

New development of the wide soil penetrator GS-YH-13 intended to high recovery rate of excavated sample

Hideki Yoshikawa^{1*}, Futoshi Nanayama², Kiyoyuki Shigeno³

¹National Institute of Advanced Industrial Science and Technology, ²Geological Survey of Japan, AIST, ³Graduate School of Sci. and Eng., Ibaraki Univ.

In general, we use peat sampler and soil penetrator, which are common excavation methods in geomorphological investigation because of low environmental impact. Upon collecting a sample minimal excavation, although this method is a very effective. But it was difficult to get wet or/and sandy samples because of simple structure of its sampler. In addition, its weight is piling up, such as connecting rods, had been struggling to move in wetlands. Although we have been developing and improving our soil sampler over the past 10 years. We retry to improve the new wide soil penetrator GS-YH-13 in three points as bellows; (1) increasing the recovery rate of the wet and sandy samples, especially in the distal end portion which is that there is no loss of sample, (2) targeting 1m as the length of the sample while maintaining the large diameter (30mm) of sampler, (3) reducing the weight and increasing the convenience using for wetlands.

Keywords: geomorphological investigation, wide soil penetrator, GS-YH-13, high recovery rate, excavated sample, development

Internal Structure of a Lithalsa in the Akkol Valley, Russian Altai Mountains

Go Iwahana^{1*}, Kotaro FUKUI²

¹IARC / University of Alaska Fairbanks, ²Tateyama Caldera Sabo Museum

Perennial frost mounds are present near the edges of ponds located on the terrace between the mountain flank and a valley-bottom lake in the Akkol valley of the Russian Altai Mountains. These mounds are 10?50m in diameter and 3?6m in height. We describe one mound, identified as a lithalsa, which had been eroded so as to expose almost the entire vertical cross-section and reveal its internal structure. The frozen core consisted mainly of soil segments suspended in reticulate ice lenses with a mean thickness of 11?48mm and a maximum thickness of about 160mm. The shapes of the soil segments matched their neighbours. Other features included soil segments suspended in the ice veins shaped like En echelon gash veins, and the presence of a radial structure of ice-rich and sediment-rich frozen bands. These features in the core all suggest a differential stress field during and after heaving of the mound due to ice segregation, acting as a more important factor than the thermal gradient, including its direction and water supply. Based on observations of the cross-section and isotopic analysis of the ice in the permafrost core, this lithalsa appears to have developed by syngenetic differential ice segregation, even after uniform thermal and hydrologic conditions, since these were followed by epigenetic creep deformation of the cryostructure, probably with a redistribution of ice due to non-coaxial shear. Given the complexity of the cryostructures in this lithalsa, the reconstruction of its development using cores samples from boreholes would have been very difficult, particularly since the dip angles of segregated ice lenses and soil segments suspended in the ice networks have changed. Laboratory experiments and numerical simulations, supported by field observations such as those in this paper, are needed to generate further insight into the growth processes of lithalsas.

Keywords: lithalsa, frost heave, frost mound, Altai, segregated ice, internal structure

Weathering of bedrock surface after glacier retreat in the Swiss Alps

Kento Adachi¹, Atsushi Ikeda^{1*}, Tsuyoshi Hattanji¹

¹University of Tsukuba

This paper discusses how the strength of intact bedrock surface has been changed within twenty thousand years in an alpine environment. The strengths of rock surfaces were measured in the Upper Engadin, Swiss Alps, where the history of glacier retreat after the Last Glacial Maximum has been well investigated. The glacier distributions of three main stadials are evident in the study areas, which are the Little Ice Age (AD1850), Younger Dryas (12 ka) and Oldest Dryas (15-18 ka). Forty-one roches moutonnees and twenty-four rock walls of glacial troughs were selected for this research, which consist of granodiorite, diorite, gneiss or limestone. The rebound values of Schmidt hammer and Equotip hardness tester, and P-wave velocities were measured as indices of surface weathering. To compare bedrock surfaces and the intact parts, two blocks were sampled from two gneiss roches moutonnees with different ages. Their specimens, not including the weathered surface, were provided for an elastic wave test, uniaxial compression test, radial compression test and Equotip test.

These tests suggested that the strength of rock surfaces has been reduced through the last 20,000 years, except for that of limestone. The decrease in the strength is remarkable at the early stage of the weathering. In particular, the decrease rates of granodiorite and diorite can be approximated by logarithmic curves. Although granodiorite and diorite roches moutonnees exposed after the Little Ice Age are mostly unweathered, gneiss rocks with the same age have already been weathered over large parts of their surfaces. Unloading from overlying glaciers weakened the surfaces of gneiss rocks, reflecting their schistosity parallel to the surface. In contrast, the surfaces of limestone rocks have been constantly renewed by dissolution. Therefore, the weathering duration does not affect the surface strength of limestone but increases its surface roughness. The surface strength of rock walls of glacial troughs is controlled by occasional rock exfoliation owing to the gravity, as well as by weathering conditions.

Keywords: weathering, roche moutonnee, Holocene, Late Glacial, Schmidt hammer, Swiss Alps

Found Kikai-Tozuhara tephra on central district of Kaetsu-Uplands and its meaning

Tsutomu Sakamoto^{1*}

¹Kanazawa University Graduate School of Natural Science and Technology

Kaetsu uplands are located between Ishikawa and Fukui Prefecture and placed on northern part of active faults on east side of Fukui plain. This area is compressive stress field by many active faults and folds. So that this district is consist of clear upheaval and sedimentation areas. Reserching area is Central part of Kaetsu uplands. From existing research, this researching area is decided into M2 terrace. But marine terraces on east part of this area are distributed into M2 without established era data as tephra, paleomagnetism, but west part of it is decided by Youokura(1991)and so on. So, I thought that before researching all of marine terrace in this area.I have to decide whether or not all of this area is M2 terrace.

I found silt layer at Akao, Awara-city on Kaetsu uplands. Took off sands and experimented. I used MAIOT by Furusawa geology to prove an index of refraction.

I found Kikai-Tozuhara tephra(K-Tz)from these samples because

- 1) an index of refraction is between 1.396 and 1.500,
- 2) has high temperature quartz,
- 3) doesn't have biotite.

From these evidence, all of Central part of Kaetsu uplands are decided to M2 terrace and formed on MIS5c.

From this research, I thought that there are precondition for researching about topography of Kaetsu uplands.I think that now, I can research about this area on geomorphology.

Keywords: Kaetsu uplands, marine terrace, MIS5c, tephrochronology

Signatures of ESR signals observed in quartz of Kizu river sediments and in host rocks

Yoshihiko Nosohara^{1*}, Shin Toyoda¹, Masashi Takada², Aiko Shimada³

¹Okayama University of Science, ²Department of History, Sociology and Geography, Faculty of Letters, Nara Women's University, ³JEOL RESONANCE Inc.

Paramagnetic lattice defects in quartz have recently been used as tracers to study the transportation of sediments on the surface of the earth especially for the origin of aeolian dust (e.g. Toyoda and Naruse, 2002), as isotopes have been used. Studies on aeolian dust have used only the E₁' center while impurity centers were shown to be other useful signatures in the studies of river sediments (Shimada, 2008). The present research aims to characterize the sediments of Muro River, a branch river of Kizu River, by analyzing the ESR signals quartz of the sediments. We collected seventeen river sediments and two granites which are possible sources of river sediments. The samples were crushed and sieved to 1000-500, 500-250, and 250-75 micrometers. Quartz grains were extracted from each size fraction by chemical treatment and density separation. The quartz grains were heated at 400 degree celsius for 1 h to erase the inherited ESR signals before gamma ray irradiation. ESR measurements were performed at room temperature and at 81 K to observe E₁' and Ge, and Al and Ti centers, respectively.

The impurity centers were enhanced by gamma ray irradiation. The formation efficiencies of the signals at the origin were obtained, which probably correspond to impurity concentrations in quartz. The E₁' center was observed after heating the sample irradiated to 2.5kGy at 300 degree celsius for 15 min. The formation efficiencies of impurity centers and the intensity of the E₁' center showed constant values in 10 samples of sediments of Muro river with standard deviations of (7 to 12%). It was also found that these values characterize the sediments of each branch river. Details will be reported in the presentation.

Keywords: ESR, quartz, river sediments

Chronology of the terrace surface in the southern part of Kujukuri strand plain, Pacific coast of the Boso peninsula

Kuniyasu Mokudai^{1*}, Futoshi Nanayama², Shinzou Ooi³

¹Pro Natura Foundation Japan, ²Geological Survey of Japan, ³Ibaraki Univ.

The marine terrace around Taito-zaki of the Pacific coast of the Boso Peninsula is considered that formed in Marine Isotope Stage (MIS) 3 by Kuwabara et al. 1999. We surveyed terraces and strata in this area.

Keywords: marine terrace, Ichinomiya River, MIS 3, hill, structural landform

Formation process of the Noshiro coastal dune, northeastern Japan: insight from internal structure and its distribution

Takako Utsugawa^{1*}, SHIRAI, Masaaki¹

¹Graduate School of Urban Environmental Sciences, Tokyo Metropolitan University

The Noshiro coastal dune extends from the Oga Peninsula in a direction NNE through the margin of the northern Hachiro-gata reclaimed land separating from the Japan Sea and is classified as a superpositioning coastal dune. It is about 30 km in length and reaches a height of almost 40-50 m at its peak (the highest peak is 65.2 m in height, Shiraishi 1990). It is composed mainly of detritus originating from the Neogene to the Quaternary strata around the Ou Mountains and delivered by the Yoneshiro River; which has a drainage basin of approximately 4,100 km².

The stratigraphical division; the units composing the Noshiro coastal dune are labeled, in ascending order, "older dunes (Do)", "older humic soils (Ho)", "younger dunes I (Dy-I)", "younger humic soils (Hy)", and "younger dunes II (Dy-II)" and formation processes of the Noshiro coastal dune have mainly been researched by Shiraishi (1990; 1993). However, the following research has not previously been carried out. Based on the characteristic shape of the dune, which is elongated in a longshore (N-S) direction, this study focuses on the formation process of the dune in the longshore direction. We discuss the processes involved in the formation of the dune, based on topographic maps and on the internal structure discussed in our field survey.

A survey using topographic maps and field studies indicated differences between the topographical characteristics and formation processes of the northern and southern parts of the Noshiro coastal dune.

(1) In E-W direction, the northern part (approximately 750 to 1,500 m) of the dune is shown to be wider than the southern part (approximately 500 to 1,000m). (2) The height of the southern parts of the Noshiro coastal dune tends to be higher than that of the northern parts. (3) At the southern site, a wavy humic soil layer was recognized in the lower part of Dy-I. It means that small sand dune bodies had been scattered at Dy-I forming age.

In addition to differences in crustal movements dipping a northeastward, it is evident that there is another factor to be considered to explain the difference between the topographic characteristics. We deduce that a decreasing supply of the beach deposits that supplied the coastal dune sand, caused a change in the formation processes of the northern and southern parts of the Noshiro coastal dune. It is possible, therefore, that swarm of barchans formed a complex internal structure in the southern part of the dune. It would be worth evaluating the sedimentary supply and its affect on the formation process of other coastal dunes situated in a longshore direction.

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Keywords: coastal dune, internal structure, sedimentary supply, barchan, Noshiro region in Akita Prefecture