Japan Geoscience Union Meeting 2013
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BPT28-01 会場:202 時間:5 月 21 日 16:15-16:30

南イラン・アルサンジャン A5-3 石灰岩洞窟における 4 万 3 千年以前の風成塵堆積層と石器供給源
80,000-60,000 BP aeolian sediments and raw materials for stone tools from A5-3 limestone cave at Arsanjan, South Iran

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Six layers were confirmed through the E5 trench survey (4 X 4 m square), Arsanjan, south Iran. Layers 1 to 3 yielded more than 6,000 pieces of chipped stone, whose majority are flint. They may belong to culture layers of Late Paleolithic to Proto-Neolithic periods. Addition to these, more than 1000 pieces of animal bones in smaller size were found. Layer 4 yielded more than 100 and several tens pieces of flint chipped stones and more than 300 and several tens pieces of animal bones. Among them, Middle Paleolithic artifacts including Levallois flakes were also discovered, and layer 4 belongs to Middle Paleolithic culture layer. Five hearths, nearly located each other, were excavated from layer 4, each hearth ranges from 0.3 m to 0.5 m in diameters. Middle Paleolithic flint chipped stones were found from layers 5 and 6. The 14C of five samples from layer 2 indicates approximate 26,000 BP. Samples from below layer 2 exceeds limit of 14C age determination and dated as earlier than 43,000 BP.

The results of B3 trench survey (4 X 4 m square) are now reviewing. The culture layers are divided into ten layers. Layers 1 to 3 correspond with layers 1 to 3 at E5 trench and belong to Late Paleolithic to Proto Neolithic. Six samples from layers 2 and 3 indicate approximate 36,000 BP. Layers 4 to 10 are included into Middle Paleolithic culture layers. It is noteworthy that structures 1 and 3 were discovered from layers 6 and 7, respectively. Structure 3 presents a circular form on plan, 1 m in long axis and 0.7 m in short axis. In profile, it is conical and depth is about 50 cm. Cave limestone bedrock is used as a bottom wall of the conical shape, and concrete-like harden wall with pebbles and clays is used as the other one. The concrete-like wall might be built after cutting soil surface. The filling of the conical shape structure is light orange color clay, 50 cm in thickness. This clay presents a bimodal pattern, 5 phai and 11 phai in grain size analysis, and consists of quarts, muscovite and hydroxylapatite. The color of the clay is characteristics (10YR7/6, 6/6 etc) and conspicuous from other soil. Based on the color and clay-seized sediments, it can be concluded that they are aeolian sediments. This sediments attain to approximate 30 cm in thickness in structure 3. The use aim is unsettled as far. This conical structure may be intended to be a water-reserved place keeping water oozed from the limestone wall. Thus, the clay might be deposited in this pit, 50 cm deep. This laying down at the pit seems to be prevented from erosion and transportation because the pit was full of water. On the other hand, structure 1 presents oval shape on plan, 1.25 m in long axis and 0.75 m in short axis, and 0.15 m in depth. The same clay, a few centimeters thick, was also found at the basal part in structure 1. This clay bed is similar to the grain size and color as those of structure 3, and is probably aeolian in origin. It, however, is unsolved whether this structure was used as a watering place or not. The ages for these layers 6 and 7 are inferred 60,000 to 80.000 BP based on the artifact study.

The major lithology of chipped stones from both trenches is radiolarite. It proves from our geological mapping that radiolarite is widely distributed in the Dalnesin valley where A5-3 cave is located. In addition, the outcrop presenting the similar lithology and color to an artifact from A5-3 site was confirmed in the Dalnesin valley. The distance between A5-3 cave and the outcrop is about 4 km. The radiolarite is making a gentle topography, and the access to there is so easy. Thus, the exposure of radiolarite could be an appropriate place for collecting raw materials for artifacts. In conclusion, Arsanjan is gifted with supply of excellent raw materials.

Keywords: Iran, artifact, radiolarite, watering place, aeolian, cave

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アラビア半島南東部における石器時代遺跡の遺りやすさに関する地考古学的考察
A geoarchaeological study of the persistence of Stone Age sites in the southeast Arabian Peninsula

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アラビア半島南東部では近年、アラブ首長国連邦のジェベル・ファヤ遺跡 [1] やオマーン南部のドファール地方 [2] で、解剖学的現代人が東アフリカからこの地域を通って南アジア・中央アジア方面へ拡散していった可能性を示唆する石器群の発見が相次ぎ、現代人の「出アフリカ・南回りルート」として研究者の注目を集めている。これをうけ、2012 年 12 月から 2013 年 1 月にかけてオマーン内陸部のアル＝ワフラ地区およびワディ・アル＝カビール地区において遺跡分布調査をおこなったところ、複数の石器時代遺跡を同定することができた。発見した石器群は、中部旧石器時代から上部旧石器時代、新石器時代以降（先ハフィート期）に属するものまで多岐にわたる。これらの石器は、製作材料となる良質なチャートの岩脈のある丘陵の裾部もしくは山麓の扇状地縁辺で採集される頻度が高かった。また、丘陵頂部に造営された積石塚に石器集中が伴う事例も複数確認された。これらの石器撒布地点における地表面の観察および試掘の結果、(1) 山麓や古い段丘上では風成作用が卓越しており、デフレーションにより細粒物質だけが移動し石器が地表に露出していること、(2) 山麓扇状地では崩積または沖積作用により原位置を離れた石器が散布していること、(3) 低位面では沖積作用により更新世の地形が失われ、完新世の遺跡だけが遺存していることが明らかになった。この観察結果に基づき、生態文化ニッチモデル [3] を用いて遺跡の存在確率を空間的に評価した。

[1] Armitage SJ et al. (2011) Science 331:453-456.
[2] Rose JI et al. (2011) PLoS ONE 6:e28239.
[3] Banks WE et al. (2006) PaleoAnthropology 2006:68-83.

キーワード: 地考古学, アラビア半島, オマーン, 石器時代, 遺跡形成過程, デフレーション
Keywords: geoarchaeology, Arabian Peninsula, Oman, Stone Age, site formation process, deflation

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BPT28-03 会場:202 時間:5 月 21 日 16:45-17:00

理化学年代から試算する文化拡散速度
Cultural diffusion rate estimated from radiometric dates

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Date of culture diffusion has often been discussed in order to well understand the cultural transition and chronological secuence on archaeology and anthropology. In the case of almost Paleolithic studies, the date is based on radiometric dating, and various scenarios of cultural diffusion are drawn. However, the more we target the order period, the more reliability of the dates is decreased, resulting in rough scenarios.

In this paper, we focus on diffusion rate of several cultures, apart from the chronological studies. Research Team B02 ”Reconstructing the Distribution of Neanderthals and Modern Humans in Time and Space in Relation to Past Climate Change”, directed by Minoru Yoneda, is part of the project of ”Replacement of Neanderthals by Modern Humans”, and is collecting the information on radiometric dates in Levant, Europe and Africa between the Middle to Upper Paleolithic period. The collected data have been recorded in the B02 database ”Neandat”. Using this data, we attempted to reconstruct the Paleolithic chronology, and to simulate population dynamics so far.

Added to these, we try to estimate cultural diffusion rate with radiometric statistic analysis, and summarize the estimated rates of the specific culture groups (esp. lithic industries). The purpose is to reveal characteristic appearance of each cultural group, and find out the difference between the groups. Here, we will discuss the calculation of the cultural diffusion rate, and present summary of each cultural group.

キーワード: 理化学年代, 拡散速度, 旧石器
Keywords: radiometric date, diffusion rate, paleolithic

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GISP2 を基づいた堆積物コアの年代モデルの NGRIP 基準への改訂
Conversion of GISP2-based sediment core age models to the North GRIP ice core chronology

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The early portion of the last glaciation is beyond the range of reliable radiocarbon dating. This is problematic for assigning ages to an important period in human history that includes the migration of modern humans out of Africa and their eventual replacement of Neanderthals. In addition to the assignment of absolute age, this also complicates understanding the relative deposition timing of stratigraphic layers from distant sites. While correlation to Greenland ice core records provides an alternate dating means, paleoclimate records generated over the past 15 years often have incompatible time scales due to significant revisions in the ice core chronologies.

Creation of a compatible chronology is required prior to quantitative analysis of spatial and temporal climate variability. Here we present an automated mathematical function that updates GISP2-based chronologies to the newer, NGRIP GICC05 age scale. This is done using the original author's own age tie points and does not effect relative phasing with Greenland stadial-interstadial variations. The script is modular in design, allowing substitution of our isotope matching for the more comprehensive volcanic matching, once available. Usage of this function highlights on the NGRIP chronology, for the first time, the series of global millennial events related to the large and rapid millennial climate events of the Last Glaciation.

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Modeling the climate of the Late Pleistocene: A general overview of results and comparisons with proxy-derived data

Modeling the climate of the Late Pleistocene: A general overview of results and comparisons with proxy-derived data

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The Late Pleistocene was a period which lasted from the Eemian interglacial period, about 130,000 years ago, to the start of the warm Holocene, about 11,700 years ago. Much of the Late Pleistocene was characterized by glaciation. It was also a period which saw modern humans spread throughout the world and other species of the same genus, like the Neanderthals, become extinct.

Climate models of various complexities are used to simulate both past and future climates. In our present study, we have used three variants of MIROC (The Model for Interdisciplinary Research on Climate), a global climate model, for timeslice experiments within the Late Pleistocene: two mid-resolution models (an atmosphere model and a coupled atmosphere-ocean model) and a high-resolution atmosphere model. We discuss the general features of the simulated climate.

Climate models are not capable of simulating climates perfectly since a theoretical understanding of climate is not complete and models include simplifying assumptions and parameterizations. Biases are therefore present in models. As it is not possible to verify the reliability of simulations of future climate changes with observational data, comparing simulations of past climates against proxy-derived data provides a valuable tool to evaluate the models and investigate the degree of confidence in model estimates. We compare our climate model results with some available proxy data to elucidate where simulations show good agreement and how higher model resolution can offer further improvements.

キーワード: paleoclimate, climate modeling, Late Pleistocene, glacial-interglacial cycle
Keywords: paleoclimate, climate modeling, Late Pleistocene, glacial-interglacial cycle

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旧人と新人の交替劇と気候変動
Replacement of Archaic humans by Modern humans in relation to climate change

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現生する人類はホモ・サピエンスの１種のみであり、それ以前の生存した化石人類種は全て絶滅した。その背景には、急激な変化を繰り返しながら寒冷化・乾燥化にむかった更新世の気候変動と、後期旧石器文化というあたらし物質文化と現代的な行動をもった現生人類の拡散があると考えられるが、その主要因は不明である。本研究では、考古学的な証拠から立てられている交替劇の原因に関する仮説を整理し、古気候・古環境情報でどのような議論が可能であるか、必要とされる情報はなにであるかを議論する。地球科学各方面からの意見を期待する。

キーワード: 人類進化, ネアンデルタール, ホモ・サピエンス, 同位体ステージ３, 更新世, 旧石器文化
Keywords: human evolution, Neanderthals, Homo sapiens, marine isotope stage 3, Pleistocene, Paleolithic industry

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古環境研究文献のデータベース（ウェブ GIS）の紹介
Introduction of PaleoGeo: A web-GIS for distributing information from paleoenvironmental literature

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There is a growing interest in the paleoenvironment, and the number of relevant research papers has been growing rapidly. Paleoenvironmental studies cover various fields such as paleohydrology, geomorphology, paleooceanology, paleobiology, paleoclimatology, and chronology. It is hard for an individual researcher to collect and compile enormous data regarding these fields. For the multidisciplinary project ”Replacement of Neanderthals by Modern Humans”, we have been compiling portal data and presenting them using a web-based geographical information system (web-GIS). It shows information with a map which is an advantage over text-based systems.

The PHEIMS (Paleo-Hydrology and Environment Internet Map Server), a precursor of the PaleoGeo, was developed in the late 1990s by one of the co-authors (T. O.), using ESRI ArcView IMS as a main server software package. It contained information from papers in international journals of earth and Quaternary sciences published during the mid-1990s to 2002. It was viewed up to 3000 times annually; however, its updating ceased because of the end of the relevant project.

The PaleoGeo is being developed to revive and update the PHEIMS. We improved the user interface and data quantity (papers up to the present). The new system uses ESRI ArcGIS Server 10 and to reduce redundancy of the data, a relational database management system (RDBMS) is applied.

The collected data consist of the journal name, information about each paper (authors, title, volume, year, and page numbers), site location (country name, longitude, and latitude), theme, subtheme, keywords, DOI (Digital Object Identifier), and period (era). DOI enables users to see publisher‘s abstract pages in one click. Bibliographic information is also available at some existing web-based search engines such as the ISI Web of knowledge. However, location data are indispensable in paleoenvironmental studies. The PaleoGeo shows information with a map, which is the most distinguishable advantage of this database system.

We have collected information from almost three thousand articles of 13 journals regarding paleoenvironmental research (i.e., Boreas, Catena, Climatic Change, Earth Surface Processes and Landforms, Geomorphology, Journal of Quaternary Science, Palaeogeography, Palaeoclimatology, and Palaeoecology, Quaternary International, Quaternary Research, Quaternary Science Reviews, The Holocene, and The Journal of Geology). The themes of the articles were classified into six (paleohydrology, earth surface processes and materials, paleooceanology, paleobiology, palaeoclimatology, and chronology) and 19 subthemes (hydrology, flood, fluvial, glacier, fluvial/glacier, sedimentology, soil, slope process, periglacial, peat land, eolian, sea-level, biology, vegetation, zoology, vegetation/zoology, archaeology, climate, atmosphere, and chronology). Until now, information of over 7000 sites has been collected and the number is being increased.

Although the PaleoGeo seems to be a useful tool, it has room for improvement; for example, expanding a window showing search results, and improving the map print function. In the future, our system will be connected to the holistic bibliography catalog of the National Institute of Information (NII), Japan, to facilitate easier access to the data.

キーワード: 古環境, ウェブ GIS
Keywords: paleoenvironment, web-GIS, PaleoGeo