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

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

Laurent Lespere, Maria-Angela Bassetti, Jean-François Berger, Jean-Michel Carozza, Laurent Carozza, Nathalie Combroux-Nebout, Laurent Dzelzeau, Arthur Glais, Matthieu Ghihardi, Catherine Kuzuzcuoglu, Didier Peyron, Pierre Sabatier, Mehdi Saqqali, Boris Vannière, Marie-Alexandrine Sicre, Bassem Talibi and Palaeo team

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Objectives and challenges

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

Methods : 4 transects – multiproxy analyses

- Long marine sequences....
- Analyses of long pollen and fire signature series for high resolution climate changes analyses (e.g. modern analog: Peyron et al. 2007; Vannière et al. 2016)
- High resolution analyses of lake and fluvial sequences (e.g. 8.2 kP anomaly in Berger et al. - CP 2016)
- Socio-political changes : cultural areas, settlement, political changes (e.g. Carozza et al., 2015; Lespere et al., 2016a, b)

Conceptual model of Climate/Environment/Society interactions

4.2 k 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 6.2 k BP event, c. 2.2 k BP recorded in the lake, fluvial and soil systems
- A temporal and spatial structure with 2 wet periods in Southern Europe
- Changes in the human settlement system around 2.2-2 k BP...
- In lowland areas, the number of settlements decreased significantly along the same system during a period of very high hydrosedimentary discharges, dryness, and fire activity...
- Environmental changes (glacial retreat) permitted the exploitation of copper resources at high altitudes (above 1,500 m) allowed for an exploitation of alpine copper as in Saint-Vanta (O.France) and archaeological findings have revealed a growth in human pressure in mountain areas, specifically in the Pyrenees (O.France)
- Change of settlement from lowland area to mountainous areas may have resulted in a societal reconfiguration at a regional level, but not in a global societal collapse.

Paleoxem in the Lion’s Gulf

Improve climate and environmental change: seesaw across the Mediterranean basin

Sea surface temperature and land-derived input time series were generated from the Gulf of Lions near-shelf sediments. PhD Mediterranean sea core chronologies and high-resolution-weight cold-organic-matter numbers. The SST record depicts a warm recovery during the Early Holocene (~8-5 ka) followed by a cooling of ~3 °C between 7000 and 1000 BP and rapid warming from ~1800 AD onwards. Several superimposed multi-decadal to centennial-scale cold events of ~1 °C amplitude were also identified. Concentrations show a broad increase from the Early Holocene towards the present with a pronounced extremum (~3500 BP) followed by a cooling of ~5 °C between 7000 and 1000 BP and rapid warming from ~1800 AD onwards.

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Map of the micro-regions documenting the Late Holocene to Early Bronze Age transitions in the Gulf of Lions (~4.2 k BP (Berger et al., 2016) – Mediterranean?)

Map of the micro-regions documenting the Late Holocene to Early Bronze Age transitions in the Gulf of Lions (~4.2 k BP (Berger et al., 2016) – Mediterranean?).

Modelling Climate/Environment/Society interactions

We propose a spatially explicit model to embed and temporally defined (scale-2) resource and agent-based model.

References: