



Cave ceiling of Altamira caves, © Museum of Altamira

THE CAVE OF ALTAMIRA IN THIRD DIMENSION: TO INVESTIGATE, DISSEMINATE AND PRESERVE IN 3D

Museum of Altamira / Author: Carmen de las Heras

Since its discovery in 1880, the cave of Altamira has been pioneer in many aspects, including the use of three-dimensional techniques.

In the elaboration of the Altamira facsimile by the Deutsches Museum in Munich (1957-1961), the team of Prof. Pietsch applied aerial photogrammetry inside the cave. This enabled a pioneer system to capture the ceiling relief and cracks and later

reproduce it in detail. It can be considered as a 2D system and a half, a preliminary step for the 3D system.

It was during the production of the Altamira Neocave (1997-2000) that the true 3D system proved all its potential. Neocave's more than 500 m² were the result of the most advanced technology at that time. The National Geographic Institute of Cantabria used high precision equipment,

monitored and controlled by calculation programs. This allowed a three-dimensional topographical mapping of enormous proportions for the time.

Currently, the cave of Altamira has a new three-dimensional model carried out with a millimetre-accurate high resolution laser scanner. It is a very sustainable and essential tool for the archeological investigation, the cave's conservation and scientific dissemination. From the information produced we may for instance obtain detailed mapping, special three-dimensional analysis, georeferenced locations for artistic representations and archaeological remains, and also we may create 3D Geographical Information Systems.

The use of 3D techniques is particularly relevant for the conservation of the cave and its artistic representations. It is

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possible to integrate multiple data, such as the cave's interior and exterior geophysical prospection results or the location of the ceiling dripping points to determine the watersheds across the entire surface. As for biodeterioration, 3D micro-photogrammetry has allowed us to measure microorganism size and growth, providing data on their development patterns.

ABOUT THE MUSEUM OF ALTAMIRA, SPAIN

The Museum of Altamira is a place devoted to learning about, enjoying and experiencing the life of those who painted and inhabited the cave of Altamira. The museum's most attractive offer is the possibility of learning about humanity's first art, Palaeolithic art. The museum is in charge of a legacy of maximum value, the cave of Altamira, a milestone in universal art history whose discovery meant the discovery of Palaeolithic cave art and one of its most spectacular manifestations. The expertise of the artistic expression of the cave's inhabitants was recognised by UNESCO in 1985 when the site was registered on the World Heritage List.

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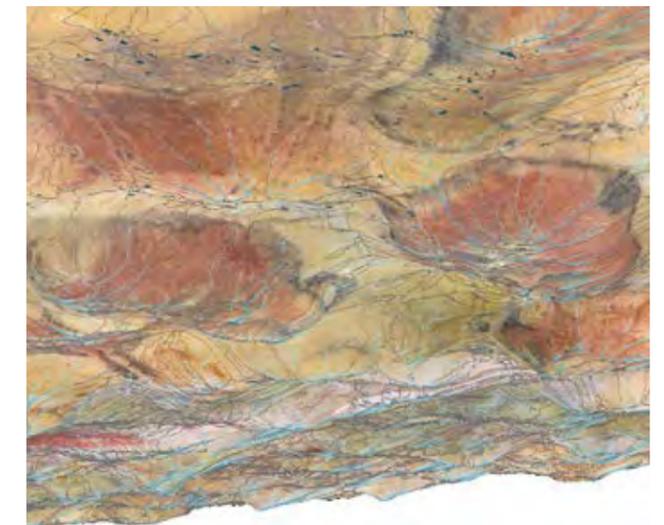
Undoubtedly, the best known aspect about 3D new technologies is the virtual reality development, mainly for VR glasses use. This tool was applied in Altamira to show the physical aspect of the cave right after its discovery and to facilitate visitors' sensory, experimental and personal access to the art of Altamira. ■



3D reconstruction of the landscape and the entrance of the cave before its collapse 13.000 years ago, © Museum of Altamira



Virtual reality development for VR glasses use, © 2017 Virtualware



3D reconstruction of ceiling watersheds, determined thanks to the dripping points location and analysis, © Museum of Altamira

