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Mediterranean Holocene climate, environment and human societies

Karin Holmgren^{a, b, c, *}, Alexandra Gogou^d, Adam Izdebski^e, Juerg Luterbacher^f,
Marie-Alexandrine Sicre^g, Elena Xoplaki^f

^a Department of Physical Geography, Stockholm University, 106 91 Stockholm, Sweden

^b Navarino Environmental Observatory, Navarino Dunes, Costa Navarino, 24001, Messinia, Greece

^c Bolin Centre for Climate Research, Stockholm University, 106 91 Stockholm, Sweden

^d Hellenic Centre for Marine Research, Institute of Oceanography, 190 13 Anavyssos, Attiki, Greece

^e Department of Byzantine History, Institute of History, Jagiellonian University in Krakow, Golebia 13, 31-007 Krakow, Poland

^f Justus-Liebig-University Giessen, Department of Geography, Climatology, Climate Dynamics and Climate Change, Senckenbergstr. 1, 35390 Giessen, Germany

^g Université Pierre et Marie Curie, Laboratoire d'oceanographie et du Climat: experimentation et approches numeriques (LOCEAN), Paris, France

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ABSTRACT

This paper introduces the reader to a special issue of articles that explores links and processes behind societal change, climate change and environmental change in a Holocene perspective in the Mediterranean region. All papers are, by purpose, co-authored by scientists representing different disciplines. The cross-cutting theme has been to reach beyond simple explanations of potential climate-society relationships and advance our understanding on how to improve research methods and theories in the field. The thirteen papers in this issue address these questions in three different ways, by i) conceptual/methodological approaches; ii) review papers; and iii) case studies.

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Can we learn about life on Future Earth by looking into the past? Can we gain any understanding of importance from the past for the development of environmental, economic and social sustainability strategies on local to global levels in times of rapid social and climate change? As historians, archaeologists, paleo-environmentalists and paleo-climatologists we often claim so, but how can we realistically contribute? Strong and long-lasting traditions to work within a single discipline have often resulted in conclusions about simple causal relationships between climate/environmental changes and human societies which are not

scientifically robust. With increased understanding about the difficult problems the world is facing today, among which is included the human induced climate change, interdisciplinary research has received higher appreciation. It is now generally acknowledged that interdisciplinary research approaches are necessary to reach beyond deterministic relationships between climate, the environment and the society in order to advance our understanding of the complex causes behind societal vulnerability and sustainability respectively (e.g. Brown et al., 2015; Ledford, 2015). To include a historical perspective on these issues is perceived as important, not least in order to formulate a balanced view on the scales and underlying processes of changes that we observe today (Caseldine and Turney, 2010; Guildi and Armitage, 2014; Haldon et al., 2014; Crumley et al., 2015). The challenge is to move beyond mere statements of the importance of interdisciplinary research in order to realize actual interdisciplinary results!

* Corresponding author. Department of Physical Geography, Stockholm University, 106 91 Stockholm, Sweden.

E-mail addresses: Karin.holmgren@natgeo.su.se (K. Holmgren), agogou@hcmr.gr (Alexandra Gogou), adam.izdebski@fundusz.org (Adam Izdebski), Juerg.Luterbacher@geogr.uni-giessen.de (Juerg Luterbacher), Marie-Alexandrine.Sicre@locean-ipsl.upmc.fr (M.-A. Sicre), elena.xoplaki@geogr.uni-giessen.de (E. Xoplaki).

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How can we work to succeed in a true integration of physical and social data and theory, analysed in a historical perspective? This was one major question for a workshop held at the Navarino Environmental Observatory (NEO), Costa Navarino, Greece, in April 2014. Sixty-one participants from 16 countries attended, representing a range of disciplines, such as: history, archeology, paleoclimatology, palynology, geomorphology, hydrology and modeling (Holmgren et al., 2014). The spatial focus of the workshop was the Mediterranean region and the temporal frame the Holocene. Stimulating discussions during the workshop led to several new initiatives, for example i) the proposal of a new PAGES working group on Society and Climate; ii) the planning of a common interdisciplinary field campaign in the Maghreb region in 2016/2017 within the Mistrals/PaleoMex program and; iii) a workshop and the formation of an interdisciplinary research network, PELOPS, focusing on Paleoclimate, Environment and Landscapes of the Peloponnesian Societies in Greece.

The first decisive move by the workshop participants to engage in a better integration is, however, this special issue of Quaternary Science Reviews. The 13 papers include conceptual/methodological papers, review papers and case studies (Table 1). All of them are co-authored by scientists representing different disciplines.

Izdebski et al. (2015a) analyse in detail the conceptual barriers hindering cross-disciplinary research and outline a number of methods to break these, while Arikan et al. (this issue) highlight the potential of interdisciplinary modelling experiments as a promising tool to approach complex and non-linear human-environment relationships. The paper by Xoplaki et al. (2015) demonstrates a holistic approach to improve our understanding of processes and drivers behind climate and climate-society systems by bridging the knowledge and evidence from climatology, palaeoclimatology, climate modelling, history and archaeology. All of the review papers and most of the case studies concern the Eastern Mediterranean/Middle East/Near East regions, while the central/western Mediterranean is represented by three studies (Fig. 1). Together the papers cover the full Holocene but with an emphasis on the late Holocene (Fig. 1). It is interesting to note that while most of the lead authors of the conceptual and the review papers are scholars from the humanities, all case studies are headed by natural science scholars. As a corroboration of the conceptual differences highlighted by Izdebski et al. (2015a), it can further be noted that – although all papers emphasize that societal development occurs both during “bad and good” climates – there is a tendency for papers with lead authors from natural sciences (i.e. the case studies) to emphasize the role of climate and the papers led by scholars from the humanities (i.e. the review papers) to highlight societal factors.

Several papers show that favorable climate generally is a plausible contributing factor to community expansions, while harsh climate does not necessarily lead to the opposite (e.g. Izdebski et al., 2015, Xoplaki et al., 2015). A changing climate may, however, lead to changing societal strategies (e.g. Cremashi et al., this issue, Gogou et al., this issue, Izdebski et al., 2015b, Mazzini et al., this issue) where different societies respond in different ways to the same specific change in climate (Weiberg et al., this issue). Other studies demonstrate how the same society seems resilient to climate change at one point in time but not at another (Sadori et al., 2015). Rapid climate events observed several times during the Holocene are discussed by Berger et al. (this issue), Clarke et al. (in press), Flohr et al. (2015) and Weiberg et al. (this issue). They all show that even though a negative impact on human societies cannot always be excluded, we are far from a conclusion that rapid climate change always leads to societal catastrophes or even to transformations. Flohr et al. (2015) identified no societal response at all in SW Asia during the rapid climate changes in the Early Holocene and they suggest that small-scale, non-specialised, societies are more sustainable than complex ones. However, more recent societies with more complex organisation have also survived and thrived despite observed rapid climate changes, as shown by several papers in this issue (e.g. Izdebski et al., 2015b, Weiberg et al., this issue, Xoplaki et al., 2015).

Human societies have always been living with and adapting to a variable climate and environment. It is clear from the latest decades of research that climate has varied at amplitudes and duration of importance for human societies even before the recent anthropogenic global impact on the climate system. The Mediterranean region is richly endowed with information on human and environmental history, which makes it suitable for exploring interactions between climate, environment and humans over a variety of time scales. The papers in this special issue demonstrate the need for local case studies to better understand the social dynamics and underlying mechanisms behind inferred climate-society interrelations. The majority of papers emphasizes the need for more highly resolved paleoenvironmental and paleoclimate records and for an improved precision in the dating of climatological and archeological-historical events and processes. Several papers stress the need to also consider other physical processes that can affect societies, particularly in the Mediterranean region where seismic activity is an important forcing of environmental changes and influences erosion base and sedimentation patterns (e.g. Morellon Marteles et al., this issue, Weiberg et al., this issue).

These points make evident that many challenges remain and they connect to some further, and perhaps even more complex, questions for forthcoming research to tackle:

Table 1
Basic information about the papers in this special issue.

Reference	Type of paper	Geographical focus	Time period covered		Labelled in Fig. 1
			ca years BC/AD	ca years BP	
Izdebski et al. (2015a)	Conceptual	n.a.	n.a.	n.a.	n.a.
Flohr et al. (2015)	Review	SW Asia	7500–5500 BC	9500–7500 BP	12
Weiberg et al. (this issue)	Review	SW Greece	7000 BC–AD 2000	9000–0 BP	6
Berger et al. (this issue)	Case study	SE France	6500–5000 BC	8500–7000 BP	1
Mazzini et al. (this issue)	Case study	N Albania	glacial; 6000 BC–AD 2000	glacial, ++8000–0 BP	4
Clarke et al. (in press)	Review	E Med–Near East	4500–3000 BC	6500–5000 BP	9
Arikan et al. (this issue)	Methodological/Case study	C Turkey	3000–1000 BC	5000–3000 BP	11
Morellon Marteles et al. (this issue)	Case study	S Albania	2450 BC–AD 2000	4400–0 BP	5
Cremashi et al. (this issue)	Case study	N Italy	1550–1170 BC	3500–3120 BP	2
Sadori et al. (2015)	Review/Case study	S Italy	AD 1–1950	2000–0 BP	3
Izdebski et al. (2015b)	Review	Eastern Mediterranean	AD 200–800	1750–1150 BP	10
Gogou et al. (this issue)	Case study	N Aegean	AD 500–2000	1500–0 BP	7
Xoplaki et al. (2015)	Methodological/Review	Eastern Mediterranean	AD 850–1300	1100–650 BP	8

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