

Workshop: Modeling adaptation of ancient agricultural societies to climate change, the core of an interdisciplinary approach

Virtual meeting, 26-27 January 2021 (only afternoon sessions CET time)

Keywords: Society-climate relationship, paleoclimates, agrosystems, interdisciplinarity, multi-agent modeling

Ancient societies have long been perceived as particularly vulnerable to climate change, which has sometimes been considered as one of the causes of the decline or collapse of ancient civilizations. The recent emergence of the concept of resilience in the field of socio-environmental research now calls for a reassessment of societies' adaptive capacities. This new orientation requires going beyond the deterministic reasoning of direct cause and effect between climate change and societal change. It requires the integration of more complexity into an approach that must be enriched by socio-economic and agro-system components. Climate fluctuations directly impact on agricultural yields, which in themselves impact on societies' dynamics. Beyond certain thresholds, food safety can be weakened, forcing people to move or adapt their crops and agrarian systems.

At the interface between the environmental geosciences and the humanities, it requires us to strengthen the dialogue between historians-archaeologists, paleo-climatologists and agricultural specialists. Modeling is at the core of this dialogue. On the one hand, modelling society-environment interaction needs the inputs from these disciplines to characterize past agriculture, way of life and trade and to ask interdisciplinary questions, and on the other hand, the outputs of the model will challenge the scientists to reconsider the interpretation of their data at the light of the processes included in the model. This overarching model also can be assembled from models commonly used in these disciplines: climate models, agrosystem models, agents-based decision models, etc...

Therefore, the aim of this workshop will be to bring together modelers working in these different disciplinary fields to share their experiences and methodologies in order to strengthen the methodological integration around the question of the history of relations between societies and climate. The discussion can be built around specific questions:

- 1) How do you optimize the interdisciplinarity needed by your own research in this domain ? Can modelling be of strong assistance to achieve that?
- 2) What are the innovative perspectives of society-environment modelling?
- 3) Can we study the past as a future with a set of different scenarios? Can the past be a scenario for the future?
- 4) The concerned disciplines require and provide data of different natures. Some of them are qualitative. How to use them together with quantitative data and models?
- 5) How to design the modelling approach in order to answer questions related to resilience ?

The workshop will be organized in two afternoon sessions, to enable a worldwide participation (even if it remains difficult for far east countries). If you are interested to participate, please propose a talk presenting your own work and trying to answer to one or several of these questions according to your expertise. We would like to receive a title and an abstract at your earlier convenience but **before end of November**. We will organize the two sessions according to the material received and your own requests.

Prospective participants:

RDmed members: Joel Guiot, Alberte Bondeau, Nicolas Bernigaud, Frédérique Bertonecello, Marie-Jeanne Ouriachi, Dominique Ami, Loup Bernard, Laurent Bouby, Delphine Isoardi, Alan Kirman, Philippe Leveau, Nicolas Maughan, Florence Mocci, Sylvain Olivier, Gül Surmelihindi, Kevin Walsh, Marcello Turci, Sander van der Leeuw, Sylvie Thoron, Daniel Contreras

Invited scientists:

- Mehdi Saqqali (Geode-CNRS)
- Philip Verhagen (Univ. d'Amsterdam)
- Andreas Angourakis (post-doc Univ. de Cambridge)
- Robert Axtell (George Mason University)

- Michael Barton (Center for Social Dynamics & Complexity, Arizona State University)
- Joshua Epstein (New York University College of Global Public Health)
- Nobuyuki Hanaki (Institute of Social and Economic Research, Osaka University)
- Amy Bogaard (Univ. d'Oxford)
- Marco A. Janssen (School of Sustainability, Arizona State University)
- Juliette Rouchier (Lamsade, Paris)
- Michael Benzaquen (École Polytechnique)
- François Bousquet (CIRAD, Montpellier)