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

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To cite this version:
Laurent Lespez, Maria-Angela Bassetti, Jean-François Berger, Jean-Michel Carozza, Laurent Carozza, et al.. Climate Change and social transformations in the past (12ka BP): from field data acquisition towards socio-ecological modeling. Conférence MISTRALS PALEOMEX, Oct 2017, Montpellier, France. 2016. hal-01683548

HAL Id: hal-01683548
https://hal-univ-tlse2.archives-ouvertes.fr/hal-01683548

Submitted on 18 Jan 2018

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

Laurent Lespérance, Maria-Angela Basseti, Jean-François Berger, Jean-Michel Carozza, Laurent Carozza, Nathalie Combournieu-Nebout, Laurent Dezileau, Arthur Glaizé, Matthieu Ghilardi, Catherine Kuzucuoglu, Didire Peyron, Pierre Sabatier, Mehdi Saqafi, Boris Vannière, Marie-Alexandrine Sicre, Bassem Sabali and Paleomex team

1. UCR-IA New CWS 2551 - Université Paris Est Créteil et Université Paris 12, UMR 8218 : EEFOM (UMR CNRS 5551), 2. EFSIN (UMR CNRS 5551), 3. EESIN (UMR CNRS 5551) - Université Paris 13 - Sorbonne Paris Cité, 4. LIEGE-ULiège CRMT-CNRS – Université de Liège, 5. GEODO-UMR CNRS 5102 - Université Toulouse 3 - Jean Jaurès - 6. Géosciences Montpellier (UMR CNRS 5133), 7. LENS-CAG-ULM-CNRS-UM 6556 Université de Caen-Normandie, 8. CIGEO-UCLouvain: CNRS - Université Libre de Bruxelles, 9. ISCM Montpellier, 10. Laboratoire EDISYM - UMR CNRS 5204, Université Savoie Mont Blanc - 11. Chrono-Environnement UMR CNRS 6249, Université de Franche-Comté, Besançon, 12. LOCAN, pour l'Office national des forêts, 13. UMR SEDER, Université de Vincennes, St-Denis, 14. UMR CNRS 7330, Poitiers, 15. UMR CNRS 8591 Caen, 16. UMR SEDER - Normandie, 17. UMR SEDER - Normandie.

Objectives and challenges

Climatic trends in Mediterranean areas during the Holocene (from 12 ka BP)

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 – multiproxy analyses

- Paleoexem 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 (e.g. 2.2-2.0 ka BC) in the lake, fluvial and soil records
- A temporal impatience structure with 2 wet periods in Southern France
- Changes in the human settlement system around 2.02–2.20 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 changes (glacial retreat) permitted the exploration of copper mines on mountain areas
- High resolution analyses of lake and fluvial sequences (e.g. 8.2 impregnation in Berger et al. (2016))
- Socio-political changes: cultural areas, settlement, political changes (e.g. Carozza et al., 2015; Lespérance et al., 2016a, b)

Paleomex in the Lion’s Gulf

Long marine sequences....

- Analyses of high pollen and fire signature series for high resolution climate changes analyses (e.g. modern analogs – Peyron et al., 2003 - Vannière et al., 2005)
- High resolution analyses of lake and fluvial sequences (e.g. 8.2 impregnation in Berger et al. (2016))
- Socio-political changes: cultural areas, settlement, political changes (e.g. Carozza et al., 2015; Lespérance et al., 2016a, b)

Modeling Climate/Environment/Society interactions

Dynamic and spatially explicit modeling is the only way for combining bioclimatic and socio-ecological models such as Palaeo, site available today, with archaologically and socio-ecologically based hypotheses in the functioning of the Neolithic societies.

Answer:

A Paleoenvironmentalists provide climate and landscape reconstructions with century-scale temporal resolution whereas, to understand the consequences on rural populations, one should translate these data into signals of human settlement patterns.

Archaeologists provide site-specific, habitat and activity descriptions for specific time periods while, to extend such reconstructions to explaining a regional scale, the site occupied by the same culture, a generic and adaptable behavioral rationality should be hypothesized, avoiding specific challenging rules and production practices.

Modelling Climate/Environment/Society interactions

Setting biophysical conditions and socio-economic rules at the ho scale and the season level

We propose a spatially explicit bridge (A) and temporally defined (scale’s seasons) multi-agent modelisation

The GASPA platform (game-platform.org) built in Matlab (France) is the software reference for such simulation and long term modelling process

References:


