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Climate Change and social transformations in the past (12ka BP): from field data acquisition towards socio-ecological modeling

Laurent Lespeze, Maria-Angela Basetti, Jean-François Berger, Jean-Michel Carozza, Laurent Carozza, Nathalie Combrouvier-Nebout, Laurent Dezileau, Arthur Glais, Matthieu Ghihild, Catherine Kuzucuoglu, Didie Peyron, Pierre Sabatier, Mehdi Saqalli, Boris Vannietre, Marie-Alexandrine Sico, Bassem Saadi and Palomeq team

Objectives and challenges

A Climatic trends in Mediterranean areas during the Holocene (from 12 ka BP)
B Definition of the spatial and temporal variability of the Rapid Climate Changes (RCCs)

⇒ Climate change and impact on local and political dynamics?
- Neolithic (9.2, 8.2 and 6.5 ka BP)
- Bronze Age (4.2 ka cal BP)
- Final Bronze Age and Historical periods (3.2-2.8 and 1.3 et 0.7 ka cal BP)

Methods: 4 transects – multiproxies analyses

Paleomex in the Lion’s Gulf

Improve climate and environmental change: seesaw across the Mediterranean basin

Conceptual model of Climate/Environment/Society interactions

4.2 ka BP climatic event and settlement pattern changes from the Late Neolithic to the Early Bronze Age in western Mediterranean?
- Effects of RCC lasting 3-4 centuries around the 4.2 ka BP event, c. 2.2 ka BC recorded in the lake, fluvial and soil systems.
- A temporary informatie structure with 2 wet periods in Southern Iberia.
- Change in the human settlement system around 2.2-2 ka BC.
- In lowland areas, the number of settlements decreased significantly during the same period being only one for high populated areas (at least of about 5,000 m²) allowed for an exploitation of alpine copper, as in San-Vicente de la Barquera and archaeological findings have revealed a growth in human pressure in mountain areas, specifically in the Pyrenees (SW France).
- Change of settlement from lowland area to mountainous area may have resulted in a societal reconfiguration at a regional level, but not in a global-scale collapse.

Map of the micro-regions documenting the Late Neolithic to Early Bronze Age transition around 4.2 ka BP (see Palmeq et al. 2016).

Modelling Climate/Environment/Society interactions

Dynamics and spatially-explicit modelling is the only way for combining complex approaches and techniques, such as climate, rare and available data, with archaeological and socio-ecological data for testing hypotheses in the functioning of the Neolithic societies.

Assumptions:
A Paleoenvironmentalists provide climate and landscape reconstructions over a century-scale temporal dimension which, in order to understand the consequences on human populations, one should translate these data into a human-centred and adaptive learning process.
B Archaeologists provide site-specific, habitat and activity descriptions for specific time periods which, to attempt to reconstruct communities of humans along a regional scale, the site occupied by the same culture, a genetic and coherent reconstruction should be hypothesized, involving some social and memory practices.

Reference:

We propose a spatially-explicit model for human dynamics in the software reference for such a collective and long-term modelling process.

The GAMA platform (www.gama-platform.org) built in Marseille (France) is the software reference for such a collective and long-term modelling process.