Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

HDS29-01 Room:415 Time:April 28 11:00-11:15

Holocene rock avalanche phenomena from the upper Okumatashirodani Basin, Kamikochi Valley, northern Japanese Alps

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Hummocks and a minor ridge both of which have been considered to be moraines are present on alluvial fans near the Shinmurabashi Bridge, Tokusawa Area of Kamikochi Valley in the Hida Mountains. A series of geomorphological, lithological, and chronological studies of these landforms and their forming materials revealed that hummocks and a minor ridge were formed by two different rock avalanches that occurred on the steep east face of Kitahotaka-dake north ridge about 3000 m ASL and ran into valley floor near the Shinmurabashi Bridge. A terrestrial cosmogenic nuclide dating method of igneous rocks comprising hummocks and a minor ridge showed that hummocks were formed during 6.0-7.9 ^{10}Be ka and a ridge was during 0.8-1.1 ^{10}Be ka.

Keywords: landslide, in-situ terrestrial cosmogenic nuclide dating, Hida Mountains

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HDS29-02 Room:415 Time:April 28 11:15-11:30

Rock failure of welded tuff in Sounkyo valley, Hokkaido, on September 2013

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A rock failure occurred at the left valley side of the Ishikari River in Sounkyo, Hokkaido, on 8th September 2013. Although Route 39 runs along the Ishikari River, rocks did not reach on the road, because the road is 170m distance from the collapse slope in the other side of the Ishikari River. However, the rock debris buried a part of the river, and formed a 200m-long flooding area at the upper reach. The type of this rock failure is a rock slide to a debris avalanche with high velocity flow.

Paleogene shale of the Hidaka Supergroup is overlain by Sounkyo welded tuff at the valley wall. Sounkyo welded tuff consists of two facies. The lower is a soft non-welded part, and the upper is a welded part with developed columnar or platy joints. Sounkyo valley has been formed by erosion of the pyroclastic flow deposits (30Ka), Sounkyo welded tuff, from Ohachidaira Caldera by the Ishikari River. In consequence, steep cliffs have developed in the valley. At the collapse point, only the uppermost 30m of the slope is steep cliff, but the lower 140m is about 40 degree. According to air photo interpretation, the surface with gently roughness profile develops on the 40 degree slope. This shows talus deposits as past collapse debris overlie the slope.

The area of the slope failure, erosional and depositional area, is 190m in height, 90-100m in width, and 365m in length. The equivalent coefficient of friction is 0.52. The volume of the collapse is more than 33,000m^3. Sounkyou welded tuff is exposed on the upper slope with 90m height, and the debris of the collapse covers on the lower slope with 95m height. A debris slump, 45m height and 20m width, is locates on the lower center part of the debris slope. A part of the past talus deposits is exposed by this debris slump. The Hidaka Supergroup shale is covered with talus deposits. Springs from the piping halls eroded the gullies in talus, and the talus deposits were wet state at the investigation of two days after the failure.

The debris from the collapse slope was spread in lobe-shapes over the valley flat. Arcuate ridges and troughs, 1-2m high, shaped concentric half circles in the center axes of the main lobe. This suggests flow-type mass movement. The debris is distributed on 130m in length and 120m in width of the valley flat. The most of the debris is grayish white welded tuff, and the pale reddish welded tuff originated from the uppermost slope is distributed around the ridges. Shale of the Hidaka super group is rare. The squeeze of the mixture of the soil deposits, composed of woods and organic matters, and volcanic ash is distributed in front of the ridges and in gaps in the troughs. This was dragged from the base of the moving body of the collapse, and played a role in a flow layer, matrix facies, of debris avalanche. The talus deposits would be fluidized. The debris would run with high velocity at the front part of the depositional area. According to the estimating equation (Sceidegger, 1973), using the equivalent coefficient of friction, the velocity is estimated by 38m/s at the foot of the slope.

The rock failure was occurred by the bellow mechanism. Rock slide was occurred near the boundary, the Hidaka Soupergroup shale and the non-welded part of the tuff, and the upper slope broke down. Ground water concentrates in the permeable layer of the non-welded tuff on the impermeable layer of the shale. Because the pyroclastic flow, the Sounkyo Welded Tuff, buried the former valley slope of the Hidaka Soupergroup shale in 30,000 years ago, the boundary is incline toward the river, and also the structure of the tuff is incline. This rock failure was occurred at the instability slope, which consisted of soft non-welded tuff with concentrated groundwater beneath heavy welded tuff. The columnar joints, the collapse surface, at the uppermost of the slope have opened before the rock failure, because moss grows on the joint surface.

Keywords: rock failure, welded tuff, rock slide, debris avalanche

Japan Geoscience Union Meeting 2014
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HDS29-03 Room:415 Time:April 28 11:30-11:45

Geologic causes of Akatani rockslide induced by heavy rain with typhoon Talas (1112)

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Heavy rain by the Typhoon Talas in 2011 triggered many landslides at Kii Peninsula. The Akatani rockslide in Gojo City, Nara Prefecture is one of the largest landslides, which has dimensions of 500 m wide, 1100 m long, about 80-100 m deep, and 10 million cubic meters in volume. Geologic causes of the rockslide were investigated.

Geology of the Akatani rockslide is composed of mudstone and sandstone of the Miyama Complex of the Shimanto Belt. Not only bedding plane, but also fault planes and joint planes formed in various stages are weak planes related to the rockslide. The average attitude of the bedding planes tends to dip steeply northward while varying. However, there are low-angle dip slip faults nearly parallel or daylight to the slope surface. These are considered to be out-of-sequence thrusts, because they obliquely intersect bedding plane and some of them subdivided the Miyama Complex into several tectonic units. The rupture surface is not smooth curved but rough. This was the combined fragile planes including faults subparallel to the slope. It is similar to the other landslides in the Shimanto Belt that simple slide along bedding planes did not occur.

Japan Geoscience Union Meeting 2014
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HDS29-04 Room:415 Time:April 28 11:45-12:00

Development history of sagging around Kanmuriyama Pass, Gifu-Fukui prefecture boundary

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Recently sagging landforms like double ridges and uphill-facing scarps attract attention as precursors of large-scale landslides. Many types of large- and small-scale saggings have been ubiquitously found in the Japanese mountainous regions by the analyses of detailed topographic maps made by LiDAR survey. Their development histories and processes, however, are unclear. We report the results of field and chronological researches on saggings in the Kanmuriyama Pass area, Gifu-Fukui prefecture boundary. Since the lithology and age of sediments accumulated in the linear depression between the double ridges east of the Kanmuriyama Pass were reported in the last meeting, those on the uphill-facing scarps west of the pass will be presented in the meeting this year.

Four rows of uphill-facing scarps parallel to the slope are recognized on the south side of the prefecture boundary ridge about 2 km west of the Kanmuriyama Pass. The sediments accumulated in the linear depressions were collected and analyzed by the hand-auger boring and pit survey. Lithological characteristics of these sediments are common and they are composed of, in descending order, 1) carbonaceous mud/leaf litter mixture, 2) dark gray mud, 3) light gray mud, and 4) orange-color conglomeratic mud. This lithology is also similar to that of the sediments between the double ridges east of the Kanmuriyama Pass. The sediments in the first, second and third depressions from the top include Kikai-Akahoya tephra (K-Ah) about 7.3 ka or have peaks of volcanic glass contents of this tephra. The horizons of the tephra, however, are recognized in the different lithologies; the sedimentary environment about 7.3 ka varied with the depression. The ages of the tephra and the AMS-^{14}C ages of wood fragments embedded in the sediments indicate that the sedimentation rates of the dark and light gray mud members are about 0.08 mm/year, and several times slower than those of the upper carbonaceous mud/leaf litter mixture member. The depressions and uphill-facing scarps formed about several tens of thousand years ago on the basis of the estimation of the thickness of sediments and the extrapolation of the sedimentation rate of the mud formations.

Keywords: sagging, landslide, Gifu, Fukui, Kanmuriyama

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HDS29-05 Room:415 Time:April 28 12:00-12:15

Detection of pre movements of landslide or deep collapse using InSAR and LiDAR

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It is possible to detect pre movements of landslide or deep collapse using SAR interferometry technology. As previous studies, there are example of the Shimegake Landslide on the foot of Mt. Gassan, Yamagata Prefecture and the Ohkamizawa Landslide in Higashi-naruse Village, Akita Prefecture. In this research, the usefulness of the monitoring methodology which combined SAR interferometry and LiDAR data will be verified for the monitoring of region where the deep collapse will occurred. This research is supported by the Grants-in-Aid for Scientific Research (No.22500994). The main verification fields are Nagano Prefecture and Shizuoka Prefecture. The used InSAR imageries are analyzed by Geodetic Department, the Geospatial Information Authority of Japan, using the data of PALSAR which is L band SAR of the earth observation satellite ”Daichi” (ALOS).

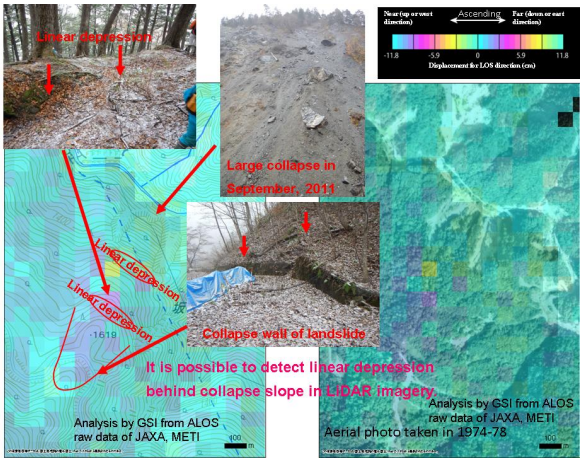
Near the Kuchisakamoto Landslide of Shizuoka Prefecture, a change significant by InSAR imagery in the autumn of 2008 and the autumn of 2009 had occurred, and about 6-7 cm deformation to the LOS direction was observed in one month and a half of 2009. In field survey, the authors checked that the large landslide had occurred between November, 2012 and June, 2013 (Nakano et al., 2013; Koarai et al., 2013).

In west side of Sakamaki hot spring of Nagano Prefecture, about 6-7 cm deformation to the LOS direction was observed in InSAR imagery of one year from 2008 to 2009, and large collapse occurred in September, 2011. In LiDAR data imagery taken before the collapse occurred, it is possible to detect linear depression behind collapse slope.

In this presentation, the authors report many case of pre movement of landslide detected by field survey or LiDAR data in the areas where InSAR imageries show small deformation in Nagano Prefecture.

Fig.1 InSAR imagery of west side of Sakamaki hot spring (2008/07/20-2009/09/07) and sloop deformation detected in field survey

Keywords: deep collapse, landslide, InSAR, LiDAR, Nagano Prefecture



Japan Geoscience Union Meeting 2014
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HDS29-06 Room:415 Time:April 28 12:15-12:30

Prediction and stability evaluation of potential sites of deep-seated catastrophic landslide

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Chigira (2009) and Chigira et al. (2013) analyzed geological structures and topographic features of deep-seated catastrophic landslides induced by rainstorms in accretion complexes of the southwest outer belt of Japan, and found that those landslides had been preceded by gravitational slope deformation typified by small scarps along their future crowns, which could be a clue to predict potential sites of catastrophic deep-seated landslide. This paper summarizes the methodology of potential site prediction and stability evaluation of catastrophic landslides, including stratified rocks in addition to broken beds and mixed rocks in accretion complexes.

In order to extract potential sites of catastrophic landslide, we need to judge whether deep-seated gravitational slope deformation may develop to catastrophic failure or not, considering possible structures of gravitational slope deformation on a certain geologic background. We examined the relationships among morphological expression of gravitational slope deformation, geologic body, geological structure, and deformation mechanisms, then took account of upslope and downslope conditions, and finally tried to evaluate the probability of catastrophic failure with the help of our experience of previous catastrophic landslides.

Irregularly shaped bumpy slope:

This is typically made when incipient sliding zones are being made in a rock body with complex discontinuities like broken beds or mixed rocks. Only this topography does not suggest the high probability of catastrophic failure, but additional eye-brow shaped small scarps and failures in the lower part of a slope may suggest high probability.

Linear depressions and wrinkles:

Symmetric alignment of linear depressions on both sides of a ridge suggests lateral spreading with the settlement of the ridge top, which does not likely develop to catastrophic failure.

Linear depressions and wrinkles developed on one side of a ridge are made flexural toppling of steeply dipping foliations of bedding or cleavage. This type is self-stabilizing deformation, but when downslope-facing eye-brow scarps are made and lower part of the slope is failed, catastrophic failure likely occur. Ridge-top depressions, when connected to steps and to a hollow on the side margin of a deformed area, catastrophic failure also likely occur.

Large head scarps or ridge top depressions:

These topographies on an under-dip cataclinal slope suggest buckling deformation, which may be stable when a competent rock layer exists or deformation extent is less, but when the deformation progresses further and lower slope is failed, the probability of catastrophic failure becomes high.

Large head scarps or ridge top depressions on an over-dip cataclinal slope suggest sliding in a strict sense with mature and continuous sliding zones. Such a landslide may continue slow movement without catastrophic failure, but when the foot is cut by failure, it may develop to catastrophic failure.

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Chigira, M., Tsou, C.-Y., Matsushi, Y., Hiraishi, N., Matsuzawa, M., 2013. Topographic precursors and geological structures of deep-seated catastrophic landslides caused by Typhoon Talas. Geomorphology, 201, 479-493.

Keywords: deep-seated catastrophic landslide, gravitational slope deformation, site prediction, susceptibility evaluation

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HDS29-07 Room:415 Time:April 28 12:30-12:45

Estimation of the slip-surface of landslide using electromagnetic approaches at Nishiikawa, Japan

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Landslide is one of the severe disasters triggered by rainfalls or earthquakes. Recently, landslides tend to increase by global-warming. Therefore, exploration into behavior of landslide becomes more important disaster prevention.

In order to explore landslide's behavior, we verified if there is slip-surface or not using magnetic approaches. In previous research, we had selected a test slope at Nishiikawa, Tokushima and we had performed electrical resistivity exploration and core-sampling. The core-sampling results indicate that there exists the structure which corresponds to slip surface. To verify this result, anisotropy in magnetic susceptibility (AMS) and natural residual magnetization (NRM) of samples that include that structure and periphery of it were measured. AMS result showed that slip-surface region provides the oblate ellipsoid characteristics, which was consistent with the developmental mechanism of slip-surface during sliding. And result of NRM indicated that magnetic minerals in slip-surface region oriented certain direction. This describes that magnetic minerals was able to move in saturated region and then were oriented to direction of earth magnetism.

These studies showed the possibility to identify slip-surface using rock magnetic approach. However, we found necessity of consideration of core-sampling technique to estimate the direction of slip using this approach because samples had rotated during core-sampling.

The details will be provided in the presentation.

Keywords: landslide, anisotropy in magnetic susceptibility, natural residual magnetization

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HDS29-P01 Room:Poster Time:April 28 18:15-19:30

Dendrochronology of a fossil log from the dammed lake deposit by Dondokosawa rock avalanche, the Southern Japanese Alps

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Large-scale rock avalanche deposits (Dondokosawa rock avalanche deposits; DRAD, V=1.9×10^7 m^3) are present in the east side of Mount Jizo, the Akaishi Range. The age of DRAD has been determined by a ^{14}C-method as AD780-870 or as AD778-793 (with help of wiggle matching). However, precise age determination of DRAD is further required as the some uncertainties remain in the previous age data. Therefore, we performed dendrochronology of a fossil wood log of Japanese cypress (*Chamaecyparis obtusa*) with 226 tree rings and bark obtained from the dammed lake deposits formed by DRAD. As a result, the fluctuation pattern of tree ring width of the sample log (DDK-A) clearly coincided with the pattern during a period from AD662 to AD887 of the 2705-year-long standard curve (705BC-AD2000) established from some tree ring samples of Japanese cypress. Statistical analysis showed that a degree of agreement between DDK-A's tree ring curve and the standard curve (t) is 7.9. Generally, it can be judged that there is high agreement between two tree ring patterns when t-value is more than 3.5. We also observed cell structures of the outermost tree ring for determining the kill season of DDK-A. The early wood ring was completely formed and the late wood ring was almost invisible. Therefore we concluded that DDK-A was dead in the late summer of AD887.

The old Japanese documents *Nihon-Sandai-Jitsuroku* and *Fuso-Ryakki* described the mega earthquake(M 8-8.5) , the *Goki-Shichido* earthquake, in AD887 August. This earthquake was considered to occur along the Suruga and Nankai Troughs off central Japan. Slope movement related to DRAD would be caused by this historical earthquake.

Keywords: dendrochronology, large landslide, Gokishichido earthquake, Akaishi Range

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HDS29-P02 Room:Poster Time:April 28 18:15-19:30

Occurrence of large landslides in past 40 years and sediment supply in the southern Japanese Alps

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Many large landslides are distributed in the southern Japanese Alps which consists of high relief and steep slopes. A lot of sediments deposited in dams suggest that sediments are produced actively in upper streams. To evaluate the sediment supply from landslides, this study addressed the mapping of landslides (>10000 m^2) in Ooi River and Hayakawa River (total area is 862 km^2) using aerial photographs and orthophotographs in 1970s and 2000s (partly including 2010s). In addition, we computed the volume of sediment supply in several large landslides based on the difference between DEMs from LiDAR data in multiple shooting periods. One hundred eighty landslides were extracted from photographs in 2000s to 2010s. The comparison between the distribution maps of landslides in 1970s and 2000s indicated that an initial large landslide (>100000 m^2) had not occurred since 1970s. In contrast, some landslides had enlarged gradually. Erosion rate computed from LiDAR data indicated the order of 10^{-1} to 10^{-2} m yr^{-1}. Such erosion rate suggests that the bare grounds after landslides are important as sediment supply area.

Keywords: large landslide, sediment supply, aerial photograph, GIS, the Southern Japanese Alps

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HDS29-P03 Room:Poster Time:April 28 18:15-19:30

Cause and age of the Yabusawa Gravel in the northern foot of Mount Senjo, the Akaishi Range, Japan: a reappraisal

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The Yabusawa gravel (YG) consists of poorly-sorted thick angular clasts of sand stone, mud stone, and hornfels, forming a geomorphic feature like fluvial terraces along Yabusawa River from Mount Senjo. The previous authors had considered that YG was of glaciofluvial or large landslide origin. However, there is no clear consensus as to the origin and age of YG. We therefore carried out new analysis of geology, geomorphology, and geochronology of YG. The following results were obtained. On the outcrop walls of YG, rock clasts clearly exhibit jigsaw crack structures, although specific sedimentary facies reflecting fluvial processes such as lamination and imbrication are not observed at all. A lithotype of rock clasts in YG is almost restricted to single geology at a given outcrop locality. Surficial topography of YG has hummocks and levee-like terrain. Terrestrial cosmogenic nuclide dating of sandstone fragments obtained from three localities apart from each other gave 10.3-8.4 ka, 10.0-8.1 ka, and 9.4-7.6 ka (in ^{10}Be scale). On the basis of these facts, we concluded that YG was produced by catastrophic rock slide (rock avalanche) in the early Holocene as single event. Although the previous authors stressed degradation of mountain permafrost for landslide occurrence, we invite attention to paleoearthquakes caused by nearby active faults or convergent plate margins as well as early Holocene pluvial climate and long-term gravitational rock deformation. A multidisciplinary study for better understanding of basic factors, onset triggers, kinematic behavior of landslide is further required

Keywords: Shimanto group, Rock avalanche, Terrestrial cosmogenic nuclides, Holocene

Japan Geoscience Union Meeting 2014
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HDS29-P04 Room:Poster Time:April 28 18:15-19:30

Gravitational rock deformation since the late Pleistocene on the Hounose-dendeiro Ridge, the southern Kanto Mountains

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We describe the geology and geomorphology related to gravitational rock deformation on the Hounose-denndeiro Ridge(HB), the upper Tama River Basin. HB is a broad ridge line 200 to 300 m wide running from northwest to southeast, and its altitudinal range spans from 1050 m to 1180 m ASL. The bedrock geology of HB is Cretaceous sedimentary rocks of Shimanto Group that generally show NE-SE strike and east dip at 60 to 80 degrees.

Linear depressions and step-like slopes both parallel to HB are present on and around the ridge-top. Depth and length of depressions are usually less than 20 m and several tens to hundreds meters in many cases. Features of valley bulging with downhill-facing scarp and gentle slopes are also found from valley side slopes immediately below ridge-top linear depressions and step-like slopes . In the area of gravitational slope deformation where bulging features occur, rock deformation caused by toppling and buckling can be observed.

We recovered sediment drill cores in the linear depressions on HB (P1 and P2). The bottom of surficial humic soil gave 4.1-4.3 cal ka (P1, -64 cm) and 9.5-9.8 cal ka (P2, -162 cm). Also a vitric ash layer Aira-Tanzawa (30 ka) was found from -153 cm (P1) and -325 cm (P2). In addition, a patch of pumice grain of Ontake-Ina (93 ka) was discovered at -709 cm of P2. These facts indicate that linear depressions as depositional sinks on HB were already formed before 30 ka at P1 and before 93 ka at P2.

Keywords: Shimanto Group, Linear depression, Toppling, Buckling, Tephra, 14C age

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HDS29-P05 Room:Poster Time:April 28 18:15-19:30

Relief, bell-shape and distortion indexes as critical topography of creep deformation due to mountain gravity

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1.Introduction

Double ridges or up-hill facing scarplets distributed on mountain ridge in high relief are known as indicators that mountain bodies are undergoing gravitational creep deformation and as signs of landslide in large scale. However, such micro topographies on ridges in Japan Alps has developed since 30 ka before. That is presumably attributed to one of the para-glacial phenomena. Trench study in Southern Japan Alps clarified that they have intermittently developed in a time scale of 10000 year and the last event, but a slight deformation occurred about 500-600 years ago. It is quite gradual movement. Consequently dense distribution of the up-hill facing scarplets is not always a pre-causious sign of sudden collapse of the mountain body in near future, though the earthquake occurs near the mountains. Other causative factors are required to induce landslide for hazard susceptibility mapping. We analyzed topographic features of mountain around Mt Shichmenzan and Ooyakuzure, which locate along the marginal mountains in Shizuoka Pref, and where huge co-seismic landslides occurred in 17th and 18th century, using DEM of 10m grid scale and more precise scale.

2.Topographic feature of mountain collapsed by earthquakes

Mountain ridges around Mt. Shichimenzan and Ooyakuzure show gentle and round and are fringed by distinct break of slopes. Mountain profiles of high contrast between steep lower slope and gentle ridge ridge tops are similar to a bell-shaped mountains of high relief. In another word, the bell-shaped profile is one kind of the concavity in ridge profiles.

3.Critical topography of creep deformation

Dense distribution of uphill facing scarplets are observed along the main ridges of the study area by aerial photograph interpretation. However, co-seismic landslides occurred only at Mt. Shichimenzan and Ooyakuzure. We analyzed relief of ridges, considering those of the surrounding slopes and ridge scale over the study area. We call it the relief index. Also we analyzed degree of bell-shape, weighting the area of convex part of the profile. These two indexes are highly scored around Mt. Shichimenzan and Ooyakuzure, but not so high along the main ridge from Mt. Yambushi-toge to Mt Dainichi-toge where the uphill facing scarplets are densely distributed. These are considered as very convenient indexes to know the high susceptibility of landslide induced by earthquake. And distortion index that is calculated ratio of total length of up-hill facing scarplets to a original slope length is also introduced as critical topography of creep deformation due to mountain gravity.

Keywords: gravitational creep, critical topography, relief index, bell-shape index, distortion index, large scale landslide

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HDS29-P06 Room:Poster Time:April 28 18:15-19:30

Development of Lake Shibire and its geomorphological relationship with landslides in Misaka Mountains, central Japan

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Geomorphological classification mapping and geological investigation were carried out to reconstruct the development of Lake Shibire (890 m ASL, max depth 9.5 m, perimeter 1.2 km) in Yamanashi Prefecture. Lake Shibire was formed on a closed depression of the hilly mound with antislopes that was produced by landslide on the steep slopes adjacent to the lake. Other smaller landslide bodies were also identified next to Lake Shibire. Lacustrine deposits with plant macro fossils and a thin vitric ash layer (Aira-Tanzawa, 30 cal ka) were discovered from the side slope of a small channel close to Lake Shibire. Radiocarbon age of a plant macro fossil sampled from the bottom of the lacustrine deposits was 47-46 cal ka. The paleo Lake Shibire was likely to consist of independent two or more basins in the late Pleistocene and only one basin has survived to the present-day Lake Shibire. It is also likely that a single basin was decoupled into two or more basins due to occupation of landslide masses caused by secondary landslide activities adjacent to the basins, and only the certain basin linked to the present-day Lake Shibire has endured.

Keywords: landslide, lacustrine deposit, Aira-Tanzawa tephra, 14C dating, late Pleistocene

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HDS29-P07 Room:Poster Time:April 28 18:15-19:30

Geological implication of the lahar disaster by Typhoon Wipha on October 16, 2013 in Izu Oshima Volcano

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Heavy rain (over 800mm per 24 hours) triggered by Typhoon Wipha on October 16, 2013, caused many slope failures and associated lahars in the western part of Izu Oshima Volcano, Japan. Tephrostratigraphic study revealed a mechanism of the slope failures and history of similar lahars for the past 700 years. Seven fallout ash or scoria layers, which were ejected during the 7 eruptions since the early 14th century, are distributed in the study area. These tephra layers are interbedded with eolian dust (loess) layers, each of which was deposited during a 10-200 years dormant period. Stratigraphic horizons of the slope failures concentrated at the boundaries between ashes and underlying loess layers. This means that more permeable ash layers were saturated with rainwater and slid down along the upper surface of less permeable loess layers. We newly found that three lahars (Lahar A, B, and C) occurred in historic time. Lahar A and B are correlated to the disaster documents of 1856 (or 1932) and of the late 16th century, respectively. Lahar C overlies directly on the Y5.2 scoria and associated Motomachi Lava and thus occurred in the early-middle 14th century.

Keywords: Izu Oshima, volcano, eruptive history, lahar, Typhoon Wipha (2013), slope failure

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Preliminary report on the landslides, Oct. 2013, Izu-Oshima Volcanic island, central Japan: Shallow landslide, landforms

SUZUKI, Takehiko[1*] ; TMU GROUP FOR, Izu-oshima typhoon wipha (1326) disaster[1]

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Before dawn of 16th October 2013, the heavy rain associated with Typhoon Wipha (1326) caused landslides disaster in Izu-oshima volcanic island, 120 km south of Tokyo. Many shallow landslides occurred on the west slope of the Younger edifice of Pre-caldera volcano, facing Moto-machi Town. Several reports (e.g. Ministry of Land, Infrastructure, Transport and Tourism; http://www.mlit.go.jp/river/sabo/h25_typhoon26/izuooshimagaiyou131112.pdf) have suggested that the distribution of the landslides overlap the area of lava flow effused 14 Centuries (AD1338?). For examine this relation between landslides and the geomorphological and geological conditions, we preliminary surveyed shallow landslides, landforms and geology along the Gojinka Sky Line on the slope of the Younger edifice of Pre-caldera volcano, 7th and 8th of December and 4th to 6th of January. In presentation, we will report results of field survey for shallow landslides, landforms and geology in detail.

Keywords: Izu-Oshima, Typhoon Wipha (1326), Shallow landslide, Fall-out tephra, Lava flow

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Landslides of granite porphyry induced by Typhoon Talas 2011 around Mt. Myoho at Nachikatsuura, Wakayama, Japan

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Typhoon Talas brought heavy rain in Kii Peninsula, Japan on September 2-5, 2011, causing a large number of rock-avalanches and debris flows in the southeastern part of Kii Peninsula. We mapped the landslide scars on aerial photographs at the scale of 1:20000, made rainfall distribution maps by using the rainfall data analyzed by radar-AMeDAS, and compared position of landslides with rainfall distribution and the geological map by Geological Survey of Japan. The result shows that almost all of the landslides occurred in both over 80 mm/h of rainfall zone and Kumano granite porphyry area. In order to clarify the geological topographical background of the landslides, we also made field investigation around Mt. Myoho at Nachikatsuura, Wakayama Prefecture, where the landslide disaster concentrated.

The field investigation showed that the landslides had different attributes at inside area of granite porphyry mass and at the edge of the mass. Mt. Myoho consists of the Kumano granite porphyry around the top and the Kumano group (sedimentary rock) of Miocene age which occupies at the lower part of surrounding slope and below plain land. Slope is gentle around the top and gets steeper from the surrounding slope break, and eventually becomes gentle again below the boundary between granite porphyry and the Kumano group. The granite porphyry shows typical spheroidal weathering with corestones in the surface layer of gentler slope. The corestones were included in deposits caused by the landslides. Accordingly, landslides within granite porphyry area had scarps at the slope breaks, where weathered and/or reworked material of granite porphyry seemed to have collapsed. At landslides near the boundary between granite porphyry and the Kumano group, the shale of the Kumano group was altered to dark gray clay. Talus deposit of the saprolite and corestones on the clay seemed to have collapsed there.

We estimated volumes of some rock-avalanches around Mt. Myoho to be range from 10^2 to 5×10^5 cubic meters, and their equivalent friction coefficients were 0.20-0.46 on the basis of positions from the rock-avalanches and following debris flows plotted on topographical maps at the scale of 1:25000. These landslides of granite porphyry were similar to those of granite in Hiroshima Prefecture induced by heavy rain on June 1999 in terms of volume and equivalent friction coefficient. In the case of weathered granite in Hiroshima, however, corestones were formed slightly and it was a different type of landslide that saprolite collapsed and transformed into debris flows.

Keywords: landslides, Typhoon Talas, granite porphyry, Nachi Katsuura

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Interpretation of landslides triggered by 1944 Tonankai earthquake around Owase City using U.S. military aerial photos

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Shallow landslides were interpreted around Owase City, Mie Prefecture using U.S. military aerial photographs (1/16,000 in scale) taken on 7 December 1944, just three days after Tonankai earthquake (M7.9). It is thought that some of landslides were triggered by the earthquake. Result of the interpretation will be reported.

Keywords: landslide, slope failure, Tonankai, earthquake, U.S. military, reconnaissance

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Long-traveling conditions for the rock-on-snow landslide: insights from the field and lab evidence

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On March 12, 2011, the M 6.6 earthquake hit the typical deep snow area of Niigata and Nagano prefectures. This earthquake (2011 north Nagano Earthquake) induced a lot of landslides, and some of them travelled on snow moving long distance. We are studying that type of landslides which named rock-on-snow landslide by field observations and lab experiments. The rock-on-snow rock avalanche differs from other conventional earthquake-induced landslides because of high mobility, and slash avalanche because water before the event does not drive rocks. Then its high mobility is important to consider earthquake disaster prevention for deep snow area.

The physical properties of snow under the moving mass could affect long-travelling property. We investigated the Tatsunokuchi landslide induced by the earthquake and found temporal liquefaction zone which lay between landsliding mass and autochthonous snow (Yamasaki et al., 2013). The condition of snow getting liquefaction depends on temperature and pressure. Snow also has effect of friction reducing as skiing. However, all rock-on-snow landslides including small rock falls on snow do not travel long-distance, rather most of them stop shorter distance from the origin than normal rock falls. Thus, condition of the long-travelling could be limited. We conducted lab experiments that miniature rock fragments slides on snow slope which tilt angle is 20 degrees, the width is 20 cm and the length is 300 cm, and then we try to understand basic properties of relation between rock and snow and processes during the sliding. The results and our field observations gave us insights to understand larger phenomena.

Reference

Yamasaki, S. Nagata, H. and Kawaguchi, T., Long-traveling landslides in deep snow conditions induced by the 2011 Nagano Prefecture earthquake, Japan, Landslides, 2013 Online available.

Keywords: landslide, snow, earthquake, avalanche, debris avalanche

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Definition of the database fields for landslide hazard database by NIED

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The history of natural hazard at a certain place is greatly related to the current risk there. It provides indispensable information to the hazard and the risk assessment. The Research Institute for Earth Science and Disaster Prevention (NIED) is building a comprehensive database of natural hazard events over the historical period in Japan, and distributing these information with Web API. Such a hazard event database is, however, no more than an index with a limited amount of information about the reality. Therefore, especially for the large natural hazards that had big social impacts, it is important to provide specific databases classified with types of hazards such as earthquake, volcano, storm, flood, slope, snow and ice disasters. We discuss about the database for slope disasters in particular here.

Keywords: landslide hazard database, database field, definition of fields