Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

HGM22-01 Room:101B Time:May 26 15:15-15:30

Terrain classification of Southwest Japan including the Seto Inland Sea by object based area segmentation

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Terrain classification studies have been predominantly pixel-based using DEMs. Previously the corresponding author developed a pixel-based automated classification method of topography using slope gradient, convexity, and texture calculated from a DEM for small-scaled classification of plains, terraces, hills, mountains, and volcanos (Iwahashi, 1994; Iwahashi and Pike, 2007). However, a pixel-based approach could not handle scale issues or increasing noise associated with enlarging resolution of DEMs. In addition, pixel data include problems of data volume and difficulties in spatial joining with attributes of thematic maps.

Recently object based techniques for land-cover classification using color orthoimages or satellite images have become popular. In this presentation, the authors introduce the method of making terrain-type polygons by object-based software using a combined image of geometric signatures. We produced a terrain classification map of Southwest Japan including the Seto Inland Sea using a 150-m DEM which was a mosaic of land elevation and seafloor elevation. The terrain-type polygons were statistically compared with other thematic maps such as landslide distribution and lithology.

This study was carried out within a framework of ”Mapping of large landslides based on the sea-land combined terrain classification: case study of the overall Outer Zone of Southwest Japan including the Nankai Trough” which was a theme in ’2014 Collaborative Research with the Disaster Prevention Research Institute, Kyoto University’. We would also like to thank the Japan Coast Guard who provided the 150-m and 450-m Geographical Feature Meshes Data of Southwest Japan.

References

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Keywords: Fundamental Geospatial Data, seafloor topography, object based area segmentation, DEM, terrain classification, Seto Inland Sea

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HGM22-02 Room:101B Time:May 26 15:30-15:45

Relation between tectonic uplift rates and erosion rates in the Kiso Range from in situ cosmogenic nuclides

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Tectonic uplift enhances the elevation and local relief of mountain ranges (Willett and Brandon, 2002). High relief leads to intensified erosion process through the slope dependent surface processes namely as relief becoming steeper larger erosion process is resulted (Ahnert, 1970). Therefore, documenting rates of uplift and erosion is critical for understating how topography of the mountains is maintained by such a negative feedback. In case of continuous rock uplift, numerical models of landscape evolution suggest that mountain ranges may reach steady states in which uplift rates and erosion rates are balanced, and hence elevation and topography may be maintained (Molnar and England, 1990). In this study, we present erosion rates reconstruction from the drainages of the Tenryu River using terrestrial cosmogenic nuclides (TCN) in order to document their relations to the topographic evolution of the Kiso Range (central Japanese Alps). Measurement of TCN allowed us to determine the erosion rates over the timescale of 10^3 year. We sampled river sediments from the tributaries and the main stream of the Tenryu River. Basin-averaged erosion rates of the tributaries near the main ridgeline of the Kiso Range are 1000-2000 mm/kyr, whereas the southern tributaries have lower erosion rates between 600 and 1000 mm/kyr. In addition to the samples from the modern riverbed, sediment samples were also collected from the drilling cores excavated near the mouth of the Tenryu River in order to reconstruct paleo-erosion rates. Erosion rates using TCN from the core samples show relatively constant erosion rates through the Holocene. Furthermore, previously reported erosion rates using sediment yields (Kawata and Uemoto, 1998) and apatite fission track ages (Sueoka et al., 2012) suggest constant erosion rates of the Kiso Range over 50 yr, 1 kyr, and 1 Myr time scales. These values are comparable with the uplift rate of the Kiso Range (Ikeda et al., 2002), and hence the topography of the range in the central Japan is maintained in a steady state.

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HGM22-03 Room:101B Time:May 26 15:45-16:00

The limit of the geomorphology learning in high school geographical B

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At most 12 units per 3 years of geography B could be taken in the curriculum which is being put into effect from the previous fiscal year. I even put emphasis on learning of physical geography more than now and am teaching. But the limit has caused the geomorphology with which I deal geographically and the geomorphology with which I deal by earth science in the explanation in a cause different in a viewpoint or the field of the geomorphology and the industrial geography.

It's introduced about the learning contents of geomorphology in a main school by this announcement. And I'd like to receive advice for teachers.

I'm thinking it's to increase the contents of geomorphology that I'm thinking, and understanding in the whole geography deepens. It's esteemed to deal with the reason that fact is explained, not to handle only to appear in a textbook. The following problem has formed by the current state.

1. There is a student going to memorize the distribution of the submarine ridge and the trench. When doing talk of "terrestrial heat flow ", I'm thinking a logic can be grasped.

2. By geography B, crustal alteration, "plate tectonics", only, to explain, the whole tectonics theory can't be fingered. Therefore the limit occurs to the in-depth explanation motive power.

3. The volcanic contents end only by a volcanic stereotype because you can't touch about developmental process of a magma. Mode of eruption and a volcanic ejecta don't also touch, so talk of a produced mineral can't be done. At the same time, a reason and a distribution area of produced resources can't be explained.

4. Only the case that those tomography exists can finger fold and a fault, and a word as lineaments doesn't exist in a textbook. Therefore the significance from which fold and a fault are learned becomes indefinite.

5. The learning which surveys a physical environment in each geologic age is needed. This would like to make them learn to reflect production of resources and the present physical environment.

On the convenience with the restrictions of curriculum guidelines and the case that I organize the contents and teach freely are difficult, but I'd like to ask the education technique which esteemed geomorphology and education contents because it's the entrance where a geography is learned to learn geomorphology.

Keywords: geomorphology, geography, geography B

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HGM22-04 Room:101B Time:May 26 16:15-16:30

Slope failure of the Oya-Kuzure and generation of the Akamizu Fall, upper reaches of the Abe River, Shizuoka Prefecture

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The “Oya-Kuzure” slope failure is located in the source area of the Abe River, Shizuoka Prefecture. It is estimated that many failure events had occurred repetitively around the area (e.g., Machida, 1959). The latest large-scale failure is estimated as occurring early 18th century. Deposits originated from the 18th century failure filled the Oya River and upstream of the Abe River (e.g., Tsuchiya, 2000).

Although origin of the Akamizu Fall, which is located on main stream of the Abe River with a height of 60 m has been inferred as that stream of the river eroded debris flow deposit filling the valley, that stream of the river flowed across a ridge, and so on, any opinion does not show evidence sufficiently.

As a result of survey, it were confirmed that distribution of debris flow deposits and paleo-current estimated from direction of gravel imbrication in the deposits imply meandering of the Abe River valley before burial by debris flow deposit. In addition, channel of the fall across a ridge of basement rock. We concluded that filling of a valley by debris flow deposit caused shortcut of stream of the Abe River across a ridge and generation of the Akamizu Fall.

Keywords: debris flow deposit, shortcut, Abe River, Akamizu Fall, Oya-Kuzure

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HGM22-05 Room:101B Time:May 26 16:30-16:45

Landform, debris transport processes and sediment budget in the Dakesawa valley, Northern Alps, central Japan

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The Dakesawa valley is originated in the Mt. Oku-Hotakadake (3190m) and runs down into the River Azusa at the elevation of 1500m. The middle part of the valley is covered with debris which is supplied from the valley side slopes. To discuss the debris transport processes and sediment budget I investigated the characteristics of the valley floor deposits and valley floor landforms. On the middle of the valley bottom, the elevation is between 2180m and 1730m, there are thick unvegetated deposits. The average slope of middle part of the valley floor is 30%. There is no flow water on the valley bottom, because of infiltration to the deposits. From the valley side slope debris are supplied forming talus cones. Erosional scars along the valley floor show debris of the valley floor are originated from the talus cone deposits. Decrease of the size of the valley floor deposits from 3m to 0.5m shows debris transport with sorting process. Debris transported from the upper and middle part stopped entering the forest area. The lower part are filled with huge blocks of talus deposits and debris flow sediments supplied from valley side slopes. Above-mentioned debris closed the outlet of the Dakesawa valley. The upper and middle part deposits cannot reach the lower end of the Dakesawa valley, bordering on the floodplain of the River Azusa. Thus, present day sediments are being accumulated in the valley floor and few sediments flow into the River Azusa.

Keywords: landform, valley floor, debris transport process, sediment budget, Dakesawa, central Japan

HGM22-06 Room:101B Time:May 26 16:45-17:00

Natural dam constructions and breaks at the Oshika and the Mitoku River, Misasa-town, Tottori southwest Japan

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Four terrace-like deposits caused by deep seated landslides were known at the lower part of the Oshika River in Misasa, Tottori, south-west Japan. Another similar terrace-like deposit seems to be at the middle part of the Mitoku River in Misasa, which is neighboring north of the Oshika. These five landslides seem to be related to earthquakes caused by the Iwatsubo active fault, which runs in the eastern part next to the Oshika and the Mitoku river basin. The objectives of this study are to clarify whether natural dams were constructed or not, and if there were natural dams, how the dams were broken down.

We conducted topo-map reading to make distribution map of terraces and their longitudinal profiles projected along the river. We did also hand borings to get soil samples in order to measure radioactive carbon datings. In the field, we observed terrace deposits.

At three sites out of the five landslides, natural dams were formed judging from reservoir silty-clay deposit at Sengenbara, Mitoku, or steep gradient (1/8 at Kannokura, 1/13 at Nishioshika, in the Oshika) terraces distributed just downstream-side of the dams in 1.2 to 1.4 km long. Large andesite boulders (ca.1 to 2 m in diameter) were observed as deposits of these dams.12 Carbon 14 dating values showed the followings: i) deep seated landslides occurred at three different times: 34,000 yr ago at Nishioshika and Mogura, 10,300 yr ago at Sengenbara, and 1,200 yr ago at Kannokura. These large landslide events suggest that the Iwatsubo active fault moves at about ca.10,000 yr intervals and successive intensive rainfall caused landslides. ii) Natural dam broke in many batches and the reservoirs maintained for longer times: 400 yr or more at Kannokura, 8,000 yr or more at Sengenbara, and 30,000 yr at Nishioshika. We need datings of Higashioshika landslide event.

Keywords: natural dam, out-burst flooding, deep seated failure, fluvial terraces, radioactive carbon chronology, Iwatsubo active fault

HGM22-07 Room:101B Time:May 26 17:00-17:15

Landform development of bedrock river focusing on the planform : Laboratory experiments

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Generally, development of fluvial landform is known to be strongly affected by surface slope, climate and tectonics. In field study, it is necessary to take accounts of developmental stage of individual rivers when discussing relations between various factors and landforms, because we need distinguish between spatial and temporal variations. In this study, we conducted flume experiments focusing mainly on temporal (developmental) change of bedrock river. The flume was about 1 m square and a weir with a slit at the center was installed at the downstream end to prevent change of base level during the run due to uncontrolled sedimentation. Parameters discussed in this study are initial surface slope, precipitation and tilting rate. Findings are as follows. Temporal increase of drainage area occurred through two stages, which is considered to correspond to the formerly reported two-staged development of channel network. Unlike temporal change of drainage area (drainage area vs. time), the relation between drainage area vs. trunk-steam length for each data of different time in an identical basin fell on a single power function. Number in the range of these functions obtained in this study, was n = 0.38 ~0.83. The drainage basin under smaller precipitation had a power number (power-law exponent) larger than 0.5, meaning that the basin became elongated longitudinally with its development, which is considered to be because tributaries could not grow largely and laterally owing to smaller precipitation. The drainage basin neighboring a larger basin had also a power number larger than 0.5, which can be attributed to suppression of later growth of basin due to small influx of water.

Keywords: laboratory experiment, bedrock river, precipitation rate, drainage area