DRAWING OF PETROGLYPHS IN MONGOLIA BY CLOSE RANGE PHOTOGRAMMETRY

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ABSTRACT:

Petroglyphs are images created by removing part of a rock surfaces by incising, pecking, carving, and abrading. The word comes from the Greek words petros meaning "stone" and glyphein meaning "to carve" (it was originally coined in French as pétroglyphe). Carved, forged or engraved petroglyhps are tarnsforming the sights ,which is placed on the area, to the natural museums. According to experts, petroglyhps are qualifying "expression resource", " mass medium" even " writings" of the times which is created date. In the portraits which are showing the praise god and complete dedication ,generally, shamans, khans, comanders have placed on the top. Besides all religion themed and ritual petroglyhps , there are also a very kind of petroglyhps which are treated everyday lifes, hunting, war scenes and ordinary events. There are several documentation techniques available in order to document of cultural heritage. These techniques are indispensable tools for the conservation of heritage monuments. These methods and equipments commonly are used for the documentation and surveying of buildings. Digital close range photogrammetry is one of the most important methods in documenting of cultural heritage.

1. INTRODUCTION

UNESCO (1946) and the Council of Europe have formed specialized organizations for this goal. ICOMOS (International Council for Monuments and Sites) is the most important one, but also CIPA (International Committee for Architectural Photogrammetry), ISPRS (International Society for Photogrammetry & Remote Sensing), ICOM (International Council for Museums), ICCROM (International Centre for the Conservation and Restoration of Monuments) and UIA (International Union of Architects) are all involved in this task.
The documentation of a cultural heritage may be defined as . The action of acquiring, processing, presenting and recording the necessary data for the determination of the position and the actual existing form, shape and size of a monument in the three dimensional space at a particular given moment in time.
There are several documentation techniques available

- Traditional manual methods:
- Topographic methods:
- Close range photogrammetric methods:

2. PETROGHYLIPY AS A HISTORICAL AND CULTURAL HERITAGE

Petroglyphs are images created by removing part of a rock surfaces by incising, pecking, carving, and abrading. The oldest petroglyphs are dated to approximately the Neolithic and late Upper Paleolithic boundary, about 10,000 to 12,000 years ago, if not earlier (Kamyana Mohyla). Around 7,000 to 9,000 years ago, other precursors of writing systems, such as pictographs and ideograms, began to appear. Petroglyphs were still common though, and some cultures continued using them much longer, even until contact with Western culture was made in the 20th century. Petroglyphs have been found in all parts of the globe except Antarctica with highest concentrations in parts of Africa, Scandinavia, Siberia, southwestern

Figure 1. Typical a petroglyph

3. DIGITAL CLOSE RANGE PHOTOGRAMMETRY

Digital Close range photogrammetry measures objects directly from photographs or digital images captured with a camera at close range.The basic model in digital close range photogrammetry is the central perspective projection.

4. PETROGHYLIPYS IN MONGOLIA

When we hear about the Mongolian People's Republic we immediately think about the ancient Turkic inscriptions (especially about Kol Tigin, Bilge Kagan and Bilge Tonyukuk inscriptions).A lot of cultural inheritance existing in history is saved in the places where the ancient inscriptions are settled. Because there were located a lot of inscriptions such as Saka, Hun, Avar, Kokturk, Uygur, gravestones, burial mounds, graves, populated areas, sculpture, balbal, jewelry and other valuable things.

In Mongolian Republic one can find the petrogliphes are served as a living picture and source of communication which turn these places into museum in the open air.

The petrogliphes in the mountains and rocks that located in a lot of territories like Hövsgöl Aymag, Uvs Aymag, Ömnögov Aymag, etc.

5. PHOTOGRAMMETRIC EVALUATIONS

Calibration of the cameras was carried out in the office. This calibration is usually carried out through the analysis of the views of a test object (calibration *target-set*), which usually consists of a set of fiducial marks (targets), positioned within the 3D volume that is being imaged by the camera system. If the geometrical characteristics of this target-set are only partially known or completely unknown, then the calibration process must include the refinement or the blind estimation of the 3D coordinates of the targets [10].The calculated camera parameters of the Nikon d200 digital camera were as follows;

Focal length =20, 8090 distortion parameters are k1= $1{,}269.10^{-3}$, k2=$1{,}860.10^{-5}$ p1= $-4{,}203.10^{-5}$ p2=$1{,}722.10^{-5}$

All photographs, measured coordinate values and camera calibration parameters were transferred to photomodeler software and drawing of the object completed.

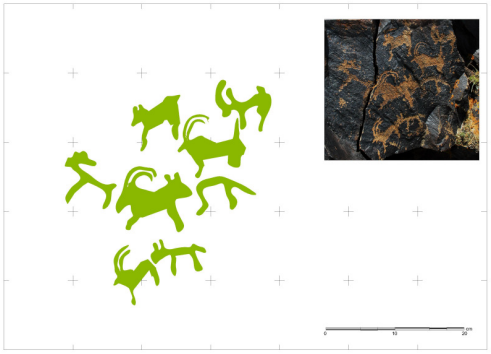

Figure 2 Mongolian petroglyphs

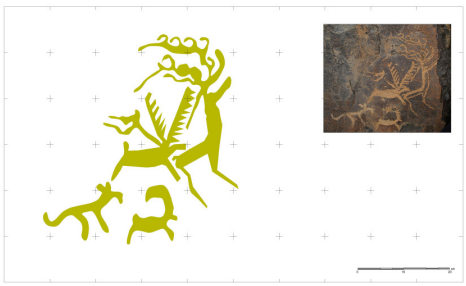

Figure 3. Mongolian petroglyphs

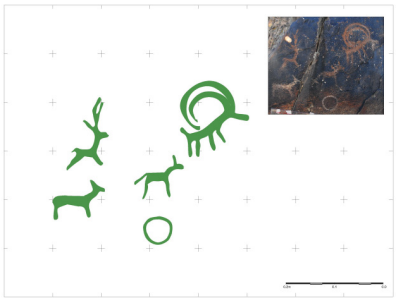

Figure 4. Mongolian petroglyphs

6. CONCLUSIONS

Cultural Heritage preservation and access is an important goal for cultural heritages Petroglyhps are among the most important culturel heritages. These culturel heritages are located very far from the centre of the villages, and cities. Some of them can be reached about one week expedition. Working is very dangeres and hard at the monuments area. So , some times it is needed very fast and short time to study on the site. For this reason ; quick and modern Technologies are needed for these types of studies. Digital close range photogrammetry is among these modern documentation technologies.

Aboriginal rock art has an important position in the cultural heritage of the world. Petrogliphs are a bridge from pst to these times. So , The petrogliphs must be preserved Close range photogrammetry technology in a way that provides good results for the petroglyphs. An efficient and effective method of recording petroglyphs and pictographs using digital photogrammetry has been presented. The approach takes advantage of the new range of cheap digital cameras, which if calibrated can produce accurate 3D data. Appropriate photogrammetric software is capable of obtaining of all types 3d data . In this study; drawing and 3D d modelling of the mongolian petroglyphs have been completed.

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