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

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Objectives and challenges

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

→ Climate change and impact on cultural and political dynamic?

• 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

- Long marine sequences....
- Analyses of long pollen and fire signature series for high resolution climate changes analyses (e.g. modern analogs – Peyron et al., 2015; Janssens et al., 2016).
- High-resolution analyses of lake and fluvial sequences (e.g. 8.2 kyr in Berger et al., 2010).
- Socio-political changes: cultural areas, settlement, political changes (e.g. Carozza et al., 2015; Lespez et al., 2016).

Paleoxem in the Lion’s Gulf

Improve climate and environmental change: seesaw across the Mediterranean basin

4.2 ka BP climatic event and settlement pattern changes from the Late Neolithic to the Early Bronze Age in the western Mediterranean:
- Effects of RCC lasting 3-4 centuries around the 6.2 ka BP event. c. 2.2 ka BC recorded in the lake, fluvial and soil remains.
- A temporal hierarchic structure with 2 wet periods in Southern France.
- Changes in the human settlement system around 2.2-2.0 ka BC.
- In lowland areas, the number of settlements decreased significantly along the river systems during a period of very high hydrosedimentary discharges, dryness, and fire activity.
- Environmental disturbances (glacial retreat) permitted the exploitation of copper in mountainous areas (high altitudes of above 2,500 m) allowed for an exploitation of alpine copper as in Saint-Vincent (US France) and archaeological findings have revealed a growth in human pressure in mountain areas, specifically in the Pyrenees (12th-13th).
- Change of settlement from lowland area to mountainous areas may have resulted in a societal repopulation at a regional level, but not in a global societal collapse.

Conceptual model of Climate/Environment/Society interactions

Map of the micro-regions documenting the Late Neolith to Early Bronze Age transition around 4.2 ka BP in the Southern Alps (Le Drezen et al., 2016). The GAMA platform “Modelling Climate/Environment/Society interactions” proposed in Toulouse (France) is the first step in building a spatially explicit multi-proxy model to explain the changes in the human societies and landscapes from the synthetic multiproxy data set. This step allows a preliminary analysis of the system with a qualitative approach to understanding the interactions between the different components (climate, environment, society). The final stage should involve a more quantitative spatial approach, using a term modelling process.