

COMBINATION CLOSE-RANGE PHOTOGRAMMETRY AND DIGITAL PROCESSING IN ARCHAEOLOGY

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ABSTRACT

Close-Range Photogrammetry in Combination with Digital Image Processing offers of solution for Survey and study of prehistoric rock painting in Brazil. The combination of colour photographs, digitized by a scanner with stereomodels taken by terrestrial Rolleiflex Camera is discussed and the results are analyzed.

KEY WORDS: Archaeological, Close-Range, Image Processing, Scanner.

1. INTRODUCTION

Brasilian archaeology has two important centers of research in the northeast of the country. One is the Fundação Museu do Homem Americano that is located in the city São Raimundo Nonato in Piauí. The other of is the Núcleo de Arqueologia-NEA of the Universidade Federal de Pernambuco.

According to Guidon (1985) and Martin (1989) 147 sites of archaeology are found in the Northeast of Brazil. Those sites are natural shelters where primitive man used to live in order to protect themselves from inclement weather. Rock paintings and engravings are found in the majority of these shelters, many of which have yet to be documented and analyzed.

necessary first to copy the rock paintings completely and then analyse them. Is important to establish morphologic subgroups, that would be defined not only because of their shape itself but also because of their location and their relative ship: "A written description can be used in order to give characteristics of the technical execution, but it can never be used, to understand the forms and their composition".

Gabriela Martin (1980) describes the techniques used by archaeologists in surveying rock paintings: "the technique, that is used by most brasilian archaeologists is to divide the shelter in many areas, cover each area with a transparent plastic sheet and then copy the rock painting by using special pens. Although this process is practical a lot of time is lost trying to gain access to the higher places.

The richness of detail and the range of colours are very specific to this region (Martin, 1982). As an exemple of this is the "Casa Santa" site, located at Carnaúba dos Dantas, RN, which has a panel (2,0 m x 1,5 m) that has more than one hundred rock paintings with a great variety of shapes and colors. The figure 2 shows "Casa Santa" panel.

2. PHOTOGRAMMETRIC METHOD

The research and learning center of the Department of Cartographic Engineering of Universidade Federal de Pernambuco has an agreement with the German Government through the GTZ (Gesellschaft fuer Technische Zusammenarbeit). The photogrammetry laboratory has two metric cameras: one UMK/100 mm, made by Zeiss Jena and the new Rolleiflex 3003, with "reseau" adapted.

Surveying of architecture were already made (Mendonça, 1985, 1989), based on some knowledge of archaeological photogrammetry (Kimata, 1980), (Waldhafusl, 1984), (Muessig, 1986) and (Saley, 1986), it the surveying of the archaeological site "FURNA DOS CABOCLÓS" in Carnaúba dos Dantas, RN has been done.



Figure 1: Brazilian Map

According to Nidge Guidon (1985) the written language is not enough to analyse and classify rock paintings. It is



Figure 2: "Casa Santa" rock paintings panel (2,0 x 1,5 m)

The equipment used was the Camera Rolleiflex 3003, with 60 mm lens, colored film and control points with the theodolite T-2, Wild. The restitution in the Analytical Plotting System PLANICOMP C-100, ZEISS.

2.1- Digital Method-Remote Sensing

The Close-Range Photogrammetry improves the surveying of the rock painting, because it decreases the manual work time spent on the site and increase the accuracy. Although it is not enough for complete documentation; for exemple it can not register colors and super imposed forms. The digital method for analysing rock painting can be divided into three parts:

a) colored pictures of the chosen scenes were taken;

b) the pictures taken were digitylized by the SCANNER EPSON; that belongs to the Photogrammetry and Remote Sensing Institut of University of Karlsruhe German;

c) the images were processed by digital ERDAS system that belongs to the Cartographic Engineering Department.

This system allowed the reconstruction of original colors through the digitalization of three different channels with green, red and blue filters.

3. RESULTS

From this Close-Range Photogrammetry we got the tridimensional coordinated panel. It is possible from this to draw all the rock paintings or to draw each one separately in different scales or in its original size. The figure 3 shows the rock painting from "FURNA DOS CABOCLOS".

From the digital process we can also highlight the rock painting against the background. The figure 4 shows the result.

4. CONCLUSION

As a result of this research we can claim that the use of Close-Range Photogrammetry is important because it decreases the hard work in the field replacing the old hand method copying in transparent plastic sheets. It also allows us to save the information into computer systems.

The Remote Sensing helps to analyse the colors used in the rock paintings and we hope to be able to classify them automatically in the future.

5. ACKNOWLEDGMENTS

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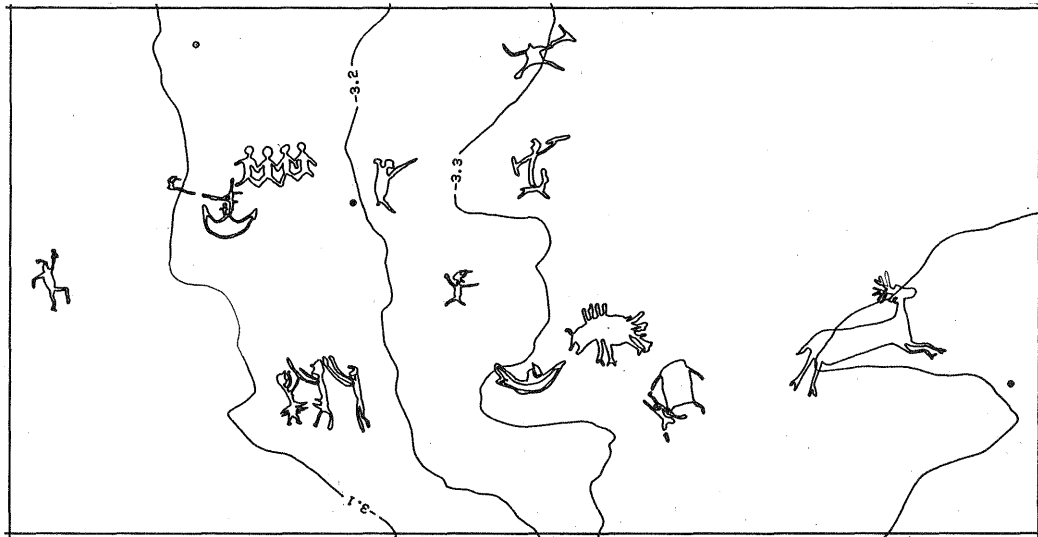


Figure 3: Rock Painting in "Furna dos Caboclos"



Figure 4: Highlight the Rock Paintings