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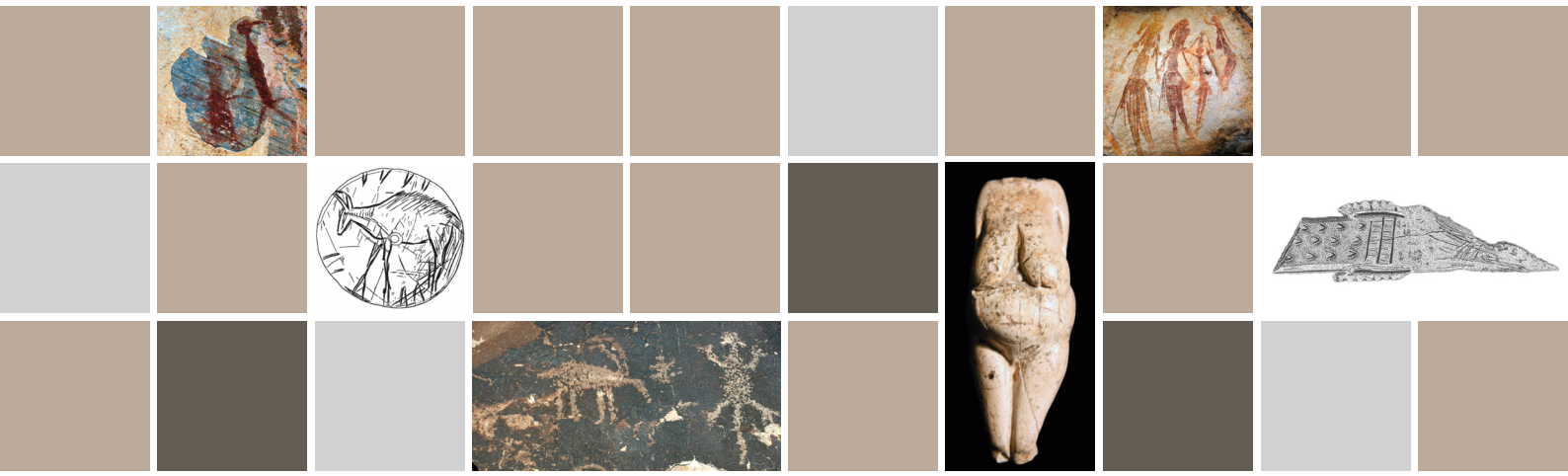

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FOR5 Azema *et al.*
Full article, pp. 1221-1238

THE DECORATED PALEOLITHIC CAVE OF BAUME LATRONE (FRANCE, GARD):

3D Time Travelling…

**Marc AZÉMA, Bernard GÉLY,
Raphaëlle BOURRILLON, David LHOMME**

Since 2009, a new research program in the cave of Baume Latrone (France, Gard), directed by Marc Azéma, has consisted of recording its astonishing parietal images, drawn in clay or engraved on limestone, using a combination of traditional techniques and three-dimensional digitalization. This technological association introduces a fourth dimension into the digital field model by confronting several chronological phases on the wall, which was vandalized and then cleaned during the 1980's, thus allowing us to travel through time...

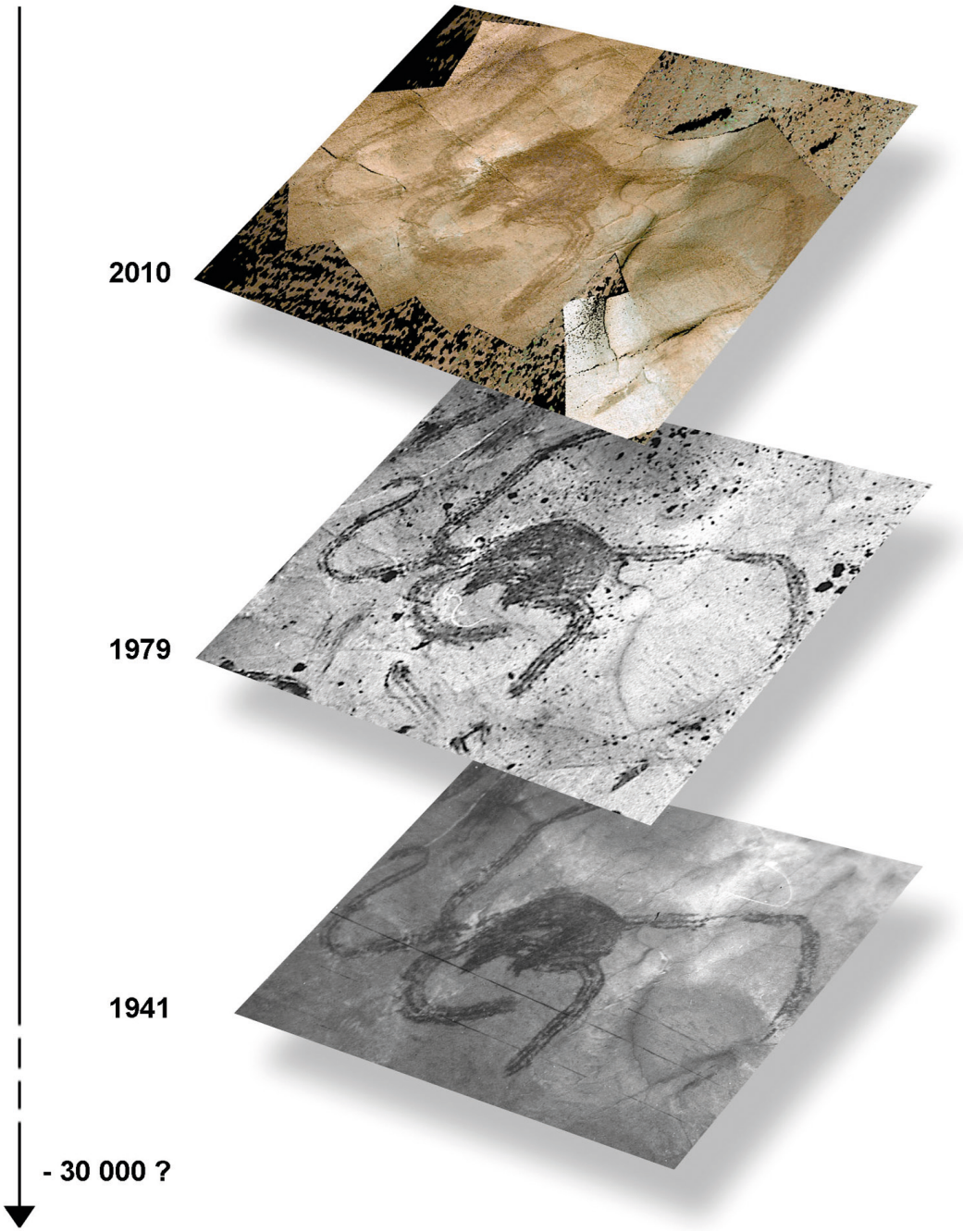
A cave to be rediscovered

Baume Latrone is one of five decorated caves in the Gard Department of France. Many of the figures are located on the western walls of the Bégouën Chamber. They were discovered in 1940 and then studied by A. Glory and P. Fitte during the same year. From the time of its discovery, the cave has suffered from human presence and acts of vandalism. Two restoration sessions were realized in 1982 / 1984 by I. Dangas and J. Brunet for the *Laboratoire de Recherche des Monuments Historiques*. The Great Ceiling, which has the most spectacular graphic ensemble, is composed of a large feline representation (3 m) surrounded by 7 or 8 mammoths and a horse and / or rhinoceros. The style of the images is original, with the animal profiles being reduced to a minimum and some anatomical details left out. Both engraving and painting was employed, but it is the multi-finger technique with large bands that is most original in the Baume Latrone parietal decoration.

Though it is impossible to precisely determine the period(s) of human presence in the cave, due to the absence of significant artifacts and wood charcoal, all researchers agree that the decoration can be attributed to an early phase of parietal art.

The contribution of 3D scanning to the recording of parietal art at Baume Latrone

The main aspect of our study of the decorated walls is to record and analyze the different human interventions. For the past fifteen years, photographic recording, which is the technique traditionally used in decorated caves and rock art, has been enhanced by advances made in 3D digitalization techniques (orthophotographic recording).



3D time travelling at Baume Latrone – mammoth no. 11 scanned from the present to 1941, and soon to be restored to its original state (2010, photo: ATM3D; 1979, photo: A. Ruppel; 1941, archives L. Bégouën).

A first three-dimensional recording session was realized in the Bégouën Chamber in January 2009, with the objective of digitalizing the environment of the figures. During the second session, in 2010, the entire Great Ceiling was digitalized at sub-millimeter scale.

At the same time, the entire Great Ceiling was photographed: 205 photos were taken and then computer enhanced (color levels, contrast and focus were optimized and the photos were organized) to prepare for 3D mapping. The orthophotographs thus produced would serve as a support for the recording. Once it is completed, this recording well be reintegrated into the original three-dimensional environment of the model.

Travelling in time

At Baume Latrone, the method of recording through orthophotography revealed an unexpected dimension: time. The decorated wall that we see today is different from that observed by the discoverers in 1940. Its condition has evolved due to vandalism during the first decades and restoration operations in the 1980's. These different "periods" were photographically documented. Since the beginning of our study, we have recovered these precious testimonies and have constituted a photo-library of hundreds of photos in the process of being enhanced and originating from archives.

Despite the technological limits associated with the time when the photos were realized (format differences, black and white and color), a first analysis of this photographic database shows that it will be possible to reconstruct several wall and floor surface states with the digital field model, using the method described above and by calibrating the photos to each other.

This voyage in time could go even further. We believe it will be possible to realize a virtual restoration of the decorated wall (and floors), similar to that made for the Great Panel of the cave of Marsoulas.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