

Proceedings of the Out of Eurasia Hawai'i Conference

March 02-03, 2023

**Trekking Shores, Crossing Water Gaps, and Beyond:
Maritime Aspects in the Dynamics of "Out of Eurasia" Civilizations**



Grant-in-Aid for Scientific Research on Innovative Areas (2019-2023)

**Integrative Human Historical Science of "Out of Eurasia"
Exploring the Mechanisms of the Development of Civilization**



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**Trekking Shores, Crossing Water Gaps, and Beyond:
Maritime Aspects in the Dynamics of "Out of Eurasia"
Civilizations**

Edited by Naoko Matsumoto



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March 4
Excursion

Schedule

08:00	Depart Lincoln Hall (UH Manoa)
08:15	Depart hotels
09:00	Arrive at Bishop Museum
11:45	Depart Bishop Museum
13:00	Arrive at Waimea Fall Park
14:00	Depart Waimea Fall Park
14:30	Arrive at Polynesian Cultural Center
21:00	Depart Polynesian Cultural Center
22:30	Arrive at hotels
23:00	Arrive at Lincoln Hall (UH Manoa)



March 2

Opening

Opening Remarks

Professor Naoko Matsumoto

Institute for the Dynamics of Civilizations, Okayama University

The Out of Eurasia project focuses on the human being, linking nature and culture, mind and matter, and human action and cognition, and advances a new theoretical model of the development of civilization. We strategically consider the Americas, the Japanese Archipelago, and Oceania: the final destinations of Homo sapiens who left Eurasia and dispersed by overcoming bottlenecks and extreme conditions, to observe human initiatives toward the natural environment, the emergence of specific cognitions or behaviors and the construction of relations with cohabitant species through comparative analyses. Through various interdisciplinary investigations and discussions on the mutual permeation of matter and mind as mediated by the body, we aim to overcome biological determinism and cultural relativism and construct an integrative history of humankind to clarify the specific human niche construction. Moving out of the Eurasia continent requires adaptation to either extreme coldness or a maritime environment. These prerequisites may be related to developing unique cultural and behavioral characteristics of the “out of Eurasia” populations. The Hawaii conference will be an opportunity to discuss various aspects of this process, with a particular focus on maritime adaptation. We are delighted to host this interdisciplinary conference in Hawaii, one of the final destinations of humankind, experiencing its landscape, culture, and history.



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The aim of the workshop

Professor (Ph.D.) Akira Goto
Nanzan University

Human groups who migrated from the eastern margin of Eurasia to the Japanese archipelago, the islands of Southeast Asia, and Oceania had to cross oceans. The first migration to the Americas is also likely to have been by sea (e.g., the Kelp Highway Hypothesis). In order to develop this view, this workshop will review the latest information on the sea routes required for the migration of the Out-of-Eurasian groups, and discuss the significance of human groups' trekking the shore, crossing the water gap, and going beyond the visible range. There are four important aspects to this: (1). Technological aspects: the archaeological evidence of human migration; the technology and means to adapt to the seaside environment and to migrate over the sea; (2). Physical and Ecological Aspects: skeletal and genetic features and evidence that are related to over-sea migration; environmental factors that could promote over-sea migration. (3). Cognitive Aspects: cognitive features produced for coping with seascape and islandscape (e.g. navigation and wayfinding). (4). Civilization Aspects: The importance of the sea to the Out-of-Eurasian civilizations; the importance of maritime trade in the formation of the ancient Japanese state and the civilizations of the New World; and in relation to (3), the characteristics and significance of seashore and island monuments. These issues are related to the problem of the extended mind, and mind-matter framework (triadic niche construction model: ecological, neural, cognitive)). In this workshop, we would like to ask how technological evolution has made it possible to move to new environments, and how the body and cognition have been formed in new environments and led to civilization.



Session 1 Recent issues on the migration of "Out-of-Eurasia" human groups

Chair: Goto, Akira

10:20-10:40 (in person)

Rethinking of the 'Big Game' Hunter-model: Population dispersal and Coastal Adaptation

Professor KATO Hirofumi
Hokkaido University

Keywords: North Eurasia, Coastal migration model, Aquatic resources adaptation, Microblade complex

The standard model of human migrations from Eurasia to the Americas is that the first human migrations occurred during the Last Glacial Maximum (26,000-19,000 years ago), followed by the rapid spread of populations across the Americas by 14,000-12,000 years ago (Fagan and Durrani 2016). The population that migrated from Eurasia during this period is considered to be the ancestral population of the Native Americans (Moreno-Mayar, Potter et al, 2018), and it has been supported linguistically and genetically that this population originated from the Siberian population. However, the Clovis First hypothesis, which considers the early migrant population to be the Clovis cultural group, a large animal hunter group that developed in the Americas 13 000 years ago, is now no longer the best model (Haynes 2002). The need to revise the old model is due to the remarkable advances accumulated in recent years in the fields of archaeology and palaeoenvironmental science as well as genetics. The aim of this paper is to reconsider the migration and adaptation models of Pleistocene hunter-gatherers between northern Eurasia and the Americas, and in particular the importance of coastal models and aquatic resource adaptation.



10:40-11:00 (in person)

(in person)

**Form, Function, and Design of Terminal Pleistocene shell fishhooks of the Pacific Rim:
coincidental convergence or shared knowledge?**

Des Lauriers, Matthew

California State University, San Bernardino

The time in question is the Late Pleistocene and it is a period of remarkable change for humanity. Both people and the world they live in are at a tipping point of irreversible change and movement. Cultural traditions of hunting and gathering people, accumulating for tens of thousands of years will be tested, transformed, and displaced, but not destroyed. Along the shore of the Eastern Pacific, there were communities of skilled boatwrights and fishermen that lived along the shore and on the islands of an immense East-facing coastline that looked out over an endless blue ocean. These populations had been expanding for thousands of years, as evidenced by occupation of even relatively small offshore island archipelagos like the Ryukyus. Their movements along the Pacific Rim – both clockwise and counterclockwise (perhaps better than thinking in terms of north-and-south) – clearly began before the Terminal Pleistocene crises became acute, but what begins as a trickle of population movement, became a flow once crises emerge, almost like a gravity driven siphon. What better archaeological marker for these ancestral islanders and maritime hunter-gatherers than their fishing tackle? We can identify some of the earliest fishhooks in the world along the Western Pacific Rim, and shortly after the earliest people arrive in the Americas, we see the earliest unequivocal fishhooks in the Americas along the Eastern Pacific Rim margin of the continents. We here detail some of these early hooks from Isla Cedros, Baja California, México and compare them to other Pleistocene fishhook assemblages from the Pacific. We propose that the possibility that this technological tradition was either brought as part of the early migrants' conceptual toolkit, or that the knowledge of and design for these objects was transmitted during the 'settlement' period following initial entry into the Americas.



10:40-11:00 (in person)

**Recent progress on the search for submerged late Pleistocene archaeological evidence
along the northern Pacific Rim**

Professor of Anthropology Loren Davis
Oregon State University

Keywords: Submerged landscapes, submerged sites, ancient DNA

Geographic information systems-based modeling of submerged paleolandscapes along the central coast of Oregon, USA combined with offshore geophysical and marine coring studies led to the discovery of multiple submerged and buried alluvial drainage systems dating to the late Pleistocene period. These discoveries highlight the preservation of landscape-scale stratigraphic units that may hold archaeological evidence of early coastal peoples or signal the nearby presence of geoarchaeologically-relevant landform targets. One of the Oregon marine cores held estuary deposits dating to ~13,610 cal BP. Preliminary sediment DNA analysis of this late Pleistocene estuary revealed the presence of ancient plant and animal DNA probably originating in the surrounding environment. The archaeological implications of these discoveries are important and far-reaching: late Pleistocene-aged landforms that were undoubtedly attractive to early coastal people are preserved on Oregon's continental shelf and should also be found elsewhere around the northern Pacific Rim region. While the exploration of submerged landscapes may ultimately result in the discovery of submerged late Pleistocene archaeological sites bearing artifacts and cultural features, we need not expect that this will be the only evidence there is related to human occupation along paleoshorelines. We should also consider the ancient sedimentary DNA record of submerged landscapes as another source of information about early coastal peoples and their surrounding coastal environments. Developing a robust multinational program involving paleolandscape modeling, geophysical survey and coring, and analysis of cored sediments from ancient submerged landforms that remain around the northern Pacific Rim could generate unprecedented scientific perspectives on a range of issues relating to the late Pleistocene peopling of northeast Asia and the Americas.



11:20-11:40 (in person)

Aleutian Kayak under the Colonisation of the North Pacific Coast

Professor Hideyuki ŌNISHI
Doshisha Women's College of Liberal Arts

Keywords: Aleut, baidarka, body technique, fur trade, Russian-American company

This presentation examines the socio-historic background of building and utilizing an Aleutian kayak named Baidarka collected on the Simushir island at the center of the Kuril Islands and is exhibited at the Hakodate City Museum of Northern Peoples, Japan. Particularly, by investigating technical choices and practices of the shipbuilding and the steersmanship of this collection, it elucidates the influences of the colonialism of Imperial Russia, including the Russian-American company, that affected indigenous communities on the North Pacific Coast. As the result of examinations of this collection's shape and the structure, the characteristics of technical choices and practices concerning shipbuilding and steersmanship can be comprehended. The reason for those choices and practices can especially be assumed to enforce specific hunts for small sea mammals, including sea otters, in the production of the fur trade to the Aleut by the Russian-American company, and to make long range transfers unnecessary. These results lead to a hypothesis that this collection's boat shape and structure are not only based on environmental adaptation and cultural tradition, but also compelled to Aleut people by the Russian-American company and others under Russian colonialism. Meanwhile, this perspective can be understood that various huge impacts of civilisation introduced by the colonial power also affected technical choices and practices concerned with kayak building and utility as a minor activity of daily social life in an indigenous community. Furthermore, such a phenomenon could be widely seen in similar case studies in indigenous communities worldwide including the South Pacific.



11:40-12:00 (in person)

Coral skeletons; high-resolution memories of ocean currents and winds

Drs. Tsuyoshi Watanabe

Faculty of Science, Hokkaido University

KIKAI Institute for Coral Reef Sciences

Drs. Atsuko Yamazaki

Graduate school of Environmental studies, Nagoya University

KIKAI Institute for Coral Reef Sciences

Keywords: Coral skeletons, isotopes, trace elements, current, wind

Reef corals, distributed in tropical and subtropical regions, grow with tree-like annual rings on their carbonate skeletons. Geochemical analysis along the direction of coral growth can reconstruct the marine environment on a weekly to monthly scale over centennial to millennium years of corals alive. In other words, reef corals precisely record climatic and environmental information on the time scale experienced as same as the human life scale. Reef corals have kept their appearance since ~200 million years ago and are well preserved as fossils. The precise dating and geochemical records of coral fossils make possible a direct comparison between high-resolution environmental information and human history after the late Pleistocene. In this talk, we focus on the information on ocean currents and winds obtained from reef coral skeletons and introduce and discuss the relationship between environmental change and humans' responses, as revealed by comparing the coral skeletal record with prehistoric and historical events. The fossil coral records from Kikai Island, Japan, revealed the changes in the East Asian monsoon over the past 8000 years. On Kikai Island, archaeological sites have been discovered from prehistoric to medieval times, allowing a direct comparison of the environment experienced by the island's inhabitants. Using a similar approach, we have reported from Oman fossil corals that the Akkadian Empire's disappearance in the Mesopotamian civilization coincided with the intensity of winter storms. We also introduce a new indicator that captures the strength of ocean currents from Hawaiian islands to the Kuroshio region and our ongoing project to reconstruct the marine environment and climate during human voyages and expansion into remote Oceania.



13:00-13:20 (in person)

Process & Experiences of Wayfinding

Educational Director Pā‘anaakalā Baybayan Tanaka
Hui o Wa‘a Kaulua, ‘Ohana Wa‘a, Polynesian Voyaging Society

Keywords: Wayfinding, Polynesian Voyaging, Navigation, Ho‘okele, Wa‘a Kaulua

The ancestors that settled Hawai‘i, Austronesians, were the greatest deep seafaring navigators of their time. Not only did they engineer a canoe technology capable of sailing far distances, they also mastered orienting themselves in their physical place by utilizing knowledge of their seascape, skyscape, and the communities that populated those places. Within Hawai‘i, the Hawaiian Renaissance of the 1970s presented a strong resurgence of cultural practices, voyaging being one of them. In 1976 Mau Piailug, Master Satawalese Pwo Navigator, successfully navigated Hawai‘i’s voyaging canoe, Hōkūle‘a from Hawai‘i to Tahiti, an ocean crossing of over 2,500 NM, using this practice of non-instrumental navigation. Mau went on to teach a new generation of Hawaiian navigators how to apply that knowledge of sky, sea, and animals within that realm to orient themselves and fish islands from the sea. Thus, the process of Polynesian wayfinding requires that the practitioner have foundational understandings as well as maintain their relationship to these places through practice. Tanaka will share her process, experiences, and tools used in wayfinding as it relates to her past, present, and future in Polynesian voyaging and navigation.



13:20-13:40 (in person)

Indigenous watercraft of the Pacific Rim: comparative ethnography and
experimental archaeology

Professor (Ph.D.) Akira Goto
Nanzan University

Keywords: boat, watercraft, grass-bundle boat, bamboo raft, dugout canoe, Ryukyu Islands

Coastal migration and transcending water bodies is an important topic in the human history of the Out-of-Eurasian populations. A necessary part of the discussion is the evaluation of the means of water transportation, namely boats. A boat here refers to a primitive means of transportation propelled by natural forces using natural materials, i.e., plants and animals. Plant materials can include wood, branches, bark, and grass. Animal materials can be animal hides, entrails, or bones. Natural propulsion can be river currents, ocean currents, wind, and human power. Classic studies by Hans Suder and Gerd Koch on the global distribution of boats show a diverse and complex distribution of boats in the Pacific Rim, where the Out-of-Eurasia group's spread. This presentation will review research on the nested distribution of boats in the ethnography of the New World, and Sunda/Sahul continents. I will then discuss the current status of early migrations to the Japanese archipelago and report on the results of an experimental archaeological study in the Ryukyu Islands 30,000 years ago. Different types of boats were tested in this experiment: grass-bundle boats, bamboo rafts and dugout canoes. As a result a successful paddling voyage was made from Taiwan to Yonaguni Island was made by dugout canoe. However, several problems remained: (1). diversity of island environment (e.g. availability of logs for constructing dugout canoe), (2). transportation of domestic and semi-domestic animals (e.g. Ryukyu wild boar), (3). presence/absence of sail, (4). cognitive/navigation aspects (e.g. invisibility of Yonaguni Island during the voyage) I will explore these problems in relation to 3D niche construction model.



Session 2 Mind and body of "Out-of-Eurasia" human groups

Chair: Seguchi, Noriko

14:00-14:20 (in person)

Pacific Paradox Revisited: Using Osteometric Data

Associate Professor Noriko Seguchi Ph.D.

Faculty of Social and Cultural Studies, Kyushu University

Keywords: Pacific Paradox, Polynesia, Philip Houghton, Bergmann's Rule, Osteometric data,

Philip Houghton (1990, 1991, 1996) has shown that the body types predominating in Polynesian populations are not commonly seen in those living in a tropical climate. He has examined this issue with multiple Pacific populations living in a tropical environment, using anthropometric data to show that such body types are more commonly associated with cold climate populations. This data conflicts with Bergmann's Rule. He proposed the "Pacific Paradox" hypothesis, that humans colonizing the Polynesia region have been subject to strong directional selection for a large muscular and robust physique due to exposure at sea in the tropical Pacific. The current study is an attempt to re-examine the "Pacific Paradox" through stature, body mass, body surface area, surface area to body mass ratio, and stature to body mass ratio derived from osteometric data of various climatically different populations from Alaska, Roman-era Britain, Eastern Europe, Indian Knoll, Jomon-era Japan, Santa Cruz Island, Yayoi-era Japan, Egypt, Kumejima Island (Japan), East Africa, the Philippines, the Andaman Islands, Australia, South Africa, and Polynesia (Pacific Island groups). The overall comparison shows significant sex differences for all variables. The ratio of femoral head breadth to femoral length of Polynesian groups is the largest among all comparative populations, which indicates the Polynesian populations have a wide body relative to other populations. The comparison illustrates that the Polynesian groups show similarity in surface area to body mass ratio and stature to body mass ratio to cold and temperate climate groups. The results of principal components with stature, body mass, body surface area, surface area to body mass ratio, and stature to body mass ratio plots Polynesian populations to be between cold climate groups and warm climate groups. However, when the ratio of femoral head breadth to femoral length is included for analysis, principal components plot Polynesian populations to be near populations from the colder temperate zone. Using osteometric data, the Polynesian groups do not adhere to the Bergmann expectation.



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14:20-14:40 (in person)

Out of Asia: the peopling of the Pacific based on craniometric data

Professor Emeritus Michael Pietrusewsky
University of Hawai'i at Mānoa

Keywords: Polynesian origins, multivariate statistics, craniometric data, Asia-Pacific, aDNA

In this presentation I review what we know about the peopling of the Pacific, and more specifically the origins of Polynesians, based on the application of multivariate statistics to measurements recorded in crania from the Pacific-Asia region. Previous analyses demonstrate the presence of two great divisions, one that contains all the cranial series from Australia, Tasmania, and geographical Melanesia, and a second that includes cranial series from East Asia, Southeast Asia and Polynesia. These results argue for a separate origin of the inhabitants of these two major geographical regions, a finding that is consistent with archaeological and historical linguistic models. These results further indicate an ancestral Polynesian homeland in East/Southeast Asia. More recent work involving cranial and mandibular measurements recorded in the earliest Neolithic more recent Indigenous Taiwanese are discussed in the context of evidence from recent analyses involving aDNA in the Pacific.



14:40-15:00 (in person)

How do cultural artifacts shape visual attention? A computational model analysis of cultural variability in visual search

Professor Jun Saiki

Senior Lecturer Yoshiyuki Ueda

Kyoto University

Keywords: Cultural difference; visual search; saliency map model; perceptual span; orthographical system

Cultural variability in cognition has often been accounted for by general concepts such as holistic-analytic processing based on social learning. However, more implicit and automatic behaviors, such as visual attention and eye movement, appear to be difficult to learn through imitation, and alternative accounts based on interaction with material cultures (such as letter use) are possible. The current study contrasted these two accounts by saliency-map model simulations of recent evidence for stimulus-specific cultural difference in visual search. Recently, Ueda et al. (2018) reported that search asymmetry for line-length, that is, the search for a long line being more efficient than the search for a short line, was observed among American participants, but it disappeared with East Asians. This lack of search asymmetry in East Asians is stimulus-specific, such that asymmetry with tilt-vertical search was significantly stronger with East Asians than Americans. The current study used a saliency map model that can account for search asymmetry and manipulated perceptual span. The holistic-analytic processing account predicts a larger span in East Asians than Americans, while the orthographical system account predicts a smaller span in East Asians than Americans based on reading studies. The simulations revealed that observed search asymmetry can be accounted for by assuming that perceptual span is larger among Americans than East Asians, which is consistent with the orthographical system account. The simulation also predicts a novel phenomenon of reversed search asymmetry with line-length search, more efficient search with a short line target, with even smaller perceptual span, which is recently observed with Taiwanese participants. These results suggest that stimulus-specific cultural difference in visual search likely reflects differential perceptual span derived from reading experiences, rather than the holistic-analytic processing. The interaction with material culture may be a more important factor to explain cultural variability in visual cognition than previously considered.



15:00-15:20 (in person)

Mutual permeation model of things, people, and the supernatural: Insights from Jomon pottery and *dogu* figurines

Dr. Takumi Ishii

National Museum of Japanese History

Professor Naoko Matsumoto

Institute for the Dynamics of Civilizations, Okayama University, Okayama

Keywords: Jomon pottery, dogu figurines, worldview, cognition, mutual permeation model

The value scale and worldview of the people of the civilization-forming period differed significantly from the worldview of modern people, which is based on subject-object dualism and mind-body dualism. Analysis of words and concepts in ancient Japanese literature reveals that ancient Japanese islanders before the 8th century considered non-humans autonomous entities equal to humans. The worldview can be represented in a model in which supernatural, natural, and human society mutually permeate each other. According to this model, pottery and dogu clay figurines in the Jomon period are considered to be hybrids that emerged at the center of the intersection of the members of the three societies. When these artifacts are produced, clay, clay spirits, and human beings are each involved in the production. The body of the clay and the body of the potter physically intermingle by touching each other, the spirits of both become mutually infiltrated, and the subject and object are mutually interchanged as the production proceeds. It is essential to recognize that this is entirely different from our method of making artifacts, in which people unilaterally control materials. The pottery and clay figurines produced by such mutual permeation of three parties are not only twins of clay but also children of clay spirits and of human beings. By examining the Jomon pottery and clay figurines from the perspective of the mutual permeation model, a new understanding of the artifacts is obtained. As the pottery and clay figurines are twins made from clay, which is of the same rank as humans, void images of the human, or animal, body, i.e., cranium, digestive organs, and womb, are projected on them. These were superimposed on the void images of containers to produce a variety of pottery \rightleftharpoons clay figurines for more than 10,000 years. They all consist of a combination of the above four void images. The analysis suggests that pottery and clay figurines easily fused as they are closely related as twins in the Jomon worldview.



15:20-15:40 (in person)

People living in high altitude

Professor Taro Yamamoto
Institute of Tropical Medicine, Nagasaki University

Keywords: high altitude, environment, adaptation

Background: Tibetan highlanders have adapted to hypoxic environments through the development of unique mechanisms that suppress an increase in hemoglobin (Hb) concentration even in high-altitude areas. Hb concentrations generally decrease with increasing age. However, in the highlands, chronic altitude sickness is known to occur in the elderly population. To investigate how aging in a hypoxic environment affects Hb levels in Tibetan highlanders, we focused on the Mustang people, who live above 3500 m. We tried to clarify the pure relationship between aging and Hb levels in a hypoxic environment. Results: We found that the Hb concentration increased with increasing age in females but not in males. Multivariate analysis showed that age, pulse pressure, the poverty index, and vascular diameter were strongly correlated with the Hb concentration. Conclusions: We found unique Hb dynamics among female Tibetan highlanders. As seen in these Hb dynamics, there may be sex-based differences in the adaptive mechanism in Tibetan highlanders.



Key Note Lecture

16:00-17:00 (in person)

What Polynesian Agriculture Teaches Us about Niche Construction

Associate Professor Seth Quintus
University of Hawai'i at Mānoa

Keywords: niche construction; adaptive radiation; agriculture; Polynesia; resilience

Polynesian agricultural development can be thought of as a process of adaptive radiation in that a similar set of techniques and ideas were transferred and utilized across the region. These techniques and ideas frequently related to activities that engineered landscapes, which had substantial consequences through time and across space. In this talk, I am discuss how investigating agricultural practices in precontact Polynesian helps us better understand human adaptability across different environments and the coupled relationship between humans and their environment. Instead of viewing the environment as either a backdrop of human activities or as a driver of human behavior, I will examine how the environment and human communities form a coevolutionary relationship with the result being emergent social and environmental trajectories. In doing so, I will highlight how Polynesian agricultural change teaches us important lessons about sustainability, resiliency, and behavioral change.



March 3

Session 3 New Methodologies and Comparative Perspectives

Chair: Ishimura, Tomo

10:00-10:20 (in person)

arcAstro-VR for archaeoastronomy

Professor Kazuhiro Sekiguchi (Kuninori Iwaki, Yoshitaka Hojo)
National Astronomical Observatory of Japan

Keywords: archaeoastronomy, Virtual reality (VR), 3D simulations

We are developing arcAstro-VR, a computer system that reconstructs archaeological remains from actual measurements and records and allows us to experience the effects of past astronomical phenomenon simulations in a virtual 3D space. arcAstro-VR is based on Stellarium, an open-source desktop planetarium software package that can reproduce the past starry sky with high accuracy. It can be visualized with astronomical data, and various verifications of the relationship between the archaeological remains and background celestial phenomena can be performed by moving freely in the VR space and changing the settings. The latest version (Ver0.17.3) is compatible with Meta Quest (Oculus Quest), and by connecting to a PC with MetaLink, we can experience a VR space through an HMD. In addition, a compass map display function centered on the marker that is the starting point of the auxiliary line, a dome master output that can be projected 360 degrees on the dome with a fisheye lens, and a function that simulates the reflection from the water surface by setting the water surface at any location, etc. have been added. arcAstro-VR is open source, licensed under the terms of the GNU General Public License version 3, and available for Windows (Windows 8 and above) and macOS (macOS 10.14 and above). (See <https://arcastrov.org/en/> for details). In this discussion, as an example of using arcAstro-VR, I will introduce a virtual reproduction model of the Yoshinogari ruins in Saga Prefecture.



10:20-10:40 (in person)

Uncovering the Environmental Conditions at the Nan Madol World Heritage Site
through Airborne LiDAR and Satellite SAR Data Relevant to Development of a
Monumental Stone Landscape

Jacob Comer, Bruce D. Chapman, Benjamin Holt, Adrian Borsa, Mitchell Porter

Dr. Comer, Dr. Chapman, Dr. Borsa

CSR Foundation

Keywords: LiDAR, archaeology, landscape archaeology, synthetic aperture radar (SAR), Pacific migration, ocean dynamics, agricultural intensification, agricultural terracing

Here we examine models created from airborne LiDAR data and satellite synthetic aperture radar data that reveal the environmental conditions on the island of Pohnpei in the Federated States of Micronesia, with a specific focus on the Nan Madol World Heritage Site. The high level of biodiversity and favorable landscape for agriculture in this area made it a desirable location for human habitation, leading to the development of complex cultural practices approaching the state level of social organization. The four volcanic islands in the current Federated States of Micronesia boast an extreme level of environmental diversity that is not present in the hundreds of coral atolls there. The location of Nan Madol along the coastline of the island also provided important protection from extreme weather events and attacks from competing groups. These factors play a crucial role in understanding why and how the monumental stone structures were built at Nan Madol. The models help to bring to light the significance of the environmental diversity and favorable location in developing the cultural and architectural wonders of Nan Madol.



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10:40-11:00 (in person)

Satellite Data Demonstrating the Need for Refined Navigational Knowledge Essential to the
Development of the Nan Madol World Heritage Site

Mitch Porter (B.S. - Remote Sensing and Geospatial Specialist)

Ben Holt (M.S. - Research Scientist, Ocean-Ice Group at JPL)

Eleanor Alvarez (B.S. - Research Assistant)

Doug Comer (PhD - President, Cultural Site Research and Management Foundation)

Natya Regensburger (B.S - GIS Specialist)

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Brittany Lockhart

Cultural Site Research and Management Foundation

Keywords: Traditional Navigation, SAR, LiDAR, ocean dynamics, bathymetry, wave patterns, Nan Madol, Caroline Islands

The World Heritage Site of Nan Madol in Pohnpei, Micronesia - an archaeological landscape inscribed on the World Heritage List in 2016 - exhibits abundant material evidence of a highly complex culture. We argue that such complexity resulted from the institutionalization of advanced navigational knowledge. This knowledge was essential to knit together myriads of humanly populated coral atolls in the Caroline Islands for trade and alliance vital to sustaining habitation on the atolls, resulting in the emergence of Nan Madol as a regional hegemon. To do this, however, required developing a highly sophisticated navigational knowledge to move among the atolls and forge strong links with Nan Madol. A combination of satellite multispectral, SAR, and LiDAR data was utilized to model the complexity of ocean dynamics in the equatorial zone near Pohnpei, a high volcanic island. We examined satellite imagery of ocean currents, wave and bathymetry patterns, sea surface temperature, and wind products to understand ocean dynamics and navigational cues used by traditional navigators. The analysis of both large and small-scale ocean features illustrates the significance of refined traditional navigation in establishing and sustaining a trade alliance network within the Caroline Islands.



11:00-11:20 (in person)

LiDAR surveying of ancient mounded tombs (kofun) in Japan

Associate Professor Joseph Ryan
Okayama University

Keywords: Lidar, mapping, mounded tombs, archaeology, Japan

Airborne LiDAR surveying allows for the detailed mapping of areas that were long difficult through traditional surveying methods, either because of the extensive dimensions or prohibitive terrain and vegetation. Commonly utilized around the world, LiDAR technology has been increasingly employed in recent years within Japan, as well. The Department of Archaeology at Okayama University has been conducting LiDAR surveys of Kofun-period (mid 3rd to early 7th century AD) mounded tombs located within Okayama Prefecture over the past three years. In this presentation, the author presents the results of these surveys, focusing on the work done at the Zozan mounded tomb group, Sakuzan mounded tomb, Tottori-kamitakatsuka mounded tomb, Sarayama mounded tomb group, and the Tenjin mounded tomb group, and addresses areas for further research.



11:20-11:40 (in person)

Ancient sea scape of Japan: Burial mounds as navigation points

Dr. Tomo Ishimura

Tokyo National Research Institute for Cultural Properties

Keywords: GIS; sea scape; maritime archaeology; Kofun period; Japan

Research of landscape using GIS is progressing in archaeology in recent years, and the significance of the research of landscape from the sea or “sea scape” is also being stressed. Sea scape research has important implications for understanding how people perceive the sea and adapt to the sea environment and may contribute to the development of maritime archaeology. This paper examines the sea scape of the Kofun period, from the third to sixth centuries, from the viewpoint of the location of the burial mounds and shows the possibility that some burial mounds were built as navigation points. GIS analysis and field surveys were conducted to investigate how the burial mounds located near the coast look from the sea and indicate that the burial mounds with good visibility from the sea were located at strategic points of marine routes, such as lagoons and straits. The survey also revealed that the most of these burial mounds were built in the specific period from the first to third quarters in the fourth century. This paper proposes that these burial mounds were built as navigation points to reflect the intention of the Yamato dynasty to control maritime traffics.



11:40-12:00 (in person)

Monument, ritual, worldview, and social transformation in prehistoric and
protohistoric Japan from a maritime and water perspective

Dr. Takehiko Matsugi

The National Museum of Japanese History

Keywords: state formation, long-distance trade, burial monument, prestige goods, world view

Until the 1980s, it was thought that the prime mover of social transformation from the chiefdom to the archaic state in the Japanese archipelago was the productive development of agriculture. However, from the end of 1980s onwards, the theory that long-distance trade centering on iron materials from outside society led to the state formation became influential. This is indicated by the distribution of burial monuments (kofun) from the 3rd to 4th centuries along the transportation routes. Also, the prestige goods circulating among the kings buried in these burial monuments often reflect long-distance negotiations, such as mirrors from China and fine stone products modeled after shells from the southern sea. From the 5th century onwards, complexes of large burial monuments began to be built inland, but they strengthened their character as the materialization of the image of an 'island floating in the sea.' Written documents show that the kings of the Japanese archipelago in the 5th century had an imaginary view of the world in which they ruled over the Korean peninsula across the sea, but the actual negotiations were equal and interdependent. Ceremonial grounds were built at the apex of the floating islands and promontories between the archipelago and the peninsula. The state formation of the Japanese archipelago progressed not through the conquest of agricultural land by the power of the central government, but by strengthening control of the long-distance trade network that emphasizes the sea, and directing materialistic competition with rival regions across the sea.



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Integrative Human Historical Science of "Out of Eurasia"
Exploring the Mechanisms of the Development of Civilization

**Symposium on Monument Studies of the Pacific:
ethnoarchaeological approaches to ritual.**

Chair: Nojima, Yoko & Yamaguchi, Toru

13:00-13:30 (in person)

Mana and tapu: Marquesan ritual architecture in comparative context

Professor Barry V. Rolett

Department of Anthropology, University of Hawai‘i, Mānoa

Keywords: ritual architecture, Polynesian culture, Marquesas Islands

The settlement of Polynesia represents the greatest seafaring event in the history of the pre-industrial world. As they explored and settled the eastern Pacific, Polynesians introduced the concepts of mana and tapu, as well as the basic concepts of Polynesian ritual architecture. Following settlement, however, these core concepts developed into different religious systems in various island groups. This presentation focuses on ritual architecture of the Marquesas Islands, an archipelago of ten high volcanic islands lying on the eastern fringes of Polynesia. Marquesan ritual spaces differ significantly from those in other parts of Polynesia, indicating a high degree of cultural divergence. Investigating Marquesan ritual architecture in comparative context lends insight into the origins and evolution of Polynesian cultures.



13:30-14:00 (online)

Multisensory Experiences of Society Island marae: An Ethnohistorical and
Archaeological Approach

Associate Professor Jennifer Kahn
Anthropology Department, College of William and Mary

Keywords: Ritual, chiefly centers, archaeology, Eastern Polynesia, marae, political theater

In the last decade, archaeologists have argued turned to understanding political theater, arguing that the development of large centralized polities would have been impossible in the past without heavy reliance on public events. Here, I examine public ritual events at chiefly centers and marae (temples) in the late pre-contact Society Islands, a complex chiefdom in Central Eastern Polynesia. Historic documents and archaeological data document the spread of a new war/fertility cult in the Societies in the mid-seventeenth century, which brought significant shifts in ceremonial architecture and public rituals, in particular rites of sacrifice and offerings, and led to an increase in chiefly power. Using ethnohistoric, linguistic, and archaeological data, I examine how large scale religious ceremonies associated with the ‘Oro cult developed into a new form of political theater, one rooted in multisensory perceptions of scents, sounds, and visual spectacles where varied socio-ritual elites asserted their role as moral leaders and embodiments of community integration. I use diverse lines of data, including site placement, architectural layout, the surrounding natural environment, such as sacred trees, and the use of fire, scents, chanting, omens, ritual sacra, and elaborate elite attire, to paint a multisensory picture of late pre-contact Ma’ohi political theater. As I argue, ‘Oro rituals not only heightened the visibility of rulers and separated those allowed to participate intimately from others who could not, but they likewise created contexts for the imposition of ideology and its constant negotiation among and between varied social personae and social strata in the late pre-contact Society Island chiefdoms.



14:00-14:30 (online)

Ethnoarchaeology of ritual landscape in Tongareva Atoll, the northern Cook Islands

Professor Toru Yamaguchi
Faculty of Letters, Keio University

Keywords: religious structures, marae, East Polynesia, ethnoarchaeology, landscape

There are scattered many coral atolls within the Pacific trade wind zone, the landform of which consists of unconsolidated sand and gravel. Those low and flat islets have the limited vegetation, and the most parts are covered only with coconut trees and some shrubs. The visual scene of elongated islets is less colorful, mainly composed with ocean blue, white sand and gravel of beach, green shade of coconut trees, and then reversely white beach and marine blue of lagoon. Such a nondescript space at glance had been oriented through daily and repeated experiences of inhabitants who had recognized subtle topographic undulation and given narratives to spots. Humanistic geographers would describe that the inhabitants invented specific places and landscapes within a homogeneous space, and maintained and altered them through various physical experiences. We, archaeologists, can find out prehistoric traces of such places and landscapes even in coral atolls. What is archaeologically most intriguing in East Polynesia should be marae, religious structures. I will discuss the ethnoarchaeological interpretation of marae in Tongareva Atoll, northern Cook Islands. The mid-19th Century's society was documented by an American trader, E.H. Lamont, who stayed there for nearly one year just before the introduction of Christianity. The most of Tongarevan marae share the basic components with religious sites in other East Polynesian islands such as in the Society Islands and Tuamotu Islands. These consist of an enclosed or otherwise delineated courtyard, elevated altar area (ahu) and upright stone slabs or carved images. Although the spatial arrangement within the courtyard appears geometrical, it does not mean symmetrical. The platform and uprights are configured on its one side. It would be true for the space of an islet or a sort of settlement pattern. A place of marae lies out of a habitation site, and other habitation sites are probably more distant from marae. Such an unevenness, which can be archaeologically confirmed, would have been socially experienced through the variety of body movements that differed according to socio-political positions, and the bundle of those shared experiences can be viewed to have reinforced its socio-political stratification.



14:30-15:00 (in person)

Ceremonial Landscape in Island Melanesia:
the *gamal* complex of the Banks Islands, Northern Vanuatu

Head of Research Section, Yoko Nojima
International Research Centre for Intangible Cultural Heritage in the Asia-Pacific Region

Keywords: Melanesia, Vanuatu, monumental architecture, ritual

In Melanesia, the development of large-scale ceremonial architectures such as Polynesian marae is not prominent. Along with the fact that a lot of ethnographically known Melanesian societies are tribal and egalitarian, Melanesia is sometimes regarded as a region without monuments. Accordingly, archaeological research addressing Melanesian monuments or monumental constructions are still very limited. This presentation introduces a case of Melanesian monumental landscape, drawing on ceremonial structures developed in the Banks Islands in northern Vanuatu. Vanuatu is an archipelago stretching north-south in central Melanesia, and the Banks Islands, along with Torres Islands, constitute the northernmost island group (Torba province). Ethnographically, northern Vanuatu is characterized by the linguistic and cultural diversity with autonomous groups that are inter-connected by a network of exchange, and also the development of a sort of bigman-like societies that are typified with a system of grade-taking (*suqe* or *nimanggi*). It is in some of these societies that prominent monumental constructions are identified in the archipelago, not in central or southern Vanuatu where societies are integrated by chiefly systems. The ceremonial space associated with *suqe* in the Banks Islands was once coined by Rivers (1914) as the ‘*gamal* complex’, which is composed of *gamal* or *makamal* (men’s house), some raised platform structures piled with stone slabs and other house foundations, with an empty space or dance ground at the center. The most prominent feature (and most visible even today) within the landscape is the terrace/mound with slabs that are piled up neatly like brickworks, with protruding slab pieces that are planted in the façade as a stairway to ascend on top of it, and such construction is distinctive only to the Banks Islands. While there are some varieties in spatial layouts of these structures, the basic components remain the same throughout the islands I have surveyed thus far (Vanua Lava, Motalava, and Ureparapara), and such structures are found exclusively in the interior of the island, where people used to live before being converted to Christianity. Many sites are also often associated with Western objects such as pieces of irons, glasses, and ceramics, suggesting possibilities that such sites represent the last stage of inland habitation, and are the outcomes of drastic sociopolitical transformation triggered by the Western contact.



List of Participants

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Goto, Akira	<i>Nanzan University</i>
Baybayan Tanaka, Pā'anaakalā	<i>Hui o Wa 'a Kaulua, 'Ohana Wa 'a, Polynesian Voyaging Society</i>
Watanabe, Tsuyoshi	<i>Hokkaido University</i>
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Pietruszewsky, Michael	<i>University of Hawai'i</i>
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Yamamotoi, Taro	<i>Institute of Tropical Medicine, Nagasaki University</i>
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