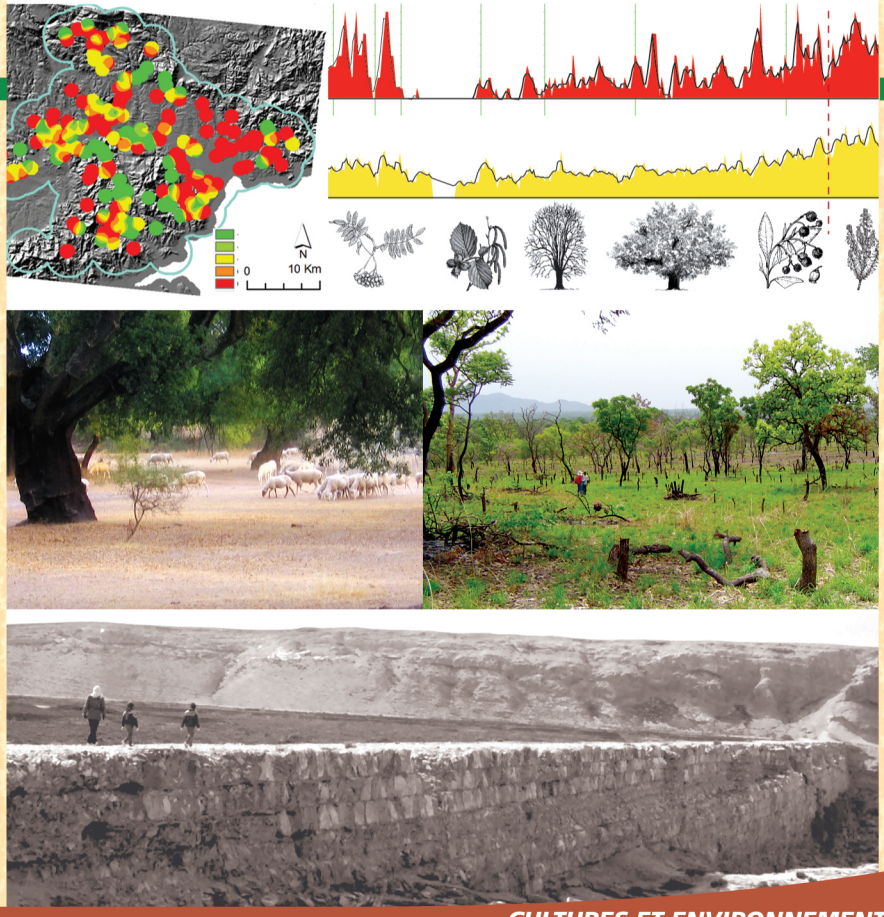
ACTES DES XXXII[e] RENCONTRES INTERNATIONALES D'ARCHÉOLOGIE ET D'HISTOIRE D'ANTIBES

VARIABILITÉS ENVIRONNEMENTALES, MUTATIONS SOCIALES

Nature, intensités, échelles et temporalités des changements

Sous la direction de
Frédérique Bertoncello et Frank Braemer



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PRÉHISTOIRE, ANTIQUITÉ, MOYEN ÂGE
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Variabilités environnementales, mutations sociales
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ASSOCIATION POUR LA PROMOTION ET LA DIFFUSION DES CONNAISSANCES ARCHÉOLOGIQUES

T2, 357 Boulevard Delmas
F-06600 Antibes

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Secrétariat d'édition, maquette et traitement des illustrations
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ISBN 2-904110-52-6

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ACTES DES RENCONTRES
20-22 octobre 2011

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Frédérique Bertoncello et Frank Braemer

Avec le concours
du CEPAM : Cultures et Environnements. Préhistoire, Antiquité, Moyen Âge
(Centre national de la recherche scientifique et Université de Nice-Sophia Antipolis)
et de la ville d'Antibes

Éditions APDCA – Antibes – 2012

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Sommaire

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Between Brenta and Adige: environmental changes and land use in the low Venetian plain (northern Italy) during Roman times

Michele Matteazzi[a]

Abstract
This paper examines the contribution of Landscape Archaeology in the study of a broad area of the low Venetian plain which extends southwards from the city of Padua and is defined by Brenta and Adige fluvial systems. The research is based on an archaeo -morphological approach. By means of an integrated analysis of geomorphological, archaeological and historical data together with photographic and cartographic interpretation that takes advantage of the multiple possibilities offered by GIS, it seeks to further understand the complex relationship between mankind and the environment which was established in the area during the Roman period, and also to define the part which climatic changes played on its implementation.
Keywords: landscape archaeology, archaeomorphology, environmental changes, climatic variability, Roman land use.

Résumé
Cet article examine la contribution de l'archéologie du paysage dans l'étude d'un vaste domaine de la basse plaine vénitienne qui s'étend au sud de la ville de Padoue et est défini par les systèmes fluviaux du Brenta et de l'Adige. La recherche est fondée sur une approche archéomorphologique. Par le biais d'une analyse intégrée des données géomorphologiques, archéologiques et historiques avec l'interprétation photographique et cartographique qui tire parti des multiples possibilités offertes par les SIG, elle cherche à arriver une meilleure compréhension de la relation complexe entre l'homme et l'environnement qui a été créé dans le région durant la période romaine, et aussi à définir le rôle qu'ont joué les changements climatiques dans sa réalisation.
Mots clés: archéologie du paysage, archéomorphologie, changements environnementaux, variabilité climatique, usage romain du sol.

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Introduction

The case study presented here is drawn from an on going Phd project that focuses upon a broad area within the low Venetian plain, south of the city of Padua, with the Euganei hills to the West and the Venetian lagoon to the East. This territory is flanked by two rivers, Brenta and Adige (fig. 1).

The primary aim of the research is to make a systematic investigation of the interaction between mankind and the environment within this area during Roman times, seeking on the one hand to identify the environmental dynamics which, at that time, both favoured and conditioned human occupation of the area, and, on the other, to come to an understanding of the forms which this occupation took, and of its actual effect on the natural landscape.

The investigation starts from the precepts of Landscape Archaeology and proceeds by way of an archaeomorphological approach which considers the restitution, the definition and the archaeological reading of the various traces that constitute the historical morphology of a territory and depend as much on natural

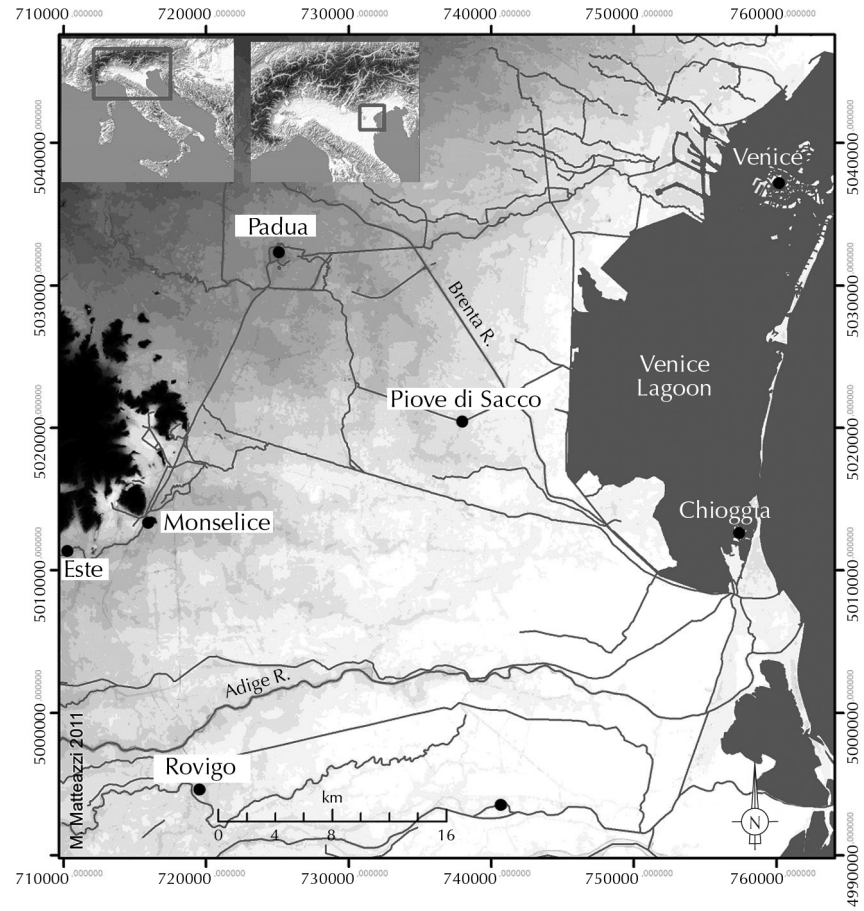


Fig. 1. *Location of the study area.*

as on human activity. This type of analysis permits, via the combination of environmental, archaeological and historical data, to establish chronological sequences based upon a "stratigraphic" reading of the reconstituted traces, enabling the definition of the historical origins of the traces themselves and the identification of changes occurred in the landscape (PALET, 1997).

Tools and Methods

The study has made use of the numerous opportunities offered by GIS systems, that enabled the management of a wide set of georeferenced data (*i.e.* geographic, geomorphological, geological and archaeological). The use of a DTM with 5 m cells, made available by the Cartographic Office of the Veneto Region, has also been invaluable : definition of this sort, in which the micro relief (*e.g.* alluvial ridges and depressions) and other characteristics which influence the morphology of the territory are particularly highlighted, has been especially useful when carrying out topographic analysis.

The archaeomorphological analysis has been conducted by using aerial photographs dating from 1954-1955 (which have the considerable advantage of showing the territory as it was prior to the upheavals brought about by the agricultural changes and urban expansion that took place from the 1960s onwards), and also by reference to historical maps (in particular, those published between the 16th and the mid-19th centuries) : in order that it might be exploited fully, this material has been digitally acquired and, when possible, georeferenced.

Geomorphological and Palaeoenvironmental Context

From a geomorphological point of view, the area which is being considered in this study is a flood plain formed for the most part in the Late Holocene by the sedimentary activity from Brenta, Adige and Po rivers. The thousand years period over which this activity took place is testified by the thick network of alluvial ridges and palaeo channels which, even today, run through the landscape (fig. 2).

As palaeo environmental data indicates, during the Roman era this territory, like much of the Mediterranean region and central Europe, was subject to an important climatic phase which resulted in a period warmer than that experienced at the present. This phenomenon is generally defined as « climatic *optimum* period » (MARCOLONGO, ZAFFANELLA, 1987). Whereas a damp and cold climate, characterised by a rainfall cycle which had a profound influence on the morphology of fluvial beds in particular, causing them frequently to change their course, was indeed a feature of the preceding Iron age, from the 4th / 3rd centuries B.C. onwards and throughout the Roman period the climatic conditions changed and became warmer and drier : as a consequence the principal rivers flowing through the area – Brenta and Adige – were able to establish their channels in such a way as to allow the Adriatic coastline to settle along the line of the sand dunes which are still visible from aerial photographs in the area around Cavanella d'Adige, Brondolo and Chioggia (fig. 3).

Fig. 2. *Geomorphological context of the study area (modified from CASTIGLIONI, 1997): Late Holocene alluvial plains and ridges created by rivers Adige (A), Brenta (B) and Po (C).*

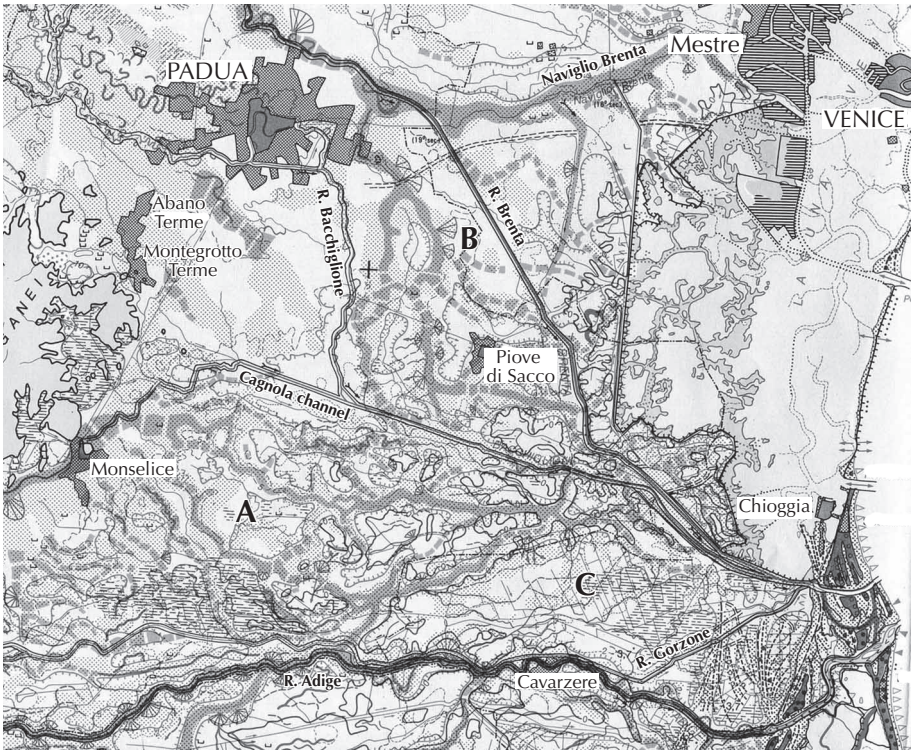
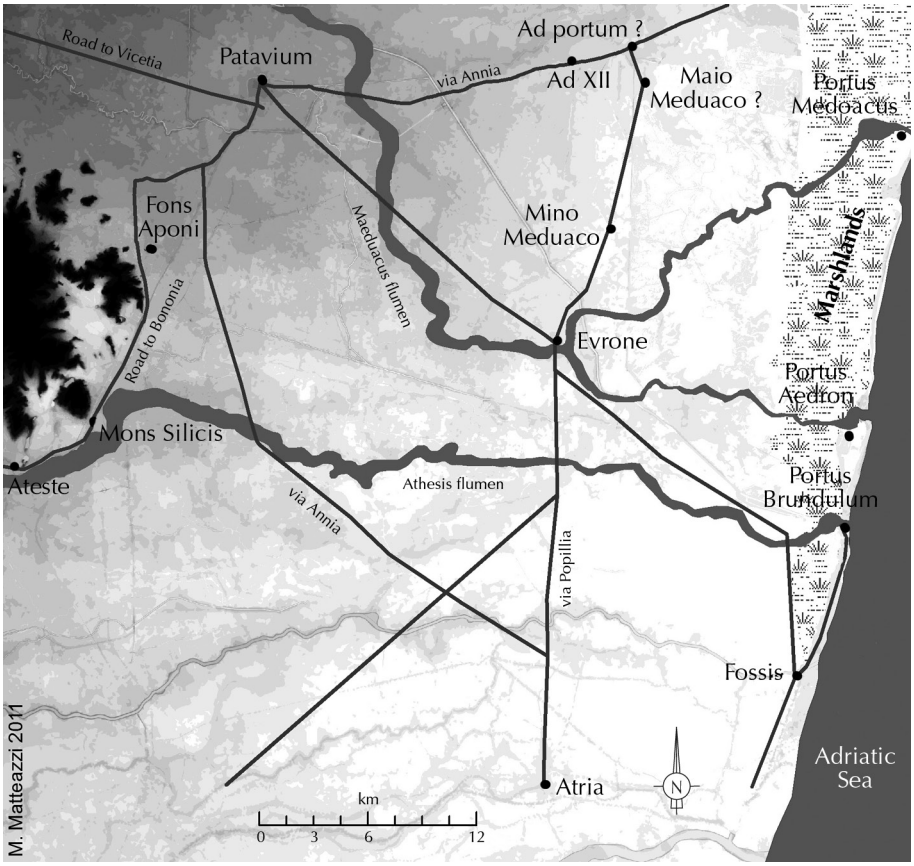


Fig. 3. *The plain southward of Padua in Roman times (reconstructive hypothesis).*



So on the basis of geological and geomorphological data, it is considered extremely likely that in this period the river Brenta (known as *Meduacus* in classical texts) descended from the North in a single course, passing slightly to the East of Padua before continuing towards the present-day lagoon of Chioggia, where it flowed into the sea via two separate branches (Bondesan *et alii*, 2010). The Adige – the ancient *Athesis* – on the other hand, would have followed a course which lies to the North of the one taken at the present time, passing through Este and Monselice and flowing into the Adriatic in the area of Brondolo, seemingly also with the *Togisonus*, a minor river course which is alternatively recognised in the present-day Bacchiglione or in the Vigenzone channel (Bondesan *et alii*, 2010).

As far as the coastal landscape is concerned, sedimentological and palynological studies both concur that during the period in question the coast was not marked by a broad and continuous lagoon basin, as is the case today, but rather was characterised by the presence of a series of freshwater stretches (mainly marshes and pools). These were spatially discontinuous and temporally sporadic, and they seem not to have extended very much beyond the internal limits of the lagoon as they are shown in antique maps dating the mid-16th century (Favero, Serandrei Barbero, 1980).

Historical-Archaeological Context

From the 2nd century B.C. onwards the territory, which up until that time had been controlled by the Venetic centres of *Patavium*, *Ateste* and *Atria*, became profoundly affected by the Roman presence. This influence manifested itself especially through the construction of great consular roads, which crossed the territory from North to South (fig. 3) ; these included the *via* from *Patavium* to *Bononia* (175 B.C.), the *Annia* (153 B.C.), and the *Popillia* (132 B.C.). During the 1st century B.C. the area became, *de facto,* a part of the Roman state, when *Venetia* came to form a constituent part of the province of Cisalpine Gaul, and the Venetian townships assumed firstly the rank of *coloniae latinae* (89 B.C.) and subsequently that of *municipia* (49 B.C.). From that time onwards and throughout the 2nd century A.D. the archaeological data bears witness to a population which was distributed over the greater part of the territory, leading to think that a major programme of territorial reorganisation must have been implemented in order to exploit the agrarian potential of the land to the full.

This hypothesis receives substantial confirmation through the identification of at least three field systems based on orthogonal axes, identified as examples of centuriation (fig. 4). The first of these was recognised during the 1980s in the area lying to the North east of Rovigo after a systematic reading of aerial photographs (Masiero, 1999). It is believed to date from the 1st century B.C. and displays an unusual modular design based on *centuriae* with sides of 27 *actus* (approximately 965 metres). The other two were identified by means of archaeomorphological analysis : one, whose existence had been the subject of various hypotheses in the past and dated from the first half of the 1st century A.D. (Rosada, Bressan, 2008), is located in a vast area extending to the South and West of Padua and is

seemingly planned around a classical model of *centuriae* with sides of 20 *actus* (approximately 710 metres). The third example extends southwards from the palaeocourse of the Adige as it passes through Monselice, and although it has the same orientation as the second example described, it nevertheless displays signs of having been based on a different model which can perhaps be associated with metrologies that were typical during the Augustan period.

Discussion

From what has been stated above it appears legitimate to infer that the particularly stable climatic conditions – and, in particular, the hydro conditions – which affected the territory during the Roman period may have allowed the population to intensify the establishment of settlements in the plain and along the coastal strip, thereby favouring territorial reorganisation and other interventions which

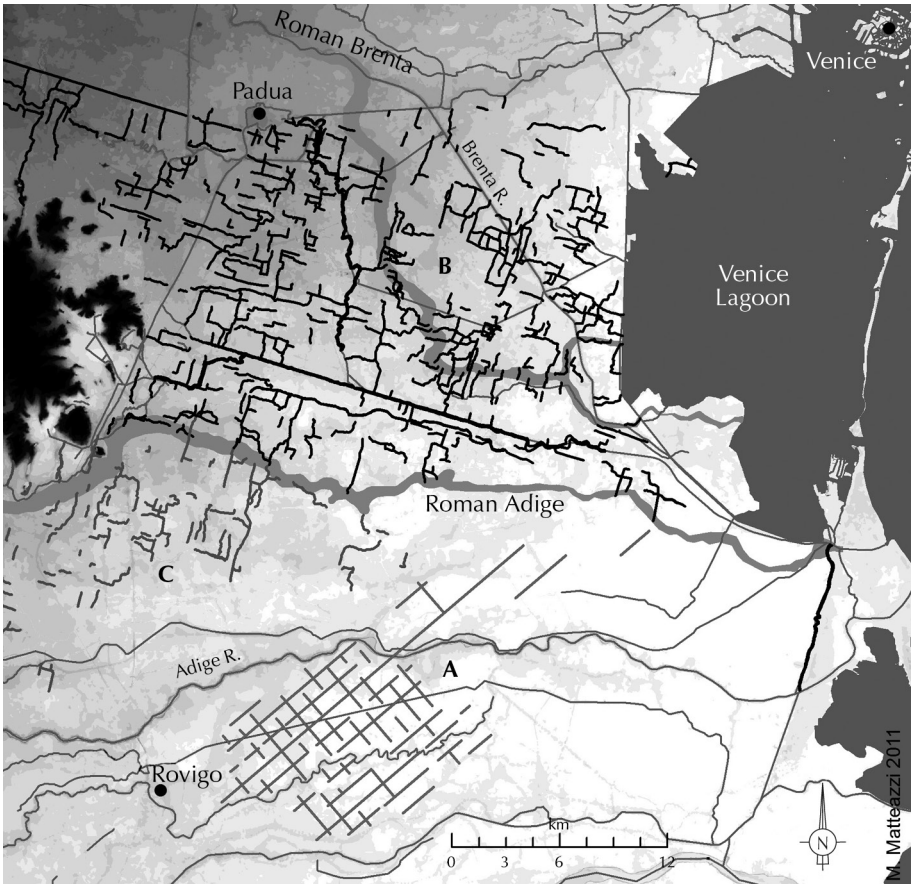


Fig. 4. *Likely centuriated field systems detected in the study area: from photointerpretation (A) and from archaeomorphologic analysis (B and C).*

were intended to improve the productivity of the land, the flow of water courses, and both the fluvial and terrestrial road network.

However, with the onset of Late Antiquity and the Early Middle Ages (5th-6th century A.D.), we notice a new and significant deterioration of the climatic conditions, marked by a rainfall cycle which brought about disastrous changes in the Venetian plain and thus in the landscape itself (Veggiani, 1983). Many rivers burst their banks, abandoning their beds to overflow into more low-lying areas, with the consequence that many of the stated areas stayed, for a long time, covered with water which then caused marshland to develop.

The effects of these events must certainly have been augmented by the lack of adequate maintenance of the hydro system which was a result of the progressive abandonment to which the lowlands were subjected. This, in its turn, was also a consequence of the general social, economic and demographic deterioration which at this time hit the Western Roman Empire. In this situation, as archaeological data highlights well, the population was constrained to move away from the low-lying areas and settle on higher terrain. At least until the 11th or 12th centuries, when the Benedictine monks began the first reclamation work in the area.

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Sous la direction de Frédérique Bertoncello et Frank Braemer

La perception des interactions entre les facteurs naturels et anthropiques sur l'évolution des environnements et des sociétés est une préoccupation majeure de la communauté scientifique, au croisement des sciences de la Terre, de l'Environnement et de la Société. La question centrale est celle de l'impact respectif des processus naturels (climatiques essentiellement) et anthropiques dans les dynamiques sociales et environnementales, que l'on peut désormais restituer avec de plus en plus de finesse. Pour dépasser les interprétations déterministes et mécanistes qui recherchent des relations directes de causes à effets, et envisager les relations sociétés-milieux dans la perspective d'un système en co-évolution, il est nécessaire de proposer des modèles de représentation et d'interprétation de plus en plus nuancés et adaptés à la variabilité des situations étudiées et des fonctionnements régionaux des géosystèmes et des anthroposystèmes. Cela passe par la mobilisation de données hétérogènes (climatiques, paléoenvironnementales, archéologiques, historiques…), souvent lacunaires, de résolutions chronologiques et spatiales variées et différents degrés de précision. De même, les effets des changements climatiques et des actions anthropiques sur les environnements et les sociétés ne se manifestent pas avec la même intensité, selon les mêmes rythmes ni les mêmes échelles. Pour confronter, dans l'espace et dans le temps, des dynamiques environnementales et sociales, des outils méthodologiques permettant de mesurer et de modéliser le changement commencent à être élaborés.
Ce sont ces questions de nature, d'intensité, de seuils, d'échelles et de temporalité des impacts climatiques et anthropiques, principaux enjeux de la modélisation des dynamiques socio-environnementales, qui ont été explorées au cours de ce colloque.

Our perception of the interactions between natural and human factors on environmental and social dynamics is a major concern of the scientific community at the crossing of Earth, Environmental and Social Sciences. The central question is the relative impact of natural (mainly climatic) and human processes on the evolution of ancient environments and societies, which we can now perceive with more accuracy. In order to go beyond mechanical and deterministic interpretations seeking direct causal links, and to consider on the contrary human-nature interactions in a co-evolutive perspective, it is necessary to propose finaly-tuned models adapted to the regional diversity of the geosystems and anthroposystems. This implies to mobilise heterogeneous data (climatic, palaeoenvironmental, archaeological, historical…), often incomplete, with various chronological and spatial resolutions and degrees of accuracy. Moreover, the intensity, rhythm and scale of the impacts of climatic changes and human activities on the environments and societies can differ greatly. News methods and tools allow change measurement and modelling in order to compare environmental and social dynamics, in space and time. This conference aimed to investigate these questions of nature, intensity, threshold, scale and temporality of the climatic and social impacts, key issues in the modelling of socio-environmental dynamics.

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