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Contribution of 3D technologies to the analysis of form in late palaeolithic rock carvings: The case of the Roc-aux-Sorciers rock-shelter (Angles-sur-l'Anglin, France)

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ABSTRACT

The 3D technologies have become essential in our researches on the Middle Magdalenian rock carving (18,500–17,000 cal. BP), complementary to the other traditional analytic tools. They play a noticeable role in our stylistic studies: the superimpositions of volumes and not only shapes make the form comparisons all the more accurate that margins of difference can be calculated. On the one hand, clarifying the degree of similarity between two carvings brings more data to the problem of the author (s) of the carvings, and thus it questions notions hardly tackled in prehistoric archaeology: the individual and the short time. These form comparisons prove to be very useful for other archaeological problems. Used for shape identification, they help for a better interpretation of the fragmentary representations and, beyond, for a more precise modelling of the chronological evolution of the parietal assemblages.

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1. Introduction

The use of 3D technologies in the process of recording palaeolithic parietal art has spread widely throughout the scientific community since the mid-2000s: caves of Cosquer (Thibault, 2001), Chauvet (Aujoulat and Pérazio, 2005), El Castillo (Warzée et al., 2009), La Peña de Candamo (Corchón et al., 2009a, 2009b), Las Caldas (Corchón et al., 2009b), Marsoulas (Fritz et al., 2010), Lascaux (Feruglio et al., 2010), Altamira (Lasheras Corruchaga and de las Heras, 2010), La Baume-Latrone (Azéma et al., 2012), La Garma (Arias and Ontañón, 2014), Cussac (Feruglio et al., forthcoming), etc. In this framework, our research on carved parietal art has given a special attention to the development of analytical applications of these technologies that have ensured methodological improvements in the study of these rock art sets. Four decorated sites of Western France, attributed to the Middle Magdalenian culture (18,500–17,000 cal. BP) are concerned: the Roc-aux-Sorciers (Angles-sur-l'Anglin, Vienne), the Chaire-à-Calvin (Mouthiers-sur-Boëme, Charente), Reverdit (Sergeac, Dordogne) and Cap-Blanc (Marquay, Dordogne) (Pinçon and Bourdier, 2009; Pinçon et al., 2009; Bourdier, 2010;). Because of its extension, complexity and remarkable conservation, the Roc-aux-Sorciers carved frieze constitutes the main testing ground on which this paper focuses on.

Situated at the margins of Aquitaine and of the Paris Basin, the Roc-aux-Sorciers is a massive rock shelter that opens in a south-facing cliff on the bank of the Anglin river (Fig. 1). It is divided into two areas with contrasting geomorphologies: a classical rock shelter in the downstream part ("Abri Bourdois"), and a wide karstic cavity parallel to the cliff in the upstream part, whose huge ceiling collapsed ("Cave Taillebourg"). Discovered in 1927 by L. Rousseau, the site was mainly excavated between 1947 and 1957 by de Saint-Mathurin and Garrod who unearthed the rock art (Rousseau, 1933; Saint-Mathurin and Garrod, 1949, 1951; Saint-Mathurin, 1984). It has been the subject of a multidisciplinary study supervised by Pinçon since 1992.

The excavations yielded evidence of an intensive sequence of occupation during the Middle Magdalenian (MM hereafter). Two thick archaeological layers were identified by L. Rousseau and later by de Saint-Mathurin and Garrod in both areas of the site: layers TCD and TCC in the "Cave Taillebourg", layers RSD and RSC in the "Abri Bourdois". In the "Abri Bourdois", the radiocarbon dates obtained extend from $14,160 \pm 80$ BP (17,571–16,923 cal. BP, GRN 1913) to $14,770 \pm 140$ BP (18,515–17,609 cal. BP, GifA 94190) (Saint-Mathurin, 1984; Iakovleva and Pinçon, 1997).¹ These layers contained many hearths and a rich and diverse material. Lithic and osseous industry, fauna, portable art and personal ornaments indicate that a wide range

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¹ [1] Dates calibrated with OxCal 4.1, IntCal 09 curve (Bronk Ramsey, 2009; Reimer et al., 2009).

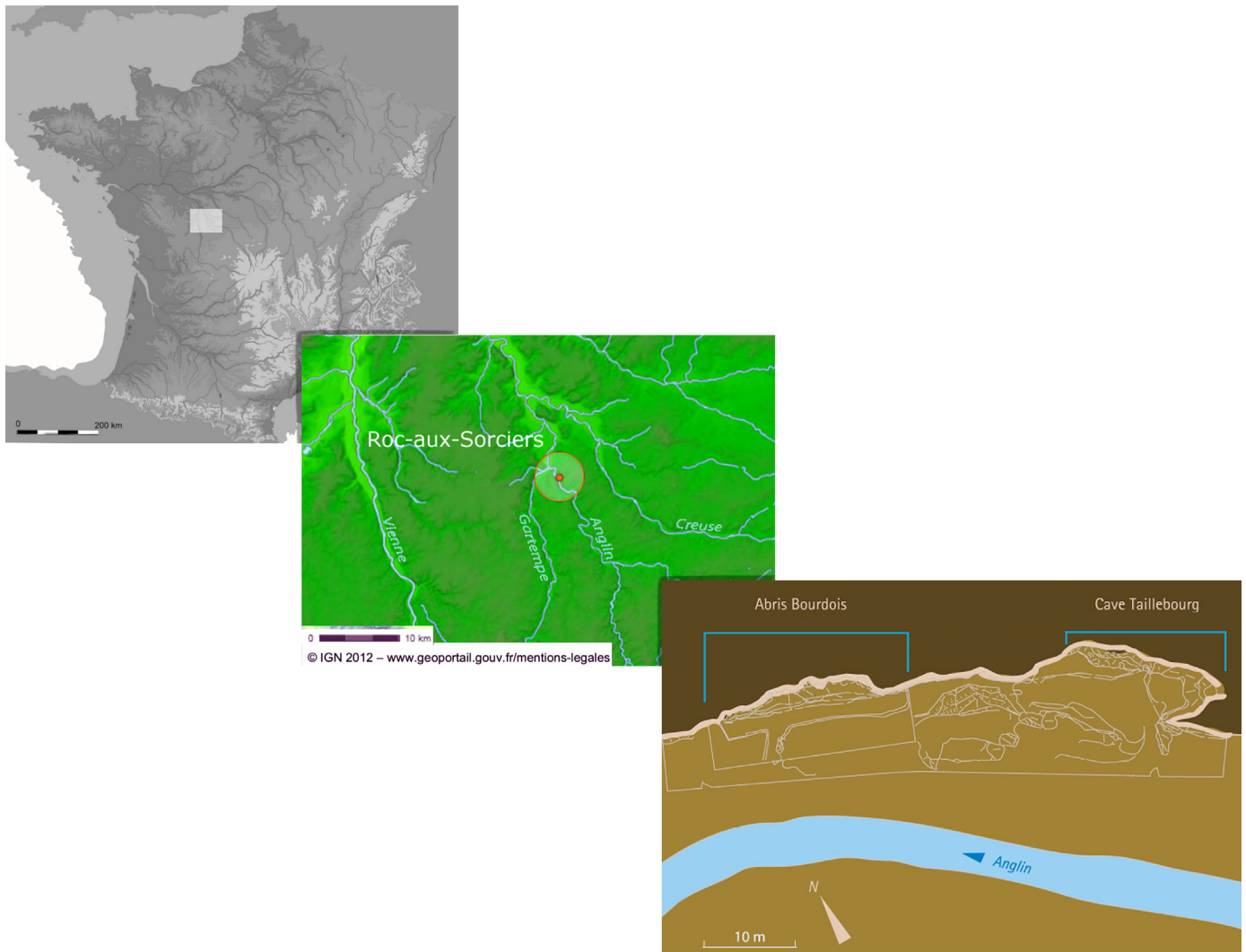


Fig. 1. Location and topography of Roc-aux-Sorciers rock-shelter Credits—map: www.geoportail.gouv.fr; topography: Ph. Conte, Gulliver; Centre d'interprétation du Roc-aux-Sorciers.

of activities were performed in the site, relating to the domestic, hunting and symbolic spheres (Pinçon, 2009–2010). The faunal remains – mainly reindeer and horse – suggest intensive and/or repeated occupations (Bignon, 2009–2010; Valensi, 2009–2010). However, the accurate characterization of the occupations can hardly be defined at present.

A central aspect of the Roc-aux-Sorciers lies in the association of a luxurious parietal art with these occupations. The site contains the most exceptional carved frieze known in the European Upper Palaeolithic, both the longest and the most diverse in terms of motifs. These bas-reliefs are combined with paintings and with fine and large engravings. The parietal art extends for more than 50 m, occupying the back wall and the fallen ceiling in the “Abri Bourdois”, but restricted to the ceiling in the “Cave Taillebourg” where it is now fragmented into several hundred blocks (Saint-Mathurin *op. cit.*; Iakovleva & Pinçon *op. cit.*) (Fig. 2). Studies are still underway, but more than a hundred motifs are known at present, with on the one hand engraved and carved figurative designs, and on the other hand red-painted abstract designs (lines, dots, quadrangles) (Abgrall, 2009–2010, 2010). The figurative corpus is diverse, with the identification of ten themes, some of them particularly scarce in European Palaeolithic iconography (saiga antelope, canid). With 60 bas-reliefs currently known, the carved imagery is dominated by the classical MM triad of Horse–Bison–Ibex together with

felines and humans as a specific feature of this parietal assemblage (Fig. 3). These representations show a strong realistic trend which is typical of the local stylistic tradition, especially applied to depiction of humans (Bourdier, 2013; Fuentes, 2013). The bodies are complete and well-proportioned, with many internal details depicting organs, muscles and bones. In the “Abri Bourdois”, the bas-reliefs are organized in thematic panels naturally delimited by the topography of the shelter (Iakovleva & Pinçon *op. cit.*). A body of evidence attests that all the parietal art can be attributed to the MM sequence of occupation: decorated wall partly covered by the fallen ceiling in the “Abri Bourdois”, fallen decorated ceiling covering the MM layers in the “Cave Taillebourg”, pieces of carvings found in the MM layers in the “Abri Bourdois”, ochre and manganese pencils and *molettes* as well as carving equipment in the MM layers from both areas (de Beaune, 2009–2010; Chehmana and Beyries, 2009–2010; Beyries and Catin, 2014).

2. Material and methods

2.1. 3D recording of the parietal art

In collaboration with a private firm (Arts Graphiques et Patri-moine), three-dimensional technologies have been introduced since

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