Visual Application for the Rockslide in Archaeological Sites

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Commission V, WG V/6

KEY WORD: Visualization, 3D Modeling, Digital Photogrammetry, Rockslide, Kiln, Pollen Analysis, Environmental-Archaeology

ABSTRACTS: It is very difficult without archaeologists, to understand about archaeological evidences, from the excavation data and archaeological reports. Therefore, easy visualization by archaeologists themselves from the archaeological records is needed. In this report, we like to present one of the applications for the rockslide system to be cleared from the archaeological the excavation using Digital Photogrammetry, 3D modeling, and CG/Animation.

1,Introduction

So many archaeological sites were excavated before constructions in 2001 in Japan. Over 13,000 archaeological sites were excavated in the year; Nakahora kiln site is the one of them, for the Tokai-
Circle Road express road constructions.
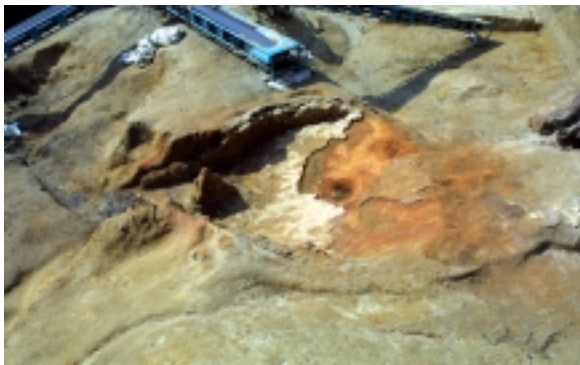

Fig.-1 Excavation for Nakahora kiln site

Fig.-2 Nakahora kiln

Kiln site (or climbing kiln site) is one of the archaeological sites, is to make the pottery vessels, especially, "Seto-Mono" ware vessels are the famous ware vessels in the Middle Era in Japan.

Nakahora site was excavated from July to October in 2001 by Aichi Archaeological Research Center with us; we could not find in suit the upper parts of kiln that were slipped down under the cliff. We considered this cliff is made from the effort of the earthquake in A.D.1361; the upper part of the Nakahora kiln site was slipped down under the cliff with the rockslide.

It is very difficult without archaeologists to understand this rockslide system from the archaeological sketches and records.

2,Archaeological Record in Nakahora Kiln Site

In Japanese archaeological fields, archaeologists themselves make the sketches for archaeological evidences , or archaeologists ordered to make these sketch maps to surveying company using Photogrammetry or other methods.

In Nakahora kiln site, we developed on-site digital Photogrammetry (Miyatsuka 2001) and made the ortho images on time. Ortho images give the real images to archaeologists, and they can expand the excavation to next steps. This is the real saving the money and time. We used digital still camera (Canon D30) and digital photogrammetric system
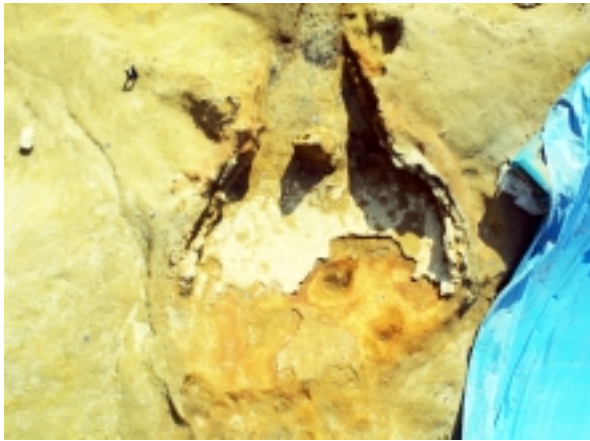
Fig.-3 Aerial Image (Canon D30)
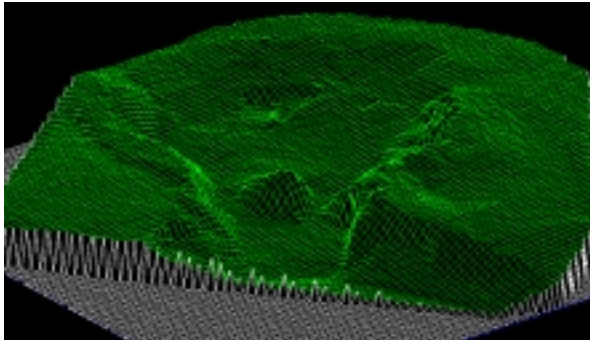

Fig.-4 Topographical Sketch Map

Fig.-5 Mesh Data

Fig.-6 CG view from the entrance

(Stereo Metric Pro in Syscam, Italy), we made real ortho images on-site, and archaeologists also checked these images on-site.

 Our system is following…

1,Take aerial images by Canon D30, and print out.

2,Check and measure the control points.

3,Make the ortho images on-site, and archaeologists check the images on-site. Archaeologists expand the next step for archaeological works.

4,after the checking of archaeologists, to make the topographic map for the archaeological reports (in the Labor. Not on-site).

3,Re-constraction and 3D Modeling of the Nakahora kiln site before/after rockslide

 Fig.-4 is the original sketch map from the archaeological reports. From this, it is difficult for the citizen to understand the original landscape of archaeological sites. CG or Ortho images are easier than these topographical sketches to understand the archaeological sites.

 So, archaeologists must reconstruct from the archaeological remains to original structures and images. The length of Nakahora kiln site is only 4.5m. The original one is considerable about 8 to 9m. From the excavation data, Nakahora kiln site were destroyed by the construction for the fortress in Modern Era. The road from the main parts in the fortress destroyed the right side of kiln.

 We considered about these 3 stages,

 1, before rockslide stage 2,after rockslide stage

 3,Modern Era stage

and, we made each contour maps and made 3D geological images from the archaeological data using 3D Studio Max (Fig.-8-10).
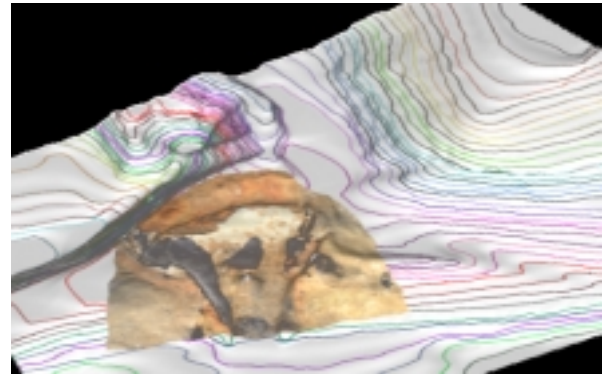

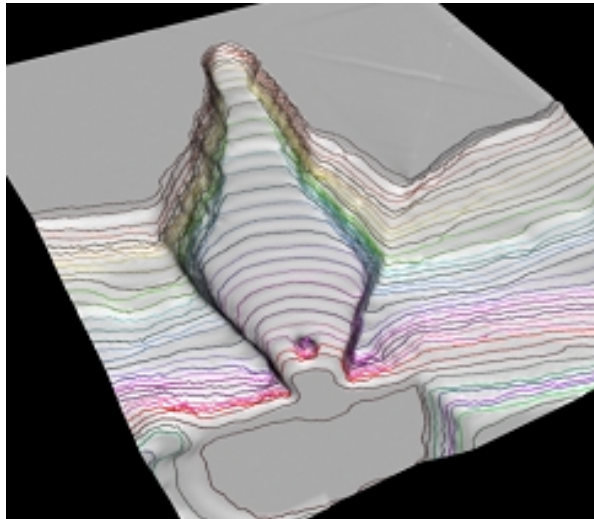Fig.7 CD Modeling from the Excavation Data
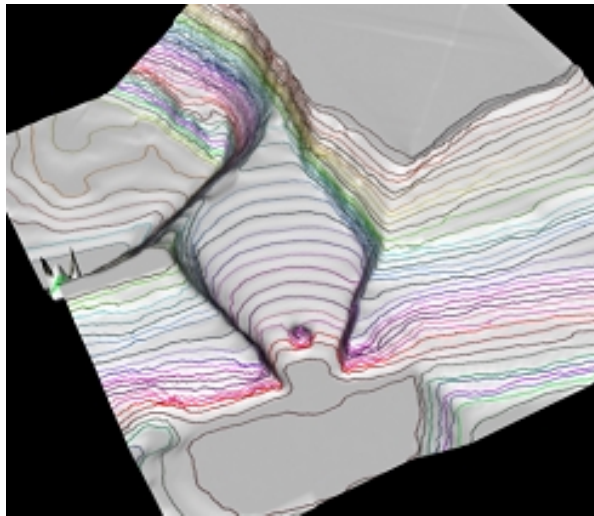
Fig.-8 before rockslide
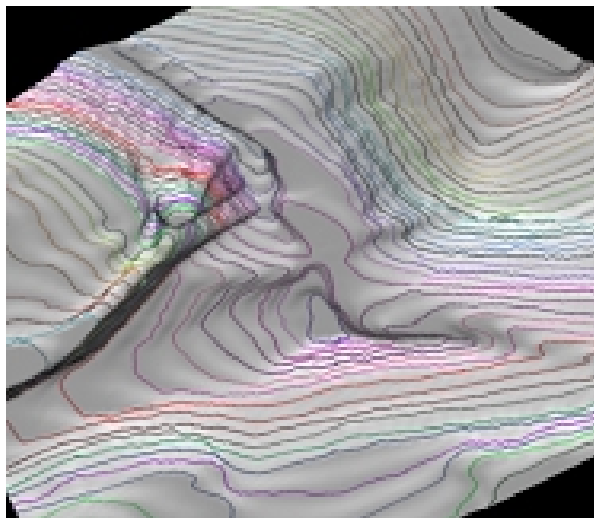

Fig.-9 after rockslide

Fig.-10 Modern Era

4,Re-construction around the Nakahora Kiln in A.D.14 century

In order to reconstruct for the original Nakahora kiln, we must once more reconstruct the fauna around the Nakahora kiln. It needs much woods to make the ware vessels, so, ware vessels makers must cut and surround the trees from the forest around the kiln. Fig.-11 is the Pollen Analysis data from the Nakahora kiln sites.
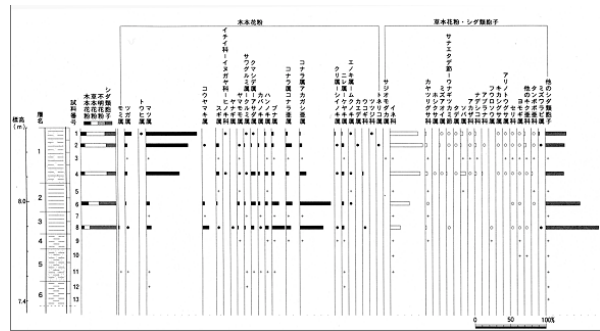

Fig.-11 Pollen Diagram

The pollens of the grass are increasing after products of kiln (layer 4), but the pollens of wide leaf trees are decreasing compare with before products (layer 6-8). The layer 3 has no pollen, this layer showed the rockslide. After rockslide, the layer 1 and 2 showed about the same condition with the after rockslide. This evidence is showed that the products of ware vessels were continued around the Nakahora kiln site.

5,Conclussion and Future Work

Visualization for the Nakahora kiln site is available to show the landscape changing. Adding real images, we can show the visual images; also adding Pollen Analysis data, we can show the real and available images to the citizens.

Future works for us is to make the animation of the changing landscape of archaeological sites.

Reference:
MIYATSUKA Yoshito "On-site image sensing for Architecture and Archaeology" 3rd International Image Sensing Seminar in Gifu Japan. Sept. 2001.
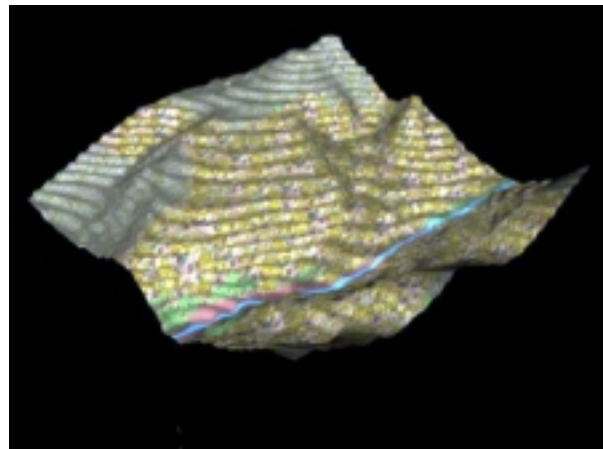
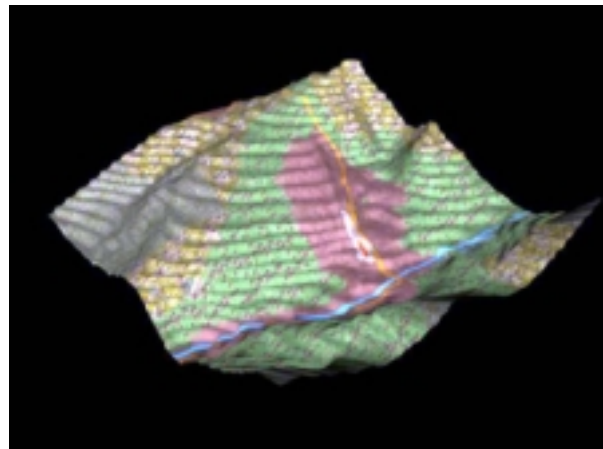Fig.12 Close-section of Changing

Fig.13 before Products

Fig.14 after Products