Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

HQR23-P01 Room:Convention Hall Time:May 24 16:15-17:30

Geomorphological evolution of Furenko barrier system controlled by scismotectonics

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In general, there is no clear barrier system around Japan because it is currently marine regression or stable stage due to hydro-isostasy effect since 5000-6000 years BP. However, there are a few barrier (island) systems in eastern Hokkaido. We have been investigating Hashirikotan barrier spits in the northern part of Furenko barrier system facing the Sea of Okhotsk because five branch of spits (BR1-BR5) are clearly observed. According to our results, the Furenko barrier system has been established since 5.5 ka, and there were two lagoon-expanding stages at 5.2 and 4.0 ka estimated by volcanic ashes from Mashu volcano. On the other hand, the youngest BR1 has occurred after the 17th centuries and BR2 was caused by the last seismic up-rifting in the 17th centuries because it is covered with historical volcanic ash layers from Tarumai and Komagatake volcanoes. BR3 and BR4 were undated clearly, but BR3 was assumed the seismic rifted barrier in the 12-13th centuries, also BR4 was caused in the 9th centuries. These two barriers associated with large sand dune just after emerged each time. Since 2003, it was clearly giant earthquakes (Mw8.5) have been occurred at an interval of 500 years along the southern Kuril subduction zone. Especially coastal area raised almost 1 or 2m just after the great earthquakes. But conversely it has been settling at a rate 8.5mm / year after the last great earthquake until now. We believe the Furenko barrier system has been strongly controlled by the seismotectonics in this region.

Keywords: geomorphological evolution, Furenko barrier system, scismotectonics, outhern Kuril trench, eastern Hokkaido

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HQR23-P02 Room:Convention Hall Time:May 24 16:15-17:30

Sedimentary facies and radiocarbon dates of the Alluvium in the lower reaches of the Tone River

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To identify the depth of the origin of the liquefaction and to reveal the stratigraphy of the Alluvium, GSJ made borehole research in the lower reaches of the Tone River. This area had severe liquefaction during the 2011 Tohoku earthquake. In this presentation, we report the sedimentary facies and radiocarbon dates of six sediment cores obtained from the north bank of the Tone River in Inashiki and Itako Cities, Ibaraki Prefecture and Katori City, Chiba Prefecture.

Keywords: Tone River, Alluvium, sedimentary facies, radiocarbon date, flood tidal delta

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HQR23-P03 Room:Convention Hall Time:May 24 16:15-17:30

Application of X-ray computed tomography to the three-dimensional structure analysis of liquefied core samples

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Geo-samples often have complex internal structure. Thus, a three-dimensional imaging method is needed to analyze such samples. X-ray computed tomography (CT) is one of the most promising tools to meet the purpose (e.g., Nakashima et al., 2011). We applied medical X-ray CT apparatus to the core samples obtained from the sites liquefied by the 2011 Great East Japan Earthquake. The obtained three-dimensional CT images clearly show the complex structure of the sand dykes (Fig. 1) and strata deformation. Although X-ray CT technique has disadvantage that the apparatus is expensive and high performance computers are needed, it is advantageous in terms of the non-destructivity, quickness, three-dimensionality, and spatial resolution as compared with the conventional soft X-ray radiography of slab samples.

Ref:
Nakashima et al. (2011) Water Air & Soil Pollution, 214, 681-698. http://dx.doi.org/10.1007/s11270-010-0473-2

Keywords: liquefaction, non-destructive analysis, X-ray CT, three-dimensional imaging, core analysis

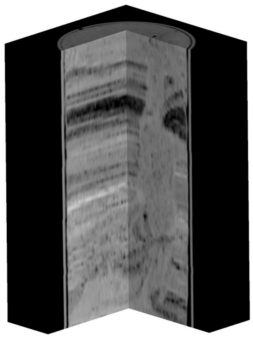

Fig. 1. Example of a three-dimensional CT image of a liquefied core. The diameter of the core is about 64 mm. A sand dyke penetrates the horizontal bedding throughout the image.

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HQR23-P04 Room:Convention Hall Time:May 24 16:15-17:30

Depositional environment of the early Pleistocene Inagi Formation, northern edge of the Tama Hills, central Japan

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The late Pliocene-early Pleistocene Kazusa Group distributing southern Kanto District occurs the Tama area, SW Tokyo. Depositional environment of the Inagi Formation, upper Kazusa Group has been estimated as delta front or foreshore, which is distinguished from lower formations in Kazusa Group at the Tama area.

Although exposure of the Kazusa Group around the Tama area is limited now, a good exposure remains on the northern edge of the Tama Hills. Above the ca. 1.5 Ma volcanic ash, well laminated tuffaceous sand layer is observed. Northward?westward dipping cross lamination means landward paleo-current and lenticular bedding means temporal changes in direction and velocity of current. These sedimentary structures suggest existence of barrier-island. Intensely bioturbated sand layer below the laminated tuffaceous sand layer is interpreted as estuarine deposits.

The barrier-island deposits of the Inagi Formation is significant because barrier island deposits has not been reported from the Kazusa Group in the Tama area despite of common occurrences of back-barrier deposits.

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Suzuki, T. and Murata, M. (2011) Stratigraphy and correlation of tephras in the Lower Pleistocene Kiwada Formation and its correlative beds, Kanto, Central Japan. Jour. Geol. Soc. Japan, 117, 379-397.

Takano,S. (1994) Stratigraphy of the Lower Pleistocene Kazusa Group in the Tama Hills, central Japan. Jour. Geol. Soc. Japan, 100, 675-691.

Keywords: Kazusa Group, Tama Hills, Inagi Formation, depositional environment, barrier?island

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Correlation of tephras in the Kazusa Group core from Setagaya and Fuchu areas, Tokyo, central Japan

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Three sediment cores were collected in Setagaya Ward and Fuchu City in Tokyo, Kanto Plain. For these core, sedimentary facies, physical properties, microfossil, chemical composition, magnetostratigraphy were studied (Funabiki et al, 2012, Ueki et al, 2012). In this study, in order to determine their stratigraphical position, we analyzed the petrographical properties of tephras included in the horizon of the Kazusa Group.

The upper part of NUCHS-1 core drilled at the college of Nihon University, Setagaya ward, is composed of terrace gravel, On-Pm1, and Musasino-Tachikawa loam Formations, from -12.7 m to the top (Kurihara et al, 2012). The lower part from -12.7 to 80.0 m, composed mainly of thick sandy deposits of the early Pleistocene Kazusa Group by magnetostratigraphy (Ueki et al.,2012). Based on the analysis in mineral composition, major element compositions and refractive index of glass, the glassy tephra in depth 59.98m is correlated with Nishikubo tephra of the Iimuro Formation in Tama Hills(Suzuki and Murata, 2011). This suggests that the sediment corresponds to the Iimuro Formation in Tama Hills, and to the Higashikurume and Kita-Tama Formations.

The TAT-1 and TAT-2 cores drilled at the college of Tokyo University of Agriculture and Technology in Fuchu City. The upper parts of those cores, from 8.9m to -11.5m, are composed of terrace deposits and Tachikawa loam Formation.The lower parts, from -11.5m to 50.0m, are composed of silt and sand with gravels of the early Pleistocene Kazusa Group. One glassy tephra, from the depth of 36.85m of the TAT-1 core, and from the depth of 41.56m of the TAT-2 core, is correlated with O21 tephra of Otadai Formation, Kazusa Group. Another tephra from the depth of 43.75m of the TAT-2 core is correlated with O22 tephra of the Otadai Formation. O21 and O22 tephras were sampled from Yoro River floor, Boso Peninsula. These results suggest that the lower part of the both cores was deposited at the same time of the Otadai Formation in Boso Peninsula and also the Toneri Formation in Tokyo.

References:
Funabiki et al(2012)Abstract for JpGU Meeting 2012 HQR23-03: Ueki et al(2012)Abstract for JpGU Meeting 2012 HQR23-02: Kurihara et al(2012)Abstract for Japan Asosociation for Quaternary Research: Suzuki and Murata(2011)Jour. Geol. Soc .Japan, Vol. 117, p.379-397

Keywords: Kazusa Group, tephra, Kanto Plain, Musashino Upland

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HQR23-P06 Room:Convention Hall Time:May 24 16:15-17:30

Construction of subsurface geological structures using a drilling database: A case study for the Osaka Plain

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Subsurface geological cross sections of 0-200 m depth were constructed using a dense drilling database of the Osaka Plain in the intra-arc Osaka Basin of the Japan island arc, an active plate margin. The cross sections revealed the subsurface geological structures and the geometry of folding and faulting in the basin. The comparison between the constructed subsurface cross sections and the seismic sections of the basement and basin fills at a depth of 1,500-2,000 m showed that the basement and shallow subsurface structures are similar; however, the shallow cross sections were of higher resolution than the deep seismic profiles.

We used the drilling database that has been operated by the Kansai Geoinformatics Network and includes about 50,000 drilling log data points for civil engineering projects. The database only includes information on lithofacies such as gravel, sand, silt and clay, N-value, and other geotechnical engineering data. Its usefulness lies in the large number of subsurface geological data that it contains.

The boundaries of the lithofacies were traced in the cross sections on the basis of sedimentological concepts. More specifically, the base of the marine clay beds with a transgressive erosional surface (i.e., ravinement surface) is shown by straight lines; the top of marine clay beds overlaid by a progressive delta or fan is shown with lightning-stroke-type ”shazam lines”; the base of gravel beds with a sequence boundary is shown by valley-shaped curve lines, and dashed lines mark uncertain boundaries.

The following are our conclusions: 1) The subsurface geological structures from the drilling database and the deep basement structures generally match. Therefore, it is possible to understand the basement structures through detailed analysis of the subsurface geological structures. 2) The subsurface geological sections from the drilling database show geological structures that are not clearly discerned in the seismic profile. Therefore, the subsurface geological section is of higher resolution than the seismic profile. 3) The structural features in the west?east section are a flexure in the northern Uemachi Plateau, which is the structural high of the inner basin, the Uemachi fault that is a major structural gap at the western margin of the flexure, and the basin-shaped structure on both sides of the flexure. 4) The features in the north?south section are the southward-dipping monocline structure in the northern part, the asymmetrical basin-shaped structure in the central part, and the northward-dipping flexure and fold in the south.

Keywords: intra-arc basin, Osaka Plain, subsurface geological structure, basement structure, drilling database, ravinement surface

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3D subsurface sturcutre of the Fukuoka Plain

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The borehole database including about 2,438 digital borehole data have been build up for constructing the subsurface structure of the Fukuoka Plain, in corporation with local government offices and the Kyushu Ground Information Association.

The 3D geologic model of the Fukuoka Plain based on the borehole database offers a good example to display the strike-slip basin structure bounded by the Kego active fault on its southwest side. The basin is characterized by west to southwestward tilting of the basement covered by the Middle Pleistocene to Holocene deposits. The basement rocks consist of Paleogene sedimentary rocks and Cretaceous granite. The basin fills are divided into four stratigraphic units, that is, and the Nakabaru gravel member, the Suzaki member, the Aso-4 pyroclastic flow deposits, the Otsubo sand-gravel member, and the Holocene incised-valley fills (called the Chuseki-so), in ascending order.

Keywords: 3d subsurface structure, Fukuoka Plain, borehole data, surface model, anaglyph