Turath

Turath
ISSN : 2830-9863 ; EISSN : 2992-0698
Volume 4 Issue 1 / June 2026 pp.62-82

تراث

The Marhouma Site in the Saoura Region: Rock Records and Fossils for Studying the Oldest Amazigh Cultural Expressions

Touhami MERZOUGUI *
https://orcid.org/0000-0003-4976-0919

Laboratory of Chime and Environmental Science, University of Bechar,
Faculty SNV University Tahri Mohamed of bechar- BP417, 08000 -Algeria.
merzougui.touhami@univ-bechar.dz

Received: 02/06/2026
Accepted: 11/06/2026
Published: 30/06/2026

***Corresponding author:**
Touhami MERZOUGUI, merzougui.touhami@univ-bechar.dz

Citation:
MERZOUGUI, T. (2026). The Marhouma Site in the Saoura Region: Rock Records and Fossils for Studying the Oldest Amazigh Cultural Expressions. *Turath* *4*(1), pp. 60-80

ABSTRACT: *The Marhuma region, located in the heart of the Saoura Valley in southwestern Algeria, is one of the most remarkable archaeological sites in the Sahara. Combining a rich rock art heritage with an exceptional concentration of paleontological remains, it constitutes a unique natural laboratory for investigating the prehistoric foundations of Amazigh cultural traditions in North Africa. This article presents the results of field surveys and iconographic analyses conducted at the site, comparing them with evidence from neighboring rock art localities in order to develop a comprehensive interpretation of the symbolic, ritual, and economic practices of the prehistoric communities that produced this visual repertoire. The study further situates these findings within the broader context of Amazigh cultural development, arguing that the Saoura region functioned as a major crossroads connecting Saharan, Mediterranean, and West African cultural traditions.*

KEYWORDS: Marhuma, Saoura, Rock Art, Amazigh Heritage, Prehistory, Iconography.

© 2026 **Turath** / Published by the Centre of Research in Social and Cultural Anthropology (CRASC), Algeria.

This is an open access article under the CC BY-NC-ND 4.0 license.

Turath
Volume 4 Issue 1 / June 2026

Le site de Marhouma dans la région de la Saoura: art rupestre et vestiges fossiles pour l'étude des plus anciennes expressions culturelles amazighes

RÉSUMÉ: *Située au cœur de la vallée de la Saoura, dans le sud-ouest algérien, la région de Marhouma figure parmi les espaces archéologiques les plus remarquables du Sahara. Grâce à la richesse de son art rupestre et à la diversité de ses vestiges paléontologiques, elle constitue un témoignage précieux sur les sociétés préhistoriques qui ont occupé cette partie de l'Afrique du Nord. Ce site offre ainsi une opportunité privilégiée d'explorer les racines anciennes du patrimoine culturel amazigh et de mieux comprendre les dynamiques humaines qui ont façonné l'espace saharien à travers les âges. Le présent article s'appuie sur les résultats d'investigations de terrain et d'analyses iconographiques menées à Marhouma, en les confrontant aux données recueillies sur d'autres sites rupestres de la région. Cette démarche comparative permet d'éclairer certains aspects de l'univers symbolique, des pratiques rituelles et des activités économiques des communautés préhistoriques à l'origine de ces représentations. L'étude inscrit également ces découvertes dans une réflexion plus large sur l'histoire culturelle amazighe, en montrant que la vallée de la Saoura a constitué, durant de longues périodes, un espace privilégié de circulation, de rencontres et d'échanges entre les mondes saharien, méditerranéen et ouest-africain.*

MOTS-CLÉS : Marhouma, Vallée de la Saoura, Art rupestre, Patrimoine amazigh, Préhistoire, Iconographie.

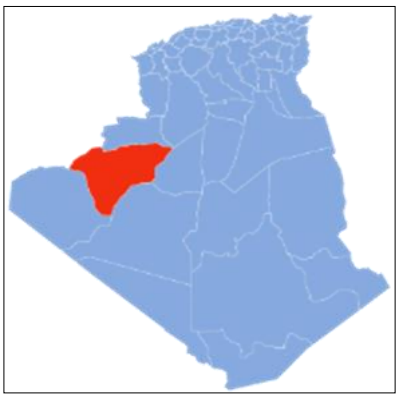
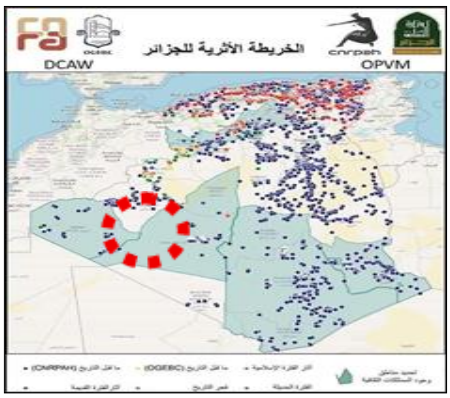
موقع مرحومة في منطقة الساورة: سجلات صخريَّة وحفريَّات لدراسة أقدم التعبيرات الثقافيَّة الأمازيغيَّة

الملخّص: تُعدّ منطقة مرحومة الواقعة في قلب وادي الساورة بالجنوب الغربي الجزائري إحدى الفضاءات الأركيولوجية الاستثنائية التي تجمع بين ثراء السجلات الصخرية وتنوّع محتوياتها الحفرية، ما يجعل منها مختبراً طبيعياً فريداً لدراسة أقدم مراحل التعبير الثقافي الأمازيغي في شمال إفريقيا. يستعرض هذا المقال نتائج الدراسات الميدانية والتحليلات الأيقونوغرافية التي أجريت على هذه المنطقة، مقارناً إياها بالمواقع الصخرية المجاورة، ومحاولاً بناء قراءة شاملة للممارسات الرمزية والطقوسية والاقتصادية لمجتمعات ما قبل التاريخ التي أبدعت هذه اللغة البصرية الحجرية. كما يسعى المقال إلى وضع هذه المعطيات في إطار المسار الحضاري الأمازيغي الكبير، مبيّناً أهمية الساورة باعتبارها جسرا بين ثقافات الصحراء والمتوسط وغرب إفريقيا.

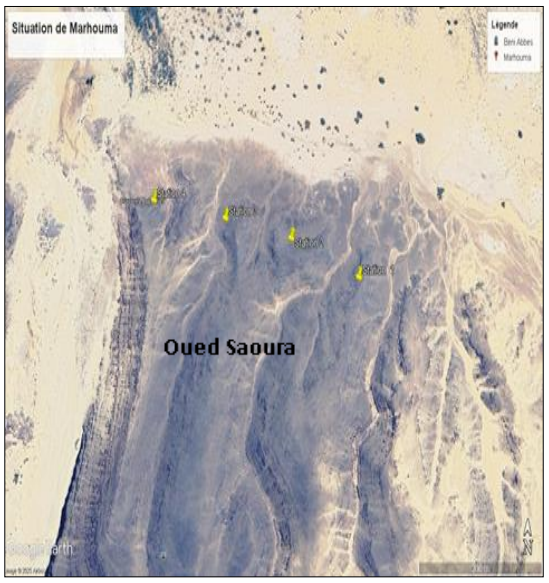
الكلمات المفتاحيّة: مرحومة، الساورة، فن صخري، أمازيغ، ما قبل التاريخ، أيقونوغرافيا.

Introduction: The Saoura as a Living Stone Memory

The region of Saoura extends along the dry valley that bears its name, located in southwestern Algeria, crossing plateaus, dunes of the great western erg and ancient rivers formed over millions of years. Far from being a mere geographical corridor in the distant past, this great valley was a vital artery where the movements of peoples, animals, ideas and beliefs converged. The petroglyphs and painted images left by its former inhabitants on the rocky walls thus constitute an irreplaceable document for understanding the first cultural roots of the Amazigh people.

	
a): situation of Beni Abbes	**b): Archaeological map of Algeria**





c): localization of the region of Marhouma

Figure 01: geographical situation of the Souara region

The region of Saoura is not only an arid desert, but a historical and cultural crossroads of life and civilizations where golden sands meet ancient history. Located in the wilaya of Béni Abbès, the archaeological site of Marhouma is an exceptional open window on prehistory. The rock carvings and symbols discovered on this site constitute a true civilizational "birth certificate" and an extraordinary stone archive that documents the deepest roots of proto-Amazigh identity and thought over millennia. This academic study explores how the engraved signs of Marhouma constitute a living testimony to the origins and continuity of the Amazigh identity in the region of Saoura.

The region of Marhuma - located about sixty kilometers southwest of the city of Béchar - occupies a particularly distinguished position at the intersection of several geological formations of different ages and character. It brings together the rocky masses of the early Cambrian, the layers of sandstone of the Devonian and the formations of the Cretaceous and Quaternary, allowing successive and diverse periods to converge in a single coherent space. This geological diversity is not merely a natural phenomenon; it is in itself testimony to the depth of history accumulated in this corner of the great Sahara.

1. Geological and Geographical Framework of the Marhuma Region

1.1. Topography and Rock Formations

The Marhuma region is characterized by a complex geomorphological structure composed of several complementary topographic units that significantly shaped ancient human activities and the distribution of rock art expressions. The rocky hammadas, consisting of extensive flat surfaces covered with compact stones, provided particularly suitable supports for engravings due to the regularity and durability of their surfaces. Seasonal wadis and deeply incised gorges, bordered by rocky escarpments, constituted favorable settings for the preservation of rock paintings, as natural cavities and overhangs protected them from solar exposure and wind erosion. Inselbergs, or isolated rocky outcrops overlooking the surrounding plains, occupied strategic positions that facilitated both territorial surveillance and symbolic or ritual practices. Finally, the sand dunes contain important anthropological deposits, including ancient hearths, organic remains, and lithic tools, making these formations valuable archaeological archives that testify to successive phases of human occupation.

1.2. Palaeoclimate and Its Significance for Understanding the Cultural Record

The Saoura has not always been the barren desert we know today. Geological and environmental evidence extracted from the Marhuma region reveals that the area passed through several humid phases between approximately ten thousand and four thousand years before the Common Era - a period known as the African Humid Period or the Saharan Wet Quaternary. During these phases, the region teemed with lakes, marshes, and open woodland; elephants, giraffes, buffalo, and crocodiles roamed its plains, as rock art from Marhuma attests beyond all reasonable doubt.

Understanding this ancient climate is the key to reading the cultural record, for it means that the social and economic structure of prehistoric communities in this region was fundamentally different from the desert life that followed. They practised hunting alongside pastoralism and rudimentary agriculture, and their social networks were broader and more ramified than any simplistic notion of "desert nomads" would suggest.

2. Rock Art at Marhuma: Description and Classification

Rock art in the Marhuma region reveals a rich diversity of artistic techniques and iconographic themes that reflect both chronological evolution and the multiplicity of symbolic, social, and environmental functions associated with these visual expressions. Field investigations have identified engraving as the

most widespread technique, appearing in several forms, including fine linear incisions executed with pointed tools to produce fluid and anatomically precise representations, deep-cut engravings characterized by more forceful removal of the rock surface to create large relief figures, and pecking techniques based on repeated percussion that generated stippled surfaces defining the desired forms. In addition, to engravings, painted images have also been documented within protected rock shelters, where the use of red ochre, white kaolin, and black pigments derived from charcoal or manganese oxide demonstrates a sophisticated knowledge of mineral coloring materials.

The iconographic repertoire of Marhuma may be classified into three principal categories. The first consists of zoomorphic representations, which dominate the corpus and reflect successive environmental and cultural phases. Species such as the African elephant and the white rhinoceros attest to a humid prehistoric environment during the sixth millennium BCE, while giraffes, often depicted in paired or confrontational postures, may suggest ceremonial or social scenes. The representation of the extinct wild cattle (Bubalus antiquus) constitutes one of the most emblematic motifs of Saoura rock art due to the remarkable realism and technical mastery involved in its execution. Later strata introducing horses and camels indicate progressive climatic aridification and the expansion of desert conditions from approximately 3000 BCE onward, whereas depictions of dogs and goats point to the emergence of domestication and the development of pastoral lifeways.

The second category concerns human representations, which provide important insights into the symbolic and ritual dimensions of prehistoric societies. These include hunting scenes featuring armed figures carrying bows and spears, collective dance scenes characterized by rhythmic and circular movements suggestive of ceremonial practices, and anthropomorphic figures adorned with masks, horns, or elaborate headdresses that may indicate ritual authority or specific social functions. Certain isolated scenes associated with sexuality and procreation are generally interpreted as references to fertility rites or initiation practices.

The third category encompasses abstract symbols and geometric signs, which remain among the least understood aspects of Marhuma's rock imagery. Some geometric motifs resemble proto-alphabetic forms comparable to ancient Tifinagh characters, raising important questions regarding the origins and chronology of Amazigh writing systems. Circular and concentric motifs are frequently associated with cosmological symbolism related to the sun, the eye, or spatial orientation, while grid-like and comb-shaped forms have been interpreted by some researchers as schematic representations of water systems or rudimentary agricultural planning. Nested squares and rectangular forms may similarly reflect early conceptions of spatial organization and settlement structuring within prehistoric communities.

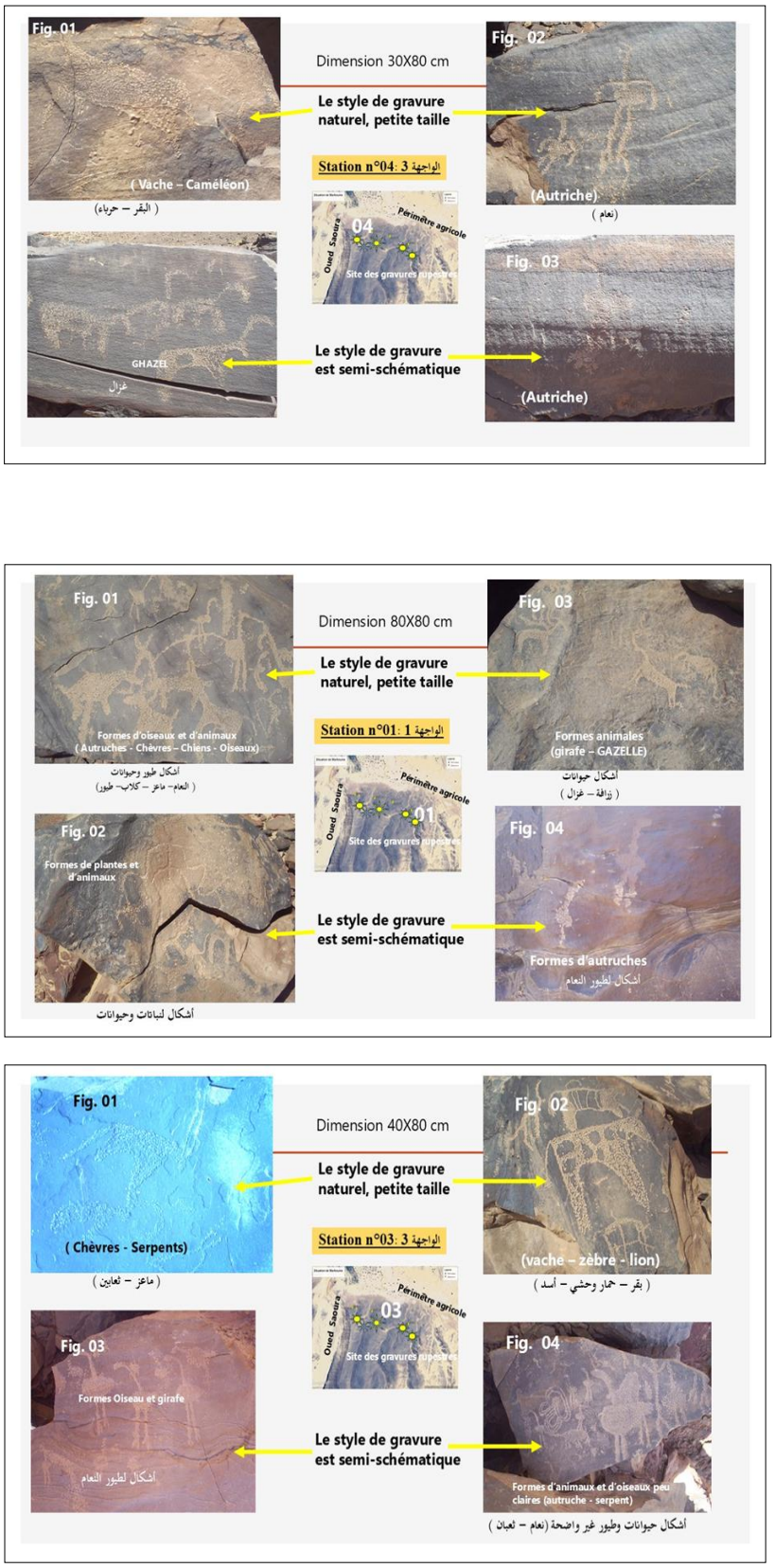


Plate 01: the sites of rock engravings in Marhouma

3. Anthropological Excavations: Sites and Findings

Anthropological and archaeological excavations conducted in the Marhuma region by Algerian and international research missions have revealed a long sequence of human occupation extending from the Middle Palaeolithic to the early historical period. Several major sites have yielded stratified archaeological evidence illustrating the cultural and technological evolution of prehistoric communities in the region. Site Marhuma-1 contains levels associated with the Saharan Mousterian tradition, dated approximately between 80,000 and 40,000 years before present, where excavations uncovered denticulate and bifacial flint tools alongside fossilised remains of extinct animal species. Site Marhuma-2, attributed to the Iberomaurusian and Capsian cultures between roughly 12,000 and 7,000 years before present, is distinguished by the presence of numerous microlithic bladelets and a carefully constructed circular hearth considered among the earliest indicators of organized domestic spatial planning in the area. Meanwhile, Site Marhuma-3 corresponds to the early pastoral period, dated between approximately 7,000 and 4,500 years before present, and has produced evidence of hearths, pastoral enclosures, and domesticated animal bones, confirming the emergence of animal husbandry and sedentary pastoral practices in the region.

The excavated material culture further highlights the complexity of prehistoric societies in Marhuma. Lithic assemblages document successive technological phases ranging from the Acheulean to the Neolithic periods, demonstrating both the continuity of human occupation over hundreds of thousands of years and the development of increasingly specialized craftsmanship. Decorated ceramic fragments dating to the fifth and fourth millennia BCE display geometric motifs such as parallel lines, comb patterns, and ovoid symbols comparable to those identified at other North African sites, suggesting the existence of extensive cultural interactions and shared symbolic traditions among Amazigh populations. Personal ornaments, including perforated marine shells and molluscs, provide evidence of long-distance exchange networks linking inland communities to coastal regions, while the presence of carnelian and other semi-precious stones points to the development of structured systems of trade and circulation. In addition, zooarchaeological and archaeobotanical analyses indicate a diversified subsistence economy combining hunting, plant gathering, pastoralism, and possibly early forms of agriculture, thereby challenging reductive interpretations of prehistoric Saharan populations as exclusively nomadic or environmentally constrained communities.

3.1. Heritage Interest: Towards a Saoura Geopark?

The "Saoura Wall of China" KM30 geosite is a geological and paleontological treasure of global importance that still lies largely in scientific and media anonymity. This bibliographic research has identified more than 40 relevant scientific references related to it, covering a period of 120 years (1905-2025) and showing a sustained and growing publication dynamic, notably with two major contributions published in 2024 and 2025.

The site brings together in a single place scientific value (international reference section for the Devonian of Gondwana), educational (continuous and legible outcrop), aesthetic (spectacular morphology in black marble ridge), and heritage (unique fossils) which make it one of the most obvious natural candidates for protected and valued geosite status in Algeria.

The urgency of the legal protection of the site cannot be overstated: each season of unregulated collection or undocumented erosion represents an irremediable loss of the heritage of humanity, in the most literal sense of the term, since the orthocera fossils from KM30 are irreplaceable witnesses to the marine life of a world 400 million years old.

4. The Rock Record and the Question of Amazigh Origins

4.1. Theories of Origin and the Evolution of Amazigh Iconography

Scholars face a genuine methodological challenge when attempting to identify the "earliest" Amazigh cultural expressions, since the term "Amazigh" in its modern ethnolinguistic sense cannot be straightforwardly projected onto prehistoric communities. The approach now accepted in Maghrebian archaeological studies consists in tracing cultural, genetic, and biological continuity from the Neolithic period through to historical and contemporary Amazigh societies.

Within this framework, several elements point to a possible cultural continuum between the creators of the Marhuma rock engravings and later Amazigh civilisation. The engravings reveal a spiritual worldview grounded in the interconnectedness of humanity, nature, and the sacred, a conception that continues to resonate within Amazigh traditions through ritual practices, musical expressions, and vernacular architecture. The frequent representation of circular forms suggests an understanding of cyclical time and perpetual renewal, principles that occupy a central place in Amazigh cosmological thought. Likewise, the recurrent depictions of the bull and the ram evoke symbolic motifs that held a sacred status across ancient North African societies, extending from Libya to Mauritania, and which are prominently featured in the iconographic repertoire of Marhuma. Finally, certain scenes portray both conflict and cooperation among

human groups, juxtaposing episodes of confrontation with representations of collective labour and social solidarity. Such imagery reflects a complex social organisation that recalls descriptions of North African populations provided by classical authors and may indicate enduring cultural patterns within the broader Amazigh historical continuum.

4.2. Tifinagh and Its Lapidary Roots

Among the most stimulating questions raised by the study of Marhuma's engravings is the relationship between the geometric signs carved into the rocks and the letters of the Tifinagh Amazigh script. A school of researchers argues that certain isolated signs at Marhuma - particularly those characterised by a regularly geometric and abstract character - may represent a primitive phase in the development of a writing system predating historically attested Tifinagh.

It is noteworthy that these signs do not appear randomly but in specific contexts: adjacent to large zoomorphic images (perhaps serving as proprietary or totemic marks), inscribed in semi-hidden areas of the rock face (suggesting a sacred or esoteric dimension), or repeated systematically in ways that imply a clear communicative function.

5. Faunal and Floral Evidence: Marhuma as Environment and Civilisation

5.1. Fossilised and Contextual Animal Remains

Excavations at Marhuma have yielded bone remains of numerous animal species distributed across different temporal levels:

-Large Bovids (Bovidae): occupying the most prominent position in the recovered assemblage, including the extinct ancient aurochs, gazelles, and oryx.

-Proboscideans: elephant molars of considerable size were recovered from the oldest strata, confirming the presence of this animal in the Sahara ten thousand years ago.

-Nile Crocodile: vertebrae and osteoderms identified in deposits associated with ancient watercourses, proving the existence of permanent water in the region.

-Fish Remains: fish bones detected in the humid strata, a precise environmental indicator confirming stable bodies of water in the area.

5.2. Plant Remains and Palynological Analysis

Specialist research teams collected samples for pollen analysis from the sedimentary layers of Marhuma, yielding a detailed environmental reconstruction: during the humid period (10,000 - 4,500 BP),

acacia, juniper, and wild olive trees prevailed alongside African savannah grasses. Following the progressive desiccation (4,500 - 3,000 BP), date palms and drought-adapted shrubs replaced denser woodland. In the early historical period, pollen of cultivated species (barley and wheat) appears in the uppermost strata, confirming the practice of rudimentary oasis agriculture.

6. Marhuma within Its Regional Network of Rock Art Sites

6.1. Comparison with Adjacent Saoura Sites

Marhuma does not stand as an isolated site but as a link in a chain of rock art localities extending along the Saoura and its tributaries:

-Tiout: characterised by an exceptional concentration of pastoral period engravings, forming with Marhuma an important documentary pair.

-Aïn Sefra: where equestrian images dating to the Libyan-Roman period appear, attesting to the extended civilisational continuity of the region.

-Kenadsa: containing camel images that point to the period following the Great Saharan Transformation (post-3000 BCE).

-Figuig Corridor Sites: ancient transit zones combining engravings from multiple periods reflecting the dynamics of ancient caravan routes.

6.2. Connections to the Rock Art of Tassili and Ahaggar

Linking the art of Marhuma with that of Tassili-n-Ajjer and Ahaggar constitutes one of the major theoretical challenges of the field, since there are evident shared elements in style and subject matter, yet a clear plastic specificity to Saoura rock art distinguishes it from the southern zones. The researcher Henri Lhote argued in his classical studies that the central Saharan zone - which includes the Saoura - formed a civilisational bridge between northern Mediterranean and southern Western Sudanese cultures, and that its rock art embodies this unique cultural synthesis.

7. Academic and Methodological Challenges

7.1. Problems of Dating

Establishing the chronology of rock engravings constitutes one of the most significant methodological challenges in rupestrian archaeology, primarily because rock surfaces generally lack organic material suitable for radiocarbon dating. To address this limitation, researchers working at Marhuma employ a combination of complementary dating approaches. The first consists of comparative stylistic analysis,

whereby the artistic techniques, motifs, and formal characteristics of the engravings are compared with those of other sites whose chronology has been more securely established. A second approach relies on advanced geochronological methods, including Optically Stimulated Luminescence (OSL) and Chlorine -36 surface- exposure dating, which make it possible to estimate the last period during which a rock surface was exposed to sunlight and thereby provide a chronological framework for the engravings carved upon it. Finally, indirect environmental dating is used to correlate the depiction of particular animal species with palaeoenvironmental and archaeological evidence documenting the periods during which these species inhabited the region. Taken together, these methods enable researchers to construct a more reliable chronological sequence despite the inherent difficulties associated with dating rock art directly.

7.2. Environmental and Security Threats

Like many remote Saharan archaeological landscapes, the Marhuma region faces a range of threats that jeopardize the preservation and integrity of its cultural heritage. Natural weathering processes constitute a major concern, as prolonged exposure to intense solar radiation and extreme fluctuations between daytime and nighttime temperatures gradually erodes rock surfaces and weakens engraved motifs. Seasonal flooding further contributes to site degradation by depositing sediments that can either obscure engravings or damage exposed panels through erosion and mechanical stress. Human activities also pose significant risks, particularly through unauthorized access to archaeological areas, which may result in the illicit removal of artefacts, the appropriation of excavation finds, or the dissemination and commercial exploitation of site coordinates. In addition, acts of graffiti vandalism represent an increasingly serious threat, as modern inscriptions are frequently superimposed on ancient engravings, causing irreversible damage and compromising the scientific, historical, and cultural value of the rock art. These combined natural and anthropogenic pressures underscore the urgent need for effective conservation and site-management strategies to safeguard Marhuma's archaeological heritage for future generations.

8. Research Prospects and Proposals for Future Study

8.1. Proposed Academic Projects

The archaeological heritage of Marhuma contains vast research potential, only a fraction of which has been exploited. The following axes may be proposed for future inquiry:

-Comprehensive Geospatial Survey: producing three-dimensional digital maps of the region's complete engraving corpus using photogrammetry and LiDAR technology, creating a digital archive immune to site degradation.

-Genetic Anthropology Project: analysing ancient DNA extracted from skeletal remains and correlating results with contemporary Amazigh populations to draw a historical genetic map of continuity and migration.

-Pigment Chemical Analysis: determining the provenance of raw materials used in painted images, revealing ancient regional economic exchange networks.

-Social Context Analysis: studying the spatial distribution of engravings in relation to water sources and ancient pathways to understand the social logic governing their creation.

8.2. Towards an Integrated Heritage Management Strategy

The preservation of Marhuma's archaeological and cultural heritage cannot rely solely on scientific research; rather, it requires the implementation of a comprehensive and integrated management strategy. Such an approach should include the formal designation of the region as a protected natural and cultural reserve through an appropriate legal framework capable of ensuring long-term conservation. It should also involve efforts to secure the site's recognition at the international level, notably through its nomination for inclusion on the UNESCO World Heritage List, thereby enhancing both its visibility and protection. Equally important is the active participation of local Amazigh communities in heritage conservation and management, recognizing their role as the primary custodians of the region's cultural legacy and as essential partners in safeguarding its historical significance. Furthermore, the development of sustainable scientific and cultural tourism could contribute to local economic development while promoting public awareness of the site's value, provided that such initiatives are carefully planned to preserve the integrity and authenticity of the archaeological landscape. Together, these measures would establish a balanced framework for the protection, promotion, and sustainable use of Marhuma's unique heritage resources.

9. Geological heritage from km30 to the ougarta mountains (western north sahara, algeria).

30 Km is recognized as the "paradise" par excellence of geologists because of the nature and diversity of its geological formations which constitute its memory. Memory inscribed in the rocks and landscapes deserves to take on a heritage dimension. Among other things, at this location, the Devonian is complete and corresponds to a regional reference. This site is of triple interest: scientific, educational and tourist.

Geology in its primary sense has as its object: the study of the materials composing the globe, their nature, their situation and the causes that have determined this situation. The specificity of geology is the knowledge of the earth's history. The geologist is mainly interested in structures and sets of existing

terrains as complete as possible (such as stratotypes). Its heritage is therefore linked to these well-known and studied structures. It is also used as a support for scientific culture, particularly in the field of teachers, pedagogues, or amateurs.

This section is aimed at an audience unfamiliar with earth sciences, while considering contributing to the dissemination and popularization of scientific culture to a wide audience (schools, colleges, local populations, etc.). Voluntarily, we present to the dear readers basic notions of stratigraphy and paleontology, conceived in a simplistic spirit. We try to give from observations carried out in the field, the geographical situation, the geological context of this site and the salient facts, which made it a particularly interesting place.

9.1. Earth archives and geological time scale

The earth archives are rocks arranged in geological units, which represent the history book of the earth. So, in a way, these are the archives of the earth. The pages of this book are scattered, so the lines are confidentially written. These archives are studied by professionals and compared to a standardized reference, called the international stratigraphic scale. Fossils play a crucial role in reading the archives of the earth; on the one hand, facies fossils allow us to know past ecological environments. On the other hand, these are biological clocks that allow us to date the formations that they contain.

Geological time is measured in millions of years (Ma). The age of planet Earth is 4.5 billion years, whereas modern man, or Homo sapiens, did not appear until 200 thousand years ago.

Subdivisions correspond to events in the history of life, either the disappearance or the appearance of new organisms.

For example, the boundary between the Precambrian and Primary eras is marked by the appearance of trilobites; the transition from the Secondary to the Tertiary era is marked by the extinction of ammonites.

The eras are in turn subdivided into periods, epochs, floors, etc. It is often the name of the locality, where layers of a certain age are well exposed, which is used for nomenclature. Thus, the Jurassic (-200 to -145 million years ago) takes its name from the Jura chain which is essentially composed of rocks of this age.

9.2. Geographical situation

The km 30 among others marking out the RN. 6, is for truckers a mark indicating the proximity of arrival in Beni Abbés. However, it is for the geologist a reference site of extraordinary value for the Devonian stage, ranging from -400 Ma to -360MA.

This site located south of Béni Abbès, takes its name from Km 30. It is practically an area where Paleozoic land is exposed. It recognizes as boundaries: the Hamada of the Guir and the region of Zeghamra to the north through, the Djebel el Kahla and the commune of Beni Ikhlef to the south through, the Djebel Serraf and the region of Ougarta to the west and the great western erg to the east (Fig. 1).

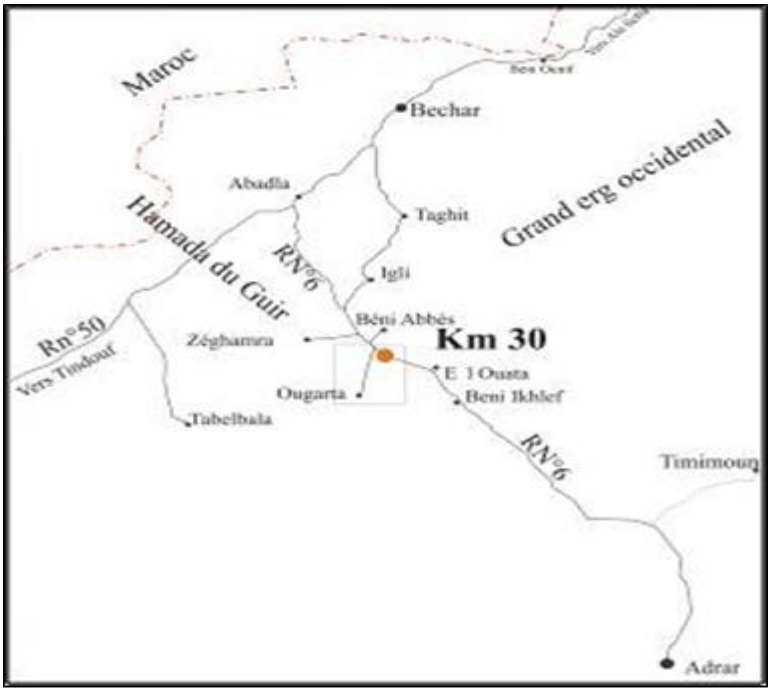


Figure 02: localization of site Km30

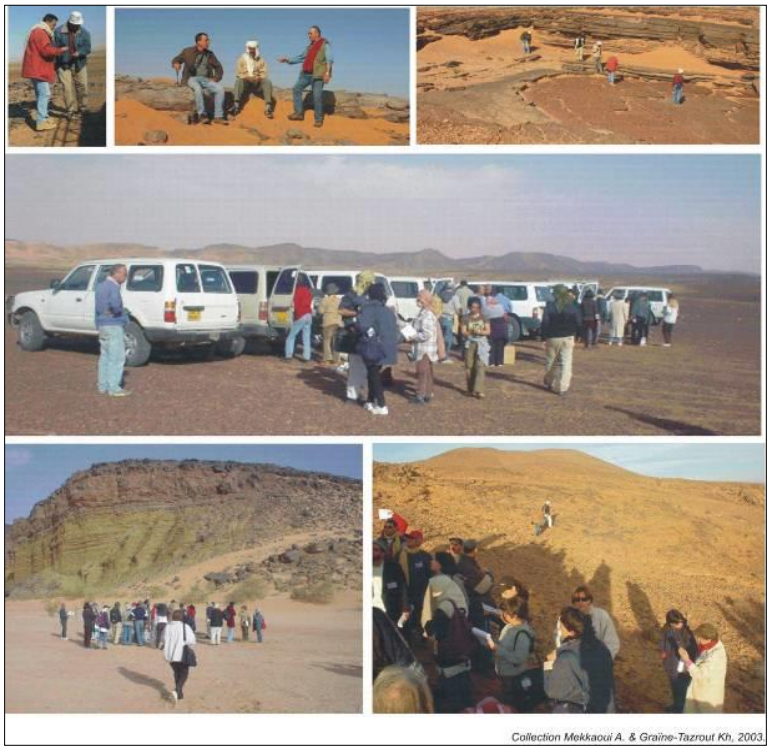


Plate 2: Scientific event at "Km 30"



Plate 3: Collection of rocks and minerals at "Km 30"

9.3. Geospatial values of the KM30 site

By applying international criteria for the qualification of geosites (scientific value, didactic value, tourist value, representativeness and rarity), the KM30 site presents an exceptional profile:

-Scientific value: Km 30 as a scientific site: is considered a place of pilgrimage for geologists, it is qualified as the MECC of geologists. World reference section for the Devonian of Western Gondwana, with a continuous succession over several tens of meters of deposit, an exceptionally diverse and preserved fauna, and a "major level" of regional to international biostratigraphic importance. he scientific interest of this site has meant that it is still home to scientific excursions.

Recently, our universities have taken an interest in this locality by conducting scientific research work, which has been crowned with great success

-Didactic value: Km 30 as an educational site; It is an ideal site for young beginners in geology and for middle school students; here you will find all the didactic elements of geology (various rocks, abundant fossils, minerals, etc.). In addition, it offers the advantage of easy access and its proximity to the national territory 6 and the agglomerations (Béni Abbès and Ougarta). Open-air exposure and continuous outcropping of a remarkable amplitude, allowing to observe in half a day the equivalent of several million years of history of marine life. Satisfactory road accessibility (paved road Béni Abbès–El Ouata).

-Aesthetic value: the morphology of the linear ridge in black marble, the contrast with the surrounding ergs and the fossil richness visible on the surface create a geological landscape of striking beauty that fully justifies the popular analogy with the Great Wall of China.

-Geotourism value: already proven attractiveness among Asian tourists (according to journalistic sources) and geologists in training; considerable untapped potential for national and international geotourism. Km 30 is an open-air museum, creating a natural landscape that faithfully memorizes the collective geological history of this site. From a tourist and cultural point of view, it represents an artistic image elaborated by dynamic geological phenomena, materialized by the proliferation of Orthoceres (numerous and large). These fossils combined with the rock carvings of Marhouma attract the curiosity of visitors, motivating a fruitful discussion.

The Km 30 preserves within its Devonian rocks a memory of 55 million years, it has an exceptional geo-diversity inherited in large part from this long history. It is therefore recognized as the "paradise" par excellence of geologists due to the nature and diversity of its geological formations which thus constitute its memory. Memory inscribed in rocks and landscapes. It is therefore recognized as the "paradise" par

excellence of geologists due to the nature and diversity of its geological formations which thus constitute its memory. Memory that is inscribed in rocks and landscapes. These natural elements can therefore take on a heritage dimension, which must be exploited in education and geotourism. Finally, to better know this heritage, to make it better known to foreigners, are essential conditions for its enhancement.

9.4. Identified Threats

The literature and field observations indicate several threats to the integrity of the geosite:

-Plundering of fossils: the absence of any legal protection status exposes fossil blocks-notably orthoceres in black marble-to unregulated commercial collection, which can lead to the permanent disappearance of the most accessible specimens.

-Degradation of outcrops: some reports report breaks and mechanical sampling on the outcrop fronts, irreparably degrading the fossil-bearing surfaces.

-Lack of signage: the site is not officially reported on the national road, which both limits supervised attendance and exposes the site to unaccompanied visits.

-Climate change and accelerated erosion: the intensification of torrential rain events in the region (reported by several hydrological studies) increases the risk of outcrops degradation by water erosion and sediment transport.

10. Operational recommendations

Based on the literature review and gap analysis, the following recommendations are made:

-Short-term (1-2 years): carry out a complete georeferenced photographic inventory of the site; submit a classification file to the Ministry of the Environment and the National Geological Agency; install bilingual signage (Arabic/French) and a protective barrier around the most exposed fossil facies.

-Medium term (3-5 years): publish an illustrated geological monograph of the site accessible to the general public; create a marked geological trail with educational panels; integrate the KM30 into the official geotourist circuits of the wilaya of Béni Abbès; explore the feasibility of a Saoura-Ougarta Regional Geopark.

-Long-term (5-10 years): prepare a UNESCO application file for the site under the Global Geoparks program; develop international research partnerships to fill identified bibliographic gaps; create a museum.

Conclusion

Marhuma as a Mirror of Humanity

The Marhuma region encapsulates in its carved rocks and accumulated sediment layers a complex and profound human story - the story of a people who adapted to a desert that was once a green paradise, who engraved upon its stones the fears, dreams, and existential questions that stirred within them, and who gradually built a complete cultural system that succeeding Amazigh generations inherited and transformed into a distinctive civilisational language.

Reading these rock records is not merely an academic exercise; it is an act of identity and memory, one that allows us to reconnect the severed threads of communication with our ancestors, and to understand that what some have called "nomadism" or "primitiveness" was in truth a highly successful civilisational strategy for living under conditions of extreme hardship. The rock art of Marhuma and the greater Saoura is nothing less than one of humanity's most beautiful testimonies to its enduring capacity for creativity, adaptation, and renewal.

References

Azzi, A. (2018). *The Saoura: Geography, history and society*. Publications of Tahri Mohammed University.

Ben Abdallah, M. (2005). *Rock art in Algeria: History and classification*. Dar al-Huda.

Bouchemla, I., & Benyoucef, M. (2024). Geo-heritage and geo-tourism potential of the Saoura Valley: A field geology museum in the Ougarta Range (SW Algeria). *Geoheritage 16*(2). https://doi.org/10.1007/s12371-024-00954-w.

Camps, G. (1980). *Berbères: Aux marges de l'histoire*. Editions des Hespérides.

Directorate General of Scientific Research and Technological Development. (2019). *Report on the archaeological heritage survey of Béchar Province*. Ministry of Culture.

Dupuy, C. (1999). Rock engravings of the Fezzan and Central Sahara. *L'Anthropologie 103,* p. 485-520.

Fabre, J. (1976). *Introduction to the geology of the Algerian Sahara*. SNED. [Major geological synthesis of the Algerian Sahara including the Ougarta Range].

Huysecom, E. (2010). The Upper Palaeolithic in the Central Sahara. *Journal of African Archaeology 8*, pp.47-78.

Ibn Khaldun, A. (1967). *Tarikh Ibn Khaldun (The Muqaddimah)*. Dar al-Kitab al-Lubnani.

Lefèvre, D. (2009). Saharan palaeoenvironments during the Holocene. *Quaternaire20*, pp. 123-144.

Lhote, H. (1958). *Les gravures rupestres du Sahara.* Musée de l'Homme.

Menchikoff, N., Dalloni, M., & Mennessier, G. (1952). *Geological map of Kerzaz at 1/500,000. Service de la Carte géologique de l'Algérie.* [Reference geological mapping document for the KM30 sector, still in use today].

Mekkaoui, A. (2015). *The basic magmatism of the Damrane-Kahal Tabelbala axis (Daoura, Ougarta Mountains, Southwest Algeria): Geology, petrology, geochemistry and geodynamic context* [Thèse de doctorat, Sciences de la Terre/Géologie, Université d'Oran 2, Algérie].

Nedjari, A., Hamdidouche, R., & Aït Ouali, R. (2018). *Saharan geology revisited: The adventure of the Ougarta region during the Paleozoic* (Original work published 2009).

Ouali Mehadji, A., Elmi, S., Rachebœuf, P., & Mekahli, L. (2004). Characteristics and significance of a major shell level with brachiopods, an event marker in the Devonian evolution of the Saoura (Northwest

Sahara, Algeria). *Geoscience Reports 336*(14), pp. 1283-1292. https://doi.org/10.1016/j.crte.2004.07.006 [Key publication on the "major level" of KM30; cites orthoceres, brachiopods, trilobites, goniatites].

Qasemi, M. (2012). *The Amazigh in prehistory*. Royal Institute of Amazigh Culture.

Soleilhavoup, F. (2009). *L'art rupestre du Sahara : Préhistoire en territoires touaregs*. CNRS Éditions.

Telmani, A. (2018, 22 février). *Béni Abbès, la perle oubliée du Sahara aux trésors cachés*. TSA Algérie.

UNESCO World Heritage Centre. (2022). *Periodic report on the state of conservation of the rock art sites in the Sahara region*. UNESCO.