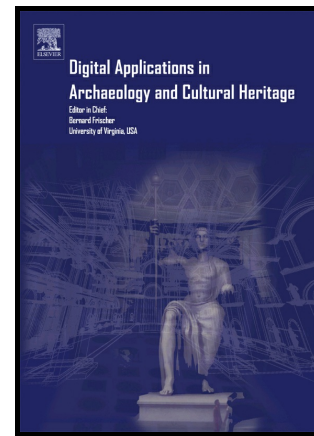


# Author's Accepted Manuscript

## DIGITAL IMAGING TECHNIQUES FOR RECORDING AND ANALYSING PREHISTORIC ROCK ART PANELS IN GALICIA (NW IBERIA)

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**DIGITAL IMAGING TECHNIQUES FOR RECORDING AND ANALYSING PREHISTORIC ROCK ART PANELS IN GALICIA (NW IBERIA)**

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**ABSTRACT**

Several works have highlighted the relevance of 3D modelling techniques for the study of rock art, especially in case of deteriorated state of preservation. This paper presents a methodological approach to accurately document two Bronze Age rock art panels in Galicia (Spain), using photogrammetry SfM. The main aim is to show the application of digital enhancement techniques which have allowed the accurate depiction of the motifs and the correction of previous calques, focusing on the application of the exaggerated shading as a novel analytical method.

**Keywords:** Digital rock art recording; 3D modelling; Photogrammetry; Radiance Scaling; Xshade; Petroglyphs; Rock Art Carving.

**1. INTRODUCTION AND RELATED WORK**

3D modelling techniques are nowadays a standard methodology to study rock art, aiming further accuracy in the documentation process compared to traditional methodologies such as handmade tracings (Ortiz Sanz et al. 2010; Scopigno et al. 2011; Domingo et al. 2013).

From this perspective, different works have been focusing on the development of digital techniques to implement a better visualization of the 3D archaeological models (see Robin, 2015 -for a synthesis-). The application of the Polynomial Texture Mapping (PMT) (Malzbender et al. 2000, 2001) or the Reflection Transformation Imaging (RTI) (Malzbender et al. 2006) have jointly generated an advanced level of interaction with the 3D models, enhancing their topographic surface (Earl et al. 2010; Díaz-Guardamino et al. 2015).

Concerning rock art studies, it is well known that traditional techniques such as “frottage”, wax and latex rubbing are insufficient to document endangered rock art panels in a detailed and non-intrusive way (Simpson et al. 2004; Cassen and Robin 2010; Plets et al. 2012, 139). Both image based modelling –dense photogrammetry- (El-Hakim et al. 2004; Chandler et al. 2005), and range-based methods (Robson et al. 2001; Escarcena et al. 2011) are typically-used approaches to fill this gap (Díaz-Andreu et al. 2006; Lerma et al. 2010; Plets et al. 2012), jointly with RTI techniques (Pitts et al. 2014a,b).

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