

The Eighth World Archaeological Congress

Kyoto, Japan August 28th – September 2nd, 2016

Editing

WAC-8 Kyoto Program Committee, directed by Makoto Tomii

Design and Desktop publishing

Hidetaka Bessho

Publishing

WAC-8 Kyoto Local Organizing Committee, under the direction of WAC Japan

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Printed by

Sansei Printing Co., Ltd.

Cover: Excavation in advance of construction of Ryoshin-Kan, the main venue of WAC-8 Photo by Doshisha University Historical Museum was not as simple as used to be thought. Data on plant and animal resource use will be compared with changing settlement patterns and landscape choice. Departing from a one-way loop framework of environmental impacts and cultural consequence, this research

will illustrate the Chulmun economic progress in a long-term evolutionary perspective.

Keywords: Human-environmental interaction, Chulmun, Korea, Economy

T10-U: Social transformation and climate change

Takehiko Matsugi, Takeshi Nakatsuka and Hyeong Won Lee

This session aims to investigate the relationship between climate change and social transformation in ancient societies. Archaeologists from across the globe and representing a broad range of time periods will consider whether social, cultural and demographic changes can be explained in terms of shifts in paleoclimate. Case studies will showcase how the recent expansion in climatic data sets and independent proxies for climate can be combined with better chronologies to support more rigorous testing of hypotheses about the effects of climate change on subsistence demography and social processes.

Keywords: Social transformation, paleoclimate, environmental archaeology

社会変化と気候変動

このセッションの目的は、先史~古代における気候変動と社会変化との関係を明らかにすることである。世界各地のさまざまな先史・古代文化を対象とする研究者が、社会・文化・人口の変化が気候変動という観点から説明できるかどうかを検討する。近年ますます充実してきた各種の方法による古気候復元のデータと、高精度化した年代測定の結果とを照合することによって、気候変動が生業・人口および社会の変化に対してどのように影響を及ぼしたのかを議論する。

キーワード: 社会変化, 古気候, 環境考古学

T10U01

Reconstruction of historical weather patterns by data assimilation of old diaries and general circulation model

Panduka Neluwala and Kei Yoshimura

Reconstruction of historical climate is important to understand the climate change and past human behaviour. Daily weather information has been recorded in personal diaries from several centuries ago and can be used as a proxy for climate reconstruction. In Japan, there are around 20 weather diaries during 17 and 18 centuries. We have done a set of numerical experiments to investigate whether the information from those old diaries has potential to constrain atmospheric fields, such as temperature, pressure, and wind speed. The idealised experiment with state-of-the-art data assimilation technique, local ensemble transformed Kalman filter (LETKF) revealed that there is indeed potential to analyse synoptic atmospheric conditions by using the very limited weather information. This study aims to reconstruct the climate of Japan during 18th centuries using available diary information to the global circulation model with appropriate data assimilation technique. Keywords: Weather Reconstruction, Data Assimilation, Weather Diaries

T10U02

The story of an African farmscape: Soils, climate change and farming innovations in Bokoni, South Africa

Alex Schoeman, Stephan Woodborne and Byron Aub
Extensive stonewalls, terraces and roads, which roughly covers 24
700 km2 in northeastern South Africa, mark the location of the
precolonial Bokoni polity that flourished between the 16th and
19th centuries CE. Complex land management strategies, including
agricultural terracing, were used to navigate physical conditions
and changing environmental contexts. While these decisions
were fundamentally social, they would have been constrained and
facilitated by physical and environmental factors, such as access to
suitable soils, as well as fluctuating temperature and rainfall regimes.
This paper reports on recent research on the conditions Bokoni
farmers faced and managed; Specifically, focusing on the creation
of a terraced farming system and the associated selection and

management of farmable soils in the context of climate fluctuations, by comparison with a 1000-year rainfall proxy record for southern Africa.

Keywords: rainfall, environmental context, Bokoni, terracing, farmscape

T10U03

Climatic periodicity and societal response: Integrating paleoclimate data with historical and archaeological evidences Takeshi Nakatsuka

Recent rapid progress in high resolution paleoclimatology, using tree rings, old documents, stalagmites, varve sediments and so on, enables us to compare climate variations and societal reactions directly in annual time resolution over last several thousand years. In Japan, I have launched an inter-disciplinary research project on historical adaptions of societies against climate variations since Jomon era. Tree-ring cellulose oxygen isotope ratios, applicable for both of hydroclimate reconstruction and dendrochronological dating, have unraveled numerous examples of historical climate-society relationship in Japan, where multi-decadal climate variations often underlain large famines, wars and subsequent societal transformations.

Keywords: Climate variation, Paleoclimatology, Tree ring

T10U04

Development of chiefdoms and climate change in central Kibi area, prehistoric Japan

Takehiko Matsugi

This paper aims to illuminate a relationship between population pattern, increase of social complexity and climate change reconstructed by high resolution paleoclimatology from the mid Yayoi period (3-1c.BC) to the initial Kofun period (AD 3c) prehistoric Japan, with special attention to central Kibi area, where large burial mounds were constructed showing that local chiefdoms developed from an egalitarian society. In 3-1c BC, warmer climate seems to have promoted population growth and disperse, while cooling with heavy rainfall during AD 1-2c is considered to have caused demographic concentration into a few large settlements

together with the development of craft specialization, more sophisticated field systems and chiefly burial mounds on surrounding hills.

Keywords: paleoclimate, population, chiefdom, prehistoric Japan

T10U05

Influence of precipitation change on land-use in the Osaka Plain of the AD 6th Century

Tomohiro Inoue

In the AD 5th Century, the complex land-use which combined rice paddy cultivation, wheat cultivation and horse-breeding began in the northeastern part of the Osaka Plain. After the middle part of the AD 6th Century, floods were caused frequently and alluvial fans were developed along the channels. Burying and restoration of the paddy fields were repeated, and the complex land-use collapsed. In this paper I will suggest that such processes might be caused by the precipitation change which is indicated by the tree-ring oxygen isotope ratio.

Keywords: Osaka Plain, complex land-use, tree-ring oxygen isotope ratio

T10U06

Environmental constrains & Socio-cultural formations in early Indian subcontinent

S Rama Krishna Pisipaty

Environment is one of the major influencing factors in the socio-cultural transformations. Drastic changes have been occurred in the south Asian region by the end of the third millennium BCE. Those systems of the region are not only the primeval but also survived very long time and still in practice in many pockets. Very close to environment or nature and eco-friendly thoughts are prevailed and socio-cultural systems have been developed in the form of traditions and customs of this region. Some of observations on liturgy and traditions developed on the south Asian region vis-à-vis palaeoenvironmental studies are subject matter for the present discussion.

Keywords: Indian subcontinent, palaeo-environment, eco-friendly

T10U07

Exploitation strategies of the animal resources at the last huntergatherers and the first farmers north of the Danube (Romania) Monica Margarit

The extent to which the human cultural evolution have been influenced by the climatic changes is a highly relevant and permanently renewed question, both according to the present international strategic axes, dealing with resource management and adaptation to climate changes, and according to the archaeological research. By this study, we shall try to analyse, quantify and compare the effects of a nearly "purely climatic" phenomenon and the effects of a mostly human-driven process and to provide an integrated image on the ways in which the animal resources were exploited by the prehistoric communities, in a technological manner, at the transition from hunter-gatherers to farmers-breeders (7200 B.C. - 5000 B.C.), identifying and comparing different eco-cultural models developed in the northern Danube area.

Keywords: Mesolihic, Neolithic, osseous industry

T10U08

The Middle to Late Holocene human-environment interactions in western Turkey: A review of multi-proxy evidences Asli Oflaz, Martin Hinz and Mara Weinelt

The late third millennium BC in western Turkey was dynamic period that includes steep decline in number of settlements, growth

of settlement sizes, numerous episodes of settlement destructions, alterations in long-distance exchange networks, and changes in relations of cultural entities - while coastal areas became more connected to Aegean islands and mainland Greece, inland northwestern Anatolia linked more to central Anatolia. This paper aims to address possible interdependencies of these changes and the climate change around 4200 yr. BP (4.2 ka event), applying multiproxy multi-regional approach (including summed radiocarbon calibrations) by comparing local differences of cultural adaptive responses to environmental change.

Keywords: 4.2 ka event, settlement patterns, western Turkey

T10U09

Rethinking complexity at the margins: The Iron Age communities of the Shashi region, south western Zimbabwe

Robert Tendai Nyamushosho

Traditional wisdom amongst Africanists working in Southern Africa, has been that marginal landscapes with environmental uncertainties have always limited Iron Age settlements. The Shashi region in south western Zimbabwe has not escaped this prejudice hence it has been assumed to have not supported any significant Iron Age communities. However recent research in this marginal landscape has revealed that Iron Age communities thrived despite vulnerability to socionatural stress. In consideration of new data from the Shashi region, this paper revisits human adaptation metanarratives of Southern Africa using frameworks that de-centres the rise of sociopolitical complexity away from the Shashi Limpopo Basin. **Keywords**: Southern Africa, Mananzwe, Adaptation

T10U10

The oldest pottery and stone arrowheads in the Incipient Jomon period appeared in the cold climate in northern Japan

Kawahata Hodaka, Yui Ishizaki and Azumi Kuroyanagi

Quantitative temperature was reconstructed by alkenone method. In the pioneer days of pottery in Japan, the Jomon community experienced the coldest climate (9.5°C) in 16.7-16.0 cal.kyrBP, not in last glacial maximum. It could be attributed to weakened Asian Monsoon induced by global Heinrich Event1. The reduced temperature by 6°C relative to modern (15.6°C) suggests that environments comparable to that at modern Nosappu(Nemmuro) city. A diet from terrestrial environments could be hard to get while marine products (fishes and shells) was more fruitful, which coincides with the evidence that the earliest pottery was predominantly used for cooking marine and freshwater resources.

Keywords: Pottery, Jomon, Digital paleo-temperature, Climate, Holocene

T10U11

The adaptation of temperate-sedentary food gatherers in the subarctic environment

Masahiro Fukuda and Vyacheslav Grishchenko

The prehistoric adaptation process in subarctic zone of sedentary food gatherers should be discussed with viewpoints of lifestyle aptitude and social orientation. During the Holocene in the Japan-Russia boundary region, 1) technology selection corresponding to climate change during the process of the Jomon transgression, including with the 8.2ka cooling event, 2) technology innovation, development of wide trade network, and orientation to the outside world in the second half of first millennium BC, can be revealed based on the series of our joint researches. In any case, the temperate living structures have been adopted through the Holocene.

Keywords: Neolithic, Japanese archipelago, Russian Far East, maritime environment, adaptation, technology