Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

HQR23-01 Room:302 Time:May 25 09:00-09:15

Relationship between grouth of active fold and slope collapse in Chuetsu District, Niigata Prefecture

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This study compared the relationship between growth of active fold accompanied by an earthquake and concentration of slope collapse about the case of the Yamakoshi area in the 2004 Niigata Prefecture Chuetsu Earthquake and the Nishiyama hills in the 2007 Niigata Prefecture Chuetsu-oki Earthquake. Koarai et al. (2011a, 2011b) have reported the result of this research in the first year.

The result of terrace classification in the area along Imokawa River interpreted from the 1-m interval contour lines by airborne laser survey data is shown in Fig. 1. The terrace was divided into eight steps, and terrace 5 is not covered with loam, but terrace 3 is covered with loam which contains bubble wall type volcanic glass and ortho-pyroxene. This tephra is not identified with known tephra. While UG tephra which regarded as having descended about 12,000 years ago is detected on terrace 1 (equivalent to terrace Lf1 by Hataya et al. (2006)), K-Ah tephra which descended about 7,000 years ago is detected and the tephra before UG is not detected on terrace 3. Thus, it is considered that terrace 3 was formed between 12,000 years ago and 7,000 year ago.

On the other hand, the volcanic glass which can be identified as UG was detected in the layer on terrace Lf4 along Uono River with chemical composition analysis. The existence of As-K tephra which descended about 15,000 years ago in this layer was reported by Hataya et al. (2006). The formed age of the terrace along Uono River has the possibility to be younger than before.

Displacement between present river bed and terrace 3 is about 30 m in the upstream area of the Imokawa River (near the axis of Komatsukura anticline), and is about 20 m in the downstream area of the river (near the Uono River juncture), with horizontal distance of 750 m. It is assumed that the difference of the displacement is brought by the growth of Komatsukura anticline. Based on Koarai (1990), it is considered as the growth rate of active fold is supposed to be equivalent to: (vertical displacement / horizontal distance) / terrace formation age. The growth rate of Komatsukura anticline might be calculated as: (vertical displacement of terrace 3 / horizontal distance) / formation age of terrace 3 = (10m / 750m) / 7,000-12,000yr =1.1-1.9$*10^{-6}$/year. According to Koarai et al. (2010), the growth rate of active fold is 8.3$*10^{-7}$/year in the Nishiyama Hills, and 4.5-5.3$*10^{-7}$/year at Yamamotoyama terrace (covered with Iz-Kt), 1.0-1.2$*10^{-7}$/year at Kowadahara terrace (covered wiyh Aso-4), 1.0$*10^{-6}$/year at Ikenaka-shinden terrace (covered with DKP), and 1.1$*10^{-6}$/year at Ojiya terrace (covered with AS-K) in the Ojiya area. The growth rate of active fold (Komatsukura anticline) near Imokawa River region is corresponded to the Nishiyama hills or the Ojiya area in order level.

In the case of the 2011 Nagano and Niigata border Earthquake, slope collapse was concentrated on Matsunoyama area which is located on the hanging wall side of a reversed fault and crustal deformation was detected by InSAR in this area (Nakano et al.2012).The phenomenon that slope collapse by an earthquake is concentrated on the upheaval region was also observed by the 2004 Niigata Prefecture Chuetsu Earthquake and the 2007 Niigata prefecture Chuetsu-oki Earthquake. Since Matsunoyama anticline existed in Matsunoyama area, slope collapses may have occurred in the growth region of active fold accompanied by an earthquake.

Keywords: active fold, slope collapse, Chuetsu District, Imokawa River basin, growth speed, UG tephra

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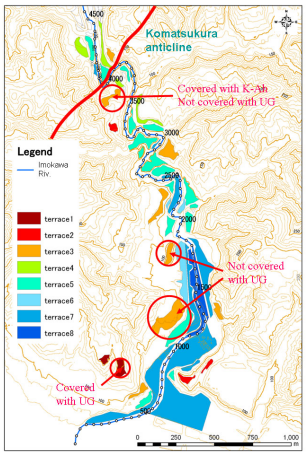

Japan Geoscience Union Meeting 2012
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HQR23-02 Room:302 Time:May 25 09:15-09:30

Magnetostratigraphy of the sediment cores derived from the Setagaya and Fuchu areas of Tokyo Metropolitan, central Japan

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Three sediment cores were derived from the Setagaya and Fuchu areas of Tokyo Metropolitan, southern Kanto Plain, central Japan. The NUCHS-1 core drilled in the Setagaya area of Nihon University is composed of terrace deposits, peat and tephric loess up to -12.7 m, and marine sand and gravels of the early Pleistocene Kazusa Group from -12.7 to 80.0 m. The Cobb Mountain Subchron was found in the NUCHS-1 core from -12.7 to -24.5 m. The TAT-1 and TAT-2 cores drilled in the Fuchu area of Tokyo University of Agriculture and Technology. The TAT-1 and TAT-2 cores are composed of terrace deposits and tephric loess up to -11.5 m and 8.9 m, and marine silt sand and gravels of the early Pleistocene Kazusa Group from -11.5 m and 8.9 m to 50.0 m. The Olduvai Subchron was found in the TAT-1 and TAT-2 cores from -11.5 to -16.3 m and -8.9 to 23.0 m.

Keywords: Kanto Plain, Magnetostratigraphy, Early Pleistocene, Sediment core, Kazusa Group

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HQR23-03 Room:302 Time:May 25 09:30-09:45

Sedimentary facies and physical properties of the Kazusa Group cores from Setagaya and Fuchu area Tokyo, Japan

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The Pliocene to Middle Pleistocene Kazusa Group is widely distributed in the Kanto Plain, central Japan. In this study, we obtained three cores from the late Pleistocene terraces called Musashino uplands in the southwestern part of the Kanto Plain. These cores consist of the Kazusa Group sediments, terrace gravels, and volcanic ashes and surface soils called Kanto Loam, in ascending order. We logged the lithology and sedimentary structures of these cores in detail. Grain-size distributions, water content, density of soil particles, electrical conductivity and pH values in soil-stirred water were measured. Also, diatom assemblage analysis and X-ray fluorescence analysis were conducted.

The 80-m-long CRE-NUCHS-1 core was obtained from Setagaya district, Tokyo (altitude: 41m), which is located on the Shimosueyoshi surface of the Musashino uplands. It consists of the bluish gray sand of Kazusa Group, terrace gravels, and Kanto Loam in ascending order. The sand of the Kazusa Group indicates upward coarsening trend with abundant pumice and plant fragments. The sulfur value and electric conductivity are high in upper part. The lower part of the sand (below 45m in depth) contains the shell fragments with high calcium content and pH values.

CRE-TAT-1 core (altitude: 56.06m, penetration depth: 50m), and CRE-TAT-2 core (altitude: 59.14m, penetration depth: 55m) were drilled in the Fuchu city, Tokyo, which is on the Tachikawa surface of the Musashino uplands. They are divided into unit 1 to unit 7 units in ascending order. Unit 2, 4, and 6 are gravels. Unit 1 is sandy channel sediments and floodplain sediments. Unit 3 consists of silt with brackish-water diatom. The lower part of the Unit 5 is bluish gray silt with abundant marine diatom. Since the sulfur content and electric conductivity is high, this part should be the marine sediments. It gradually changes into the sandy channel and floodplain sediments. Geomagnetic polarities change from normal to reverse in unit 5 (Ueki et al., this volume). Thus, unit 1 to 5 should be the Kazusa Group sediments. Unit 6 and unit 7 are terrace gravels and Kanto Loam, respectively.

Acknowledgement

This work was supported by the Core Research Evolutional Science and Technology (CREST) project of Japan Science and Technology Agency (JST).

Keywords: Kazusa formation

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HQR23-04 Room:302 Time:May 25 09:45-10:00

Human-environment interactions and a framework of prehistoric anthropography

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Present paper discusses how the reconstructed human society from archaeological records should be integrated and named when we understand the human-environment interactions. Prehistoric human society that has reconstructed from various Quaternary disciplines is only possible to evaluate from fragmental excavated data. There are two feedback reference methods from present to the prehistoric past. First is experimental archaeology, and the second is ethnographic archeology; and both are called as middle range research in archaeology. The latter method based exclusively on behavioral patterns of present ethnographic evidence. As a matter of fact, the reconstructed prehistoric world is not a concrete ethnography and /or ethos, it should be emphasized that a neutral term anthropography will be more adequate when discusses the prehistoric objects. The ongoing project, Historical variation in interactions between humans and natural resources: towards the construction of a prehistoric anthropography, (project leader: A. Ono) will be introduced in this connection, and the conceptual framework of prehistoric anthropography is also discussed.

Keywords: prehistory, anthropography, middle-range reserach, ethnographic archeology, human-environment interactions, archaeology

Japan Geoscience Union Meeting 2012
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HQR23-05 Room:302 Time:May 25 10:00-10:15

Radiocarbon dates of the Early Upper Palaeolithic and Environmental History during the MIS 3 in the Palaeo-Honshu Island

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Relationships between human activities and environmental changes have become an important research topic in the Japanese Palaeolithic archaeology. This presentation focuses on this topic with particular reference to the temporal correlation among climatic and archaeological records during the Marine Isotope Stage (MIS) 3 in the Palaeo-Honshu Island.

To show the general outline of the environmental history of the MIS 3 and MIS 2, climate history has been roughly divided into seven phases:

MIS 3 Stable Warm (ca. 60,000-44,000 cal BP)
MIS 3 Transition (ca. 44,000-38,000 cal BP)
MIS 3 Early Cold (ca. 38,000-28,000 cal BP)
MIS 2 LGM Cold-1 (ca. 28,000-24,000 cal BP)
MIS 2 LGM Cold-2 (ca. 24,000-15,000 cal BP)
MIS 2 LG Warm (ca. 15,000-13,000 cal BP)
MIS-2 LG Cold (ca. 13,000-11,500 cal BP)

Archaeological sites of the Early Upper Palaeolithic have been correlated with these climate phases, using calibrated radiocarbon dates by Intcal09.

MIS 3 Stable Warm and Transition (ca. 60,000-38,000 cal BP)

These phases are placed early half of the MIS 3 in which relatively warm climate condition had been dominated in the Last Glacial. Around the Lake Nojiri at the central Honshu, fossil bones of the megafauna at the Tategahana site have been placed ca. 53,000-37,000 cal BP. Tategahana was interpreted as a kill and butchery site, however, the presence of the big game hunters is still uncertain. We have no reliable archaeological evidence of the Early or Middle Palaeolithic period (before 37,000 cal BP) in the Japanese archipelago.

MIS 3 Early Cold (ca. 38,000-28,000 cal BP)

The earliest human occupations in the Palaeo-Honshu Island were characterized by trapezoid tools, blade tools, edge-ground stone tools, and circular settlements are found in Tachikawa Loam layer X and IX, at ca. 37,000-34,000 cal BP. Compiled radiocarbon dates of the Early Upper Palaeolithic sites were concentrated on ca. 37,000-30,000 cal BP, and they were almost coincided with the Early Cold phase (ca. 38,000-28,000 cal BP). The number of Palaeolithic sites increased suddenly after 37,000 cal BP. This event seems to coincide with the timing of the migration of Homo sapiens into the Japanese archipelago as many archaeologists pointed out.

The temporal placement of the lithic industry from Tachikawa Loam layer VII and VI, characterized by blade tools especially standardized backed blades, seem to be placed at 33,000-29,000 cal BP. It coincides with the second half of the Early Cold, however, climate had already become cold and dry condition same as the LGM Cold phase (28,000-24,000 cal BP).

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Exploitation of obsidian sources in the Central Highlands and the earliest obsidian use

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A number of Upper Palaeolithic (UP) and Jomon occupation sites remain in an obsidian source area of Kirigamine and Yatsugatake, Nagano Prefecture. The site distribution pattern attributed to both periods is in stark contrast in the area. While the UP sites tend to be concentrated in a high altitudinal zone above 1500 m particularly close to the sources, the Jomon sites tend to be distributed in hillslopes apart from sources in a lower altitudinal zone below 1500 m. This fact reflects historical changes of procurement technologies, landscape use, organization of groups, and the circulation systems. Obsidian from the Central Highlands is a non-local lithic raw material transported and distributed extensively in central Japan. Here, non-local means that transportation of lithic raw material is more than 80 km to a residential area.

PROCUREMENT TECHNOLOGY: obsidian used in the UP is collected from the ground surface of either outcrops or other procuring spots. No evidence asserting the existence of mining activities of the UP has been found. The earliest use of obsidian from the Central Highlands dates back to ca. 38 ka cal yr BP. In contrast, large-sized Jomon mining sites in which underground obsidian nodules were dug out from numerous pits have been discovered. The existence of digging technology features in Jomon procurement activities. The earliest mining pit dates back to the late phase of the incipient Jomon.

LANDSCAPE USE: UP obsidian procurement tended to be connected with primary nodule processing, stone tool production, and short-term encampment probably with hunting activities. In addition, large-sized lithic workshops adjacent to the sources occurred as a result of the recurrent landscape use. This is the reason why concentrated distribution of the UP occupations occurred in places close to the sources. While primary processing of obsidian took place in the vicinity of mining pits by the time of the incipient Jomon, subsequent mining activities were not associated with lithic workshops. No semi-sedentary Jomon settlement, except small-sized temporary sites have been discovered above 1500 m. Specialization in mining and carrying out unprocessed obsidian nodules, and rarity of other subsistence activities close to the sources are features of the Jomon obsidian procurement.

ORGANIZATION AND CIRCULATION SYSTEM: three types of procurement patterns are recognized in the UP. First, the procurement is originally embedded in an extensive territory of local groups. Second, small parties dispatched by a local group obtain and transport obsidian. Third, a local group near the source area supplies obsidian to the other local groups. The first and the second patterns had occurred since the Early Upper Palaeolithic (38 - 28 ka cal yr BP), and the third one emerged in the Late Upper Palaeolithic (28 - 16 ka cal yr BP). For the Jomon obsidian mining, the existence of specialized task groups which engaged in mining activity is assumed. Jomon pottery and hearth features packed between layers of abandoned soil resulted from digging indicate the existence of encampment matched the period of work. The Jomon settlements and the mines are completely distinguished from each other. A large amount of obsidian artifacts, and obsidian storage often found from the former sites located in the zone below 1500 m show them to be relay stations for obsidian circulation. The tendency for specific obsidian from a given source to be transported and distributed in a specific consumption area and time reflects either the emergence of a local group which controlled the obsidian circulation, or of highly sophisticated social relations among the local groups, or both.

The oral presentation also refers to the earliest obsidian use of the UP peoples in the Kanto Plain, and its relationship with the dispersal of modern humans into the Japanese Archipelago.

Keywords: The Upper Palaeolithic, The Jomon Period, Natural resource exploitation, Obsidian, Jomon mining

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HQR23-07 Room:302 Time:May 25 10:45-11:00

Drastic environmental changes recorded in the core deposits of Balkhash Lake, Kazakhstan

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To reconstruct environmental evolution in Ili Delta and Balkhash Lake areas, Kazakhstan, we have continued geological, geomorphological and paleoenvironmental researches under the Ili project, RIHN, since 2007(Endo et al.,2010). Following the results of lake level change in the last 2000 years using 2007 core in the western part of Balkhash Lake, we took several cores in 2009 in the easternmost part of the lake, where is the deepest part of the lake. These 2009 cores cover almost Holocene, and have been analyzed using pollen, diatom, and ostracod, and also geochemical and magnetic properties. These provide us continuous environmental records, which are combined with geological and geomorphological evidences in the land survey along Lepsi and Ili rivers to discuss the environmental evolution especially in mid Holocene in central Eurasia.

Location of two cores, 0901 and 0902, is in the easternmost part of Balkhash Lake, in the deepest part of the lake, about 20 m in depth. Cores are 5.67 m and 5.80 m in length, composed of whitish, massive clayey horizons, and blackish to brownish laminated silt/clay, partly sandy layers.

Both cores can be divided into three main sedimentary units of A,upper, B,middle and C, lower.In the core 0901, the unit A of 0-1.1 m and unit C of 4.0-5.6 m consist of massive whitish clayey sediments, and the unit B of 1.1-4.0 m is the alternations of finely-laminated sediments including sandy layer from 2.6 to 3.0 m. In the core of 0902, three units show the same character as 0901 core but the thickness is a little different, the unit A of 0-2.1 m, the unit B of 2.1-4.85 m, the unit C of 4.85-5.8 m. Both units A and C show high Ca, while unit B relatively low Ca, high Fe and Si. Especially in 0902 core, fine gypsum crystals are rich in the 3.55-3.68 horizon of the unit B, probably suggesting rapid desiccation of the lake floor. In this case, the lake level must be 20 meters lower than the present level.

The unit B of the cores is characterized by special lithology, frequent changes in diatom and ostracods, arid land vegetation like desert, decreased pollen from coniferous forest, suggesting dominance in highly lowered lake level, and warm and dry climate. It ranges from 6000-5500 to 3500 years ago, corresponds to the mid Holocene hyper arid stage, recently recognized in various regions.

Keywords: Balkhash Lake, lake level change, Central Eurasia

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HQR23-08 Room:302 Time:May 25 11:00-11:15

Holocene synchronous fluctuations of the river beds flowing into Balkhash Lake and their relation to climate change

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Sedimentology and geomorphology team of Ili project organized by Research Institute for Humanity and Nature has reported Balkhash Lake level changes (e.g., Endo et al, 2009; Chiba et al, 2010 , Sugai et al, 2010) and fluvial geomorphology of the rivers running into Balkhash Lake (e.g., Shimizu et al, 2010; Sugai et al, 2010; Kondo et al, 2011) based on field survey and integrated sediment analyses. This paper reports Holocene riverbed fluctuations of the Kurty River, a tributary of Ili River, and correlates with those of other rivers flowing into Balkhash Lake. Then, it discusses climate control on riverbed fluctuations along with the Balkhash Lake level changes. Holocene terrace levels along Kurty River can be classified into three of KH 1, 2 and 3 whose relative altitude to the present riverbed are about 6-7, 4-5, and 2 m, respectively. KH 1 was formed during early to middle Holocene (before ca. 5 ka: stage 1), while KH 2 and 3 late Holocene (from ca.2 ka to LIA: stage 3). Between ca. 5 ka and ca. 2 ka (stage 2), fluvial processes became inactive and aeolian processes were dominant.

KH 1, 2 and 3 can be correlated with LRT 2a, 2b and 3 terrace levels formed by Lepsy River, respectively. Both stages 1 and 3 can be correlated with the periods of high water level of Balkhash Lake, while stage 2 with low water level. In between the late 13th c and early 15th c of stage 3 peat or peaty silt deposited in wide areas inc. Kurty River valley, paleo Ili river channel system preserved on Bakanas delta, and Lepsy River valley, while Balkhash Lake level recorded highest during the last 2 ka. These suggest cold and wet climate conditions appeared in wide areas, central Asia. This probably reflects the increase of precipitation supplied from North Atlantic Ocean by the westerlies under negative NAO phase.

Endo et al,2009; Shimizu and Sugai, 2010; Sugai et al,2010;Chiba et al,2010: Project report on an Oasis-region vols.,7 and 8/ Endo et al,2011,Shimizu et al,2011: abstracts JpGU 2011 meeting/ Sugai et al, 2010; Kondo et al,2011: abstracts, Japan association for Quaternary research scientific meeting

Keywords: Ili river, central Asia, fluvial terrace, Holocene, climate change, chronology

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HQR23-09 Room:302 Time:May 25 11:15-11:30

Numerical evaluation of human impacts on hydrological cycle of Ili-Balkhash basin

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The Ili River Basin is stretching over the China and Kazakhstan. It is an internal river that flows into the Balkhash Lake, which is the largest lake in the Central Asia. Its significant discharge comes from the Tian Shan ridge. Thus, elevation and precipitation difference in the basin is very large. Especially, from the middle part of the river to the lower part of the river, precipitation amount is drastically decreased, and there are classified as semi-arid and arid zone. While traditional living form of this region was combination of nomadic grazing and agriculture, there were large-scale developments such as electric power development by a dam construction and agricultural development during the period of the Soviet Union. In addition, under the condition of global warming, the amount of water supplied by glacier melting in the Tian Shan Mountain might decrease. Thus, to evaluate these anthropogenic impacts on hydrological cycle of the basin, we constructed a hydrological model.

The model consists of several modules to simulate hydrological processes. While spatial resolution of river routing is 0.5 degree, runoff calculation is executed with 1km spatial resolution. Time resolution is 1day. Number of tuning parameters is designed to be minimum as possible as we can. Without considering any anthropogenic impacts, simulated results could not follow the actual water level change of the Balkhash Lake after 1980. Thus, to clarify what kind of human impacts is the most significant one, we attempted to consider irrigation to agricultural lands, evaporation from the Kapchagai reservoir and outflow from melted glacier. As a result, we found that irrigation and evaporation from the Kapchagai reservoir are the two important factors which have a significant impact on water level changes of the Balkhash Lake.

Keywords: Ili River, irrigation, Kapchagai reservoir, Balkhash Lake

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HQR23-10 Room:302 Time:May 25 13:45-14:00

The history of soil erosion in the Chinese Loess Plateau

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With regard to the history of soil erosion in the Chinese Loess Plateau, historians and historical geographers have hypothesized that the anthropogenic destruction of vegetation accelerated soil erosion and increased the flood frequency in the North China Plain. In order to demonstrate this hypothesis, geologists or physical geographers have accumulated related data. However, the specific effect of human activities and climate change on soil erosion is still unclear. Therefore, this paper proposes to introduce landform division and to conduct case studies in each geomorphic region for solving the abovementioned problem. Further, the necessity of study on the historical development of landforms is emphasized since it is the basis of landform division. As a case study, this paper conducts temporal comparison between two satellite imageries on the Chinese Loess Plateau.

Keywords: history, soil erosion, Loess Plateau, remote sensing, geographical information system

Japan Geoscience Union Meeting 2012
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HQR23-11 Room:302 Time:May 25 14:00-14:15

The buried river valley found at Lake Tonle Sap, Cambodia

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Lake Tonle Sap is a huge lake located in the central part of Cambodia. The lake is known to drastically shrink and swell in an annual cycle. In dry periods the lake is less than 1-m deep, whereas the water depth exceeds 10 m in rainy periods. The latter phenomenon is caused by a water pulse supplied from the lower Mekong River For this, Lake Tonle Sap serves a natural flood control for the Mekong delta, preventing floods, although the precise function and its historical change are still unclear.

Although previous studies presented the environmental history and geological structure for a limited small area of the lake, investigations for the wider are is expected to better understand the seasonal behavior and its role in the Southeast Asia. For this, we undertook a seismic survey three times covering the whole all area of the lake using an echo-sounding device (Strata Box by Synquest Inc.). The total distance of the survey reached up to 300 km.

The seismic data for Lake Tonle Sap showed that the lake bottom is quite flat and the strong sonic reflectance was spatially observed at 1 to 2 m under the lake bottom surface. This suggests that thin mud layer is deposited up to the depth. On the other hand, the pattern of the sonic reflectance showed an lvalley-shapd configuration at several measuring lines. This valley could be a remnant of old streams having the depth ranging from 10 to 14 m and the width from several hundred meters to several kilometers. We reconstructed the distribution pattern of the paleo-Tonle Sap Rivers by spatially connecting the buried rivers

We collected the sediment core at the deepest part of the Paleo Tonle Sap River, and a series of lab measurements were undertaken, e.g., 14C dating, paleomagnetism, and physical properties. These will be shown in the other paper during the conference.

Keywords: Lake Tonle Sap, buried river valley

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HQR23-12 Room:302 Time:May 25 14:15-14:30

Chronology by 14C analyses of wood circles excavated at the Mawaki site facing on Toyama Bay, in Noto Peninsula

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The Mawaki archaeological site, one of the biggest archaeological sites in central Japan, is located on the alluvial coastal plain facing to the Toyama bay at Noto peninsula, Central Japan. Excavation surveys at the site revealed that the site had been continuously occupied from the Early to Final Jomon periods (ca. 5200 cal BC - 500 cal BC). In the final stage of the site, wooden circular structures, peculiar to this region, were constructed. At the Mawak site, totally 31 wooden poles have been excavated. The circular structures were discovered for the first time during the excavation in 1982-83, and confirmed explicitly in 2002-04. According to the archaeological studies, the combinations of 6-10 poles among these 31 wooden poles formed 6 independent circular structures (designated as Circles A to F). All wooden poles are chestnut trees, being cut in half vertically and possessing no bark. The biggest pole belonging to Circle A is about 1 m in diameter, and 10 poles were used to make up the Circle A. Each pole was set up in a pit of about 10-70 cm in depth from the ground surface. Diameter of the circles is about 5-7m, and circles A and B have a gate-like structure. The six structures overlapped each other at limited areas indicating that these structures had been rebuilt five times consecutively. Among the archaeological sites well-known for the wooden circular structures, the Mawaki site has the most typical structures and the wooden poles were well preserved against weathering. Therefore, the circular structures at the Mawaki site are suitable for chronological studies.

The 14C wiggle-matching technique normally uses 14C ages of several annual rings from the same wood. The radiocarbon community has developed internationally accepted data sets that describe the relation between 14C ages and tree-ring ages (IntCal09). The 14C ages of successive rings of sample wood are compared with those of the IntCal09 calibration data set by shifting the annual-ring number on the calibrated-age axis. Then the most probable calendar date is obtained for the outermost ring of the sample wood by using all the 14C ages measured for annual rings.

This analysis was applied to wood samples, belonging to individual sets of wooden circular structures excavated at the Mawaki site, to estimate calendar age values of their outer-most rings accurately, and the formation age of each structure was estimated. For Circle A, 4 wooden poles and one wooden plate were analyzed and it was concluded that calendar age of its construction was about 820-770 cal BC. Also, the analysis was conducted for 2 wood poles belonging both Circles D and E, for one wood pole belonging definitely to Circle E, 2 wood poles belonging to Circle F. However, clear results were not obtained, because of the flat 14C age structure against calendar age on this age periods in the IntCal09 calibration dataset. Calendar ages assigned briefly for the circles are: 770-740 cal BC for Circle D; 690-540 cal BC for Circle E; 740-680 cal BC for Circle F. The wood samples belonging to Circles B and C were impossible to collect this time. The 14C age, 2655+/-25 BP, for the outermost ring of wood belonging to Circle B obtained by the previous work was calibrated to be 890-790 cal BC. The present experiment suggests that the formation of wooden circular structures lasted from 890 cal BC to 540 cal BC at the Mawaki site.

By applying the wiggle-matching analysis to 5 wood samples from Circle A structure at the Mawaki site, we were successful to assign the period of its formation in 50 years range. However, for other circles that can provide only limited number of wood poles to the wiggle-matching analysis, the precision of the age estimation was not good. The poor precision also resulted from the flat 14C age structure against calendar age around this age periods in the IntCal09 calibration dataset.

Keywords: 14C age, Jomon shell midden, wood circle, chestnut wood, 14C wiggle-matching, layer of dolphin bones

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HQR23-13 Room:302 Time:May 25 14:30-14:45

Stratigraphy and chronology of the late quaternary sediments from Lake Imuta-ike, Kagoshima, southern Kyusyu

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We present the stratigraphy and chronology of the sediment core from Lake Imuta-ike, southern Kyusyu over the last 30,000 years.

Lake Imuta-ike, is a volcanic crater lake, located on the southern part of Kyushu Island. The lake serves a protected natural habitat of rare animals, and is a registered wetland under the Ramsar Conservation. The environment of the lake and its vicinity is of particular importance, because there have been no geological studies so far.

We collected sediment cores from the lake in February 2011 for reconstructing the past environmental history of the lake since the last glacial period. Using the core, we undertook a series of analysis, e.g., lithological observation, non-destructive X-ray CT scanning, identification of tephras, 14C dating and sequential measurements of physical properties and paleomagnetism. A part of these were used to build up the stratigraphy and the precise chronology of the core.

Sediment cores were taken up to the 25-m depth from the lake bottom, according to an overlapping method (e.g., Nakagawa et al., 2011) using a thin-wall and vibro-hitting sampler.

The lithology of the cores was composed of a peat layer to the 7.6-m depth, a mud layer (7.6 to 13.0 m) and a volcanic material complex called Shirasu (below 13.0 m). Six volcanic ash layers were visibly intercalated within peat layer, and four of these were wide-spread tephras: Sakurajima-5 (Sz-5) at 3.25 m (thickness: 7 cm), Kikai-Akahoya (K-Ah) at 4.53 m (21 cm), Sakurajima-11 (Sz-11) at 5.75 m (1 cm) and Sakurajima-Satsuma (Sz-S) at 6.60 m (32 cm).

Radiocarbon dates shows no stratigraphycal contradiction. The date above the Shirasu layer (12.66 m) was 30,040+/-300 cal BP, showing a good agreement with the previously reported age of a pyroclastic flow when the Shirasu was deposited. The age-depth plots indicated that the beginning of the peat deposition could be at 15,000 cal yr B.P. This corresponds to the onset of B/A warm interstadial in LGIT. The average sedimentation rate was ca. 0.5 mm/year for the peat layer. The falling ages of the volcanic layers in Lake Imuta-ike were estimated to be5.5, 7.1 10.5 and 12.8 ka for Sz-5, K-Ah, Sz-11 and Sz-S, respectively. Our results are reasonably comparable with the those obtained from the eastern area of the Osumi Peninsula (e.g. Okuno et al., 1997).

The sediment of Lake Imuta-ike has a great potential for the paleoenvironmental study in this region over the last 30 ka.

Keywords: Lake Imuta-ike, tephra, the Sakurajima Volcano, the Ito pyroclastic flow, peat

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HQR23-14 Room:302 Time:May 25 14:45-15:00

Middle Pleistocene tephrostratigtaphy of C9001 core drilled by CHIKYU off Shimokita Peninsula and its application for in

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We described Middle Pleistocene tephra layers detected from C9001 core drilled by CHIKYU off Shimokita Peninsula, and attempted to correlate these tephra layers with those already identified on land by previous studies. Two pumiceous tephra layers found at 141.2 mbsf (meters below seafloor) and 146.6 mbsf are very similar to Tanabu B and C tephras, respectively. Tanabu B and C tephras are both derived from Osore-zan volcano located in the north part of Shimokita Peninsula. Two marine terraces named Toei and Kabayama from upper to lower have been formed before and after the depositions of Tanabu B and C tephras. In previous studies, the ages of Tanabu B and C tephras have been not determined precisely, resulting in two interpretations that the ages of Toei and Kabayama Terraces are MIS 9 and MIS 7, or 203-212 ka and 163-169 ka. Due to the isotope stratigraphic study by Domitsu et al. (2010), two tephra layers found at 141.2 mbsf and 146.6 mbsf are positioning in MIS 7. This will constrain the ages of Toei and Kabayama Terraces. A vitric tephra found at 154.8 mbsf is similar to Shiobara-Otawara tephra in the chemical composition of glass shards. Previous study concluded that Shiobara-Otawara tephra was derived from Shiobara caldera in the north part of the Tochigi Prefecture at 300-330 ka as a large ignimbrite and a plinian pumice fall deposit distributing with NNE axis. However, the age estimation (250 ka) by the isotope stratigraphic study by Domitsu et al. (2010) shows that the vitric tephra found at 154.8 mbsf is younger than that of Shiobara-Otawara tephra. It means that reconsideration of age estimation or correlation is needed.

Keywords: Chikyu, Off Shimokita Peninsula, tephrochronology, Osorezan-Tanabu tephra, Shiobara-Otawara tephra

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HQR23-15 Room:302 Time:May 25 15:00-15:15

Stratigraphy of Middle to Lower Pleistocene tephras under Koriyama Basin, Northeast Japan

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In order to construct the stratigraphy of Middle to Lower Pleistocene tephras under the Koriyama Basin, Northeast Japan, a 100.33 m long boring-core was obtained at the Fukushima Prefectural Koriyama-kita Technical High-school (248.6m absl) located on the Koriyama Upland emerged between occurrences of Nm-SB tephra (110 ka) and DKP tephra (620 ka). We detected two well-studied Middle Pleistocene fall-out tephras and one Lower Pleistocene ignimbrite. A white fine pumice fall deposit with a thickness of 4 cm collected from 37.63-37.67 m in depth can be correlated to Sn-SK tephra derived from Sunagohara Caldera at 220 ka. A weather pumice fall deposit with a thickness of 16 cm collected from 38.24-38.40 m in depth can be correlated to So-OT tephra derived from Shiobara Caldera at 300-330 ka. A thick ignimbrite with a thickness of ca.11 m (69.60-80.37 m in depth) is similar to Asino Ignimbrite erupted Lower Pleistocene Caldera in south part of Fukushima Prefecture at 1.27-1.45 Ma. The recognition of these tephras constrains the age of the sediment filling the Koriyama Basin, providing significant information for consideration of the development of the Koriyama Basin.

Keywords: Koroyama Basin, Middle Pleistocene tephra, ignimbrite, Boring core, Koroyama Formation