EGU22-4827
https://doi.org/10.5194/egusphere-egu22-4827
EGU General Assembly 2022

A high-resolution, high-quantity approach to mollusc shell analysis and linking archaeological with climatic data.

Niklas Hausmann[1,2], Danai Theodoraki[1], Victor Pinon[3], and Demetrios Anglos[3]
[1]Leibniz Centre for Archaeology, Germany (niklas@palaeo.eu)
[2]BioArCh, University of York, York, United Kingdom
[3]Institute of Electronic Structure and Laser, Foundation for Research and Technology - Hellas, Heraklion, Greece

This talk will outline how the immediate impact of climatic events on societies of the past can be identified and quantified more robustly by archaeological research using mollusc shell records.

Advances in data acquisition regarding speed and resolution promise improved access to this high-resolution climate archive, and thus an improved interdisciplinary palaeo-perspective. Different to most long-term climate archives, mollusc shells are often found on site and record temperature changes on a seasonal scale, allowing us to measure weather extremes on a resolution that a) would have been immediately noticeable by individuals and b) is essential to subsistence strategies. In particular, we hope to provide a better environmental backdrop to the question of the climatic impact on the Neolithic Dispersal along the Mediterranean coasts and verify extreme short-term events on site, should they have occurred.

We are employing an innovative way of acquiring sea surface temperature (SST) data using a combined approach of stable oxygen isotopes ($\delta^{18}O$) and LIBS-screening (Laser Induced Breakdown Spectroscopy), resulting in a lower quantity of $\delta^{18}O$ values required per shell and, as a result, a higher quantity of sampled shells. Our improved data acquisition process enables us to use a high resolution (i.e. +1000 data points per shell record) as well as a high sample quantity (100s of shells) approach, that provides extensive coverage across entire site stratigraphies.

By sourcing our climate data from shell remains found in archaeological layers, we are able to directly compare archaeological information of that layer with the individual climate records, side-stepping the need of radiocarbon-dating either dataset extensively and instead using the shared stratigraphic position to infer temporal concurrence.

This high quantity and high resolution approach produces a combined natural and societal archive, that because of its size can more easily and robustly reveal links between society and the immediate climate change, extreme events and natural hazards it experienced.