High resolution climate records from stable isotopes and trace metals in mollusc shells from Gibraltar

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Climate records from Europe with seasonal resolution would allow investigation of the role of seasonality in controlling mean climate on diverse timescales, and of the evolution of climate systems such as the North Atlantic Oscillation (NAO). But achieving such seasonal resolution is difficult for regions outside the growth range of surface corals. Mollusc shells provide a posible archive and contain growth increments varying in scale from tidal to annual. Finding and dating sequences of mollusc shells spanning long periods of climate change is difficult, however, due to sea-level change and the destructional nature of most coastal environments.

In this study, we have made use of the habit of hominins on Gibraltar to collect molluscs for food over at least the last 120 kyr. Mollusc samples are found, sometimes in habitation levels, interspersed with layers of sediment blown into two caves (Gorham's and Vanguard Caves). Existing ^{14}C, OSL, and U-series chronologies collected for archeological purposes provide a chronological framework for this suite of mollusc samples. Gibraltar is an interesting location for paleoclimate reconstruction due to its proximity to the boundary of modern day climate belts.

To gain a quantitative understanding of the local controls on stable isotopes and trace elements within Gibraltarian shells, we have initiated a water-sampling programme; emplaced a temperature and salinity logger near the sampling site; and marked live *Patella* and *Mytilus* with fluorescent dye to firmly establish growth rates and controls on chemical composition. We have also conducted stable-isotope and trace-element analysis of modern and fossil *Patella* and *Mytilus* shells by micromilling. Initial work has focused on recent shells, and on samples from a Neanderthal occupation level from approximately 115 kyr. Results allow an assessment of past changes in seasonality and of the utility of this archeological shell material as an archive for past change.