Sea is a region under high anthropogenic stress, thus a hotspot for climate change studies. Natural conditions, such as SST, productivity, precipitation and dust fluxes along with human induced activity affect seawater chemistry. We study millennial variability of trace elements in East Mediterranean Sea high-resolution records, in attempt to connect them to environmental factors.

The Mediterranean reef builder Vermetid, D. *petraeum* is a sessile gastropod, secreting its aragonite shells in tidal zones. Cores of Vermetid reefs from the South Eastern Mediterranean (Israel) were previously analyzed by Sisma?Ventura et al. (2014) to reconstruct seawater surface temperature (SST) and $\delta^{13}C$ of dissolved inorganic carbon (DIC). In this study we analyzed trace elements of these vermetid cores, and reconstructed millennial records of elements to calcium (el/Ca) molar ratios.

Vermetid trace element contents from recent decades are mostly in agreement with known values for marine biogenic aragonites from corals and mollusk.

We divide vermetid trace element records into three element groups: 1) Sr and U are related to SST and DIC. These elements correlate with major climatic events of the last millennium, such as the Medieval Warm Period (900-1300 AD) and the Little Ice Age (1450-1850 AD). 2) Pb and Cd are related to anthropogenic pollution and demonstrate industrial sourced trends throughout the anthropocene (since 1750 AD). 3) Terrogenous elements, including Fe, Al, Mn and V. Al in seawater and sediments has been used to trace water masses and land derived sediment source. We observe a major change in average vermetid Al/Fe ratios from 0.5 to 2.5 over the recorded period (n=72). This vermetid Al/Fe change points at a possible shift from Nilotic sediments (0.1-0.5 Al/Fe molar ratio) to Saharan dust ratio (2-4 Al/Fe molar ratio). Mn and V show a similar variability to Fe.

Understanding the variability of vermetid TE can help us interpret the relative dominance of different climate systems and anthropogenic processes on the East Mediterranean environment.