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A Critical Inventory and Associated Chronology of the Middle Stone Age and Later Stone Age in Northwest Africa

DATA PAPER

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ABSTRACT

The study of human evolution and cultural patterns relies on empirical evidence provided by the archaeological record. Accessing dependable archaeological data from scholarly publications can often be challenging due to the variability in site documentation and the diversity of academic practices in publication processes. This study presents a comprehensive synthesis of the published literature documenting dated and undated archaeological materials from the Middle Stone Age and Later Stone Age in Northwest Africa, notably Morocco, Algeria, Tunisia and Libya. No previously published open-access database exists for these chronocultural periods in the region. Our dataset encompasses 993 sites and 1152 dates spanning approximately 370,000 to 8,000 years ago. Through a critical evaluation of the dates, we reveal qualitative and quantitative disparities and highlight the potential of the current archaeological record. While only ~10% of sites are dated and ~4.5% have reliable dates associated with a human occupation, this database holds significant potential for demographic and taxonomic meta-analyses as well as for methodological studies associated with chronological data in archaeology.

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African prehistory; Archaeological sites; Chronological database; Radiocarbon dates

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(1) OVERVIEW

CONTEXT

In North Africa, archaeological research has a rich and varied history influenced significantly by geopolitics, particularly European colonial administration during the 19th and 20th centuries [1, 2]. New investigations have revealed the deep population history of our species in this region, including the earliest known fossil remains of the *Homo sapiens* clade at Jebel Irhoud dating back to ~300,000 years ago [3, 4]. Cultural evidence associated with *Homo sapiens* in Africa has been traditionally divided into two major chronocultural periods: the Middle Stone Age (MSA) and the Later Stone Age (LSA) [5]. While the MSA is generally characterized by core-and-flake technologies, the LSA is generally marked by the predominant production and use of blade and bladelet technologies (see [6]).

In Northwest Africa, distinctive culture trajectories have been recognized diachronically and regionally in stone tool technologies during the MSA [7–11] and the LSA [12–18], in personal ornaments [19–21], bone technology [22–25], subsistence strategies [26, 27], including plants [28, 29], and burial activities [30, 31]. Traditionally, two MSA lithic taxonomic units (Mousterian and Aterian) specific to North Africa have been described based on the presence or absence of tanged tools in lithic assemblages (e.g. [32]). Some scholars have highlighted that Aterian and Mousterian should not be considered as distinct cultural identities due to their temporal overlap in certain stratigraphical contexts [9, 33]. In Morocco, MSA lithic assemblages persist until 23 ka cal BP[1] and are designated as "Non Levallois Flake Assemblages" [34, 35] while in Libya (Cyrenaica), MSA lithic assemblages are documented until ~43 ka [36]. In this region, LSA archaeological assemblages are currently dated from 43 to 18 ka (Dabban cultural taxa) and from 18 to 12 ka cal BP (Iberomaurusian cultural taxa) [15, 35, 37]. In Maghreb, they are documented from 25.5 ka to 8.8 ka cal BP (Iberomaurusian) [13, 14, 35, 38], while technological practices persist alongside cultural innovation during the Holocene [39]. This overarching chronocultural framework masks significant disparities between geographical areas. Much of this framework is derived from well-contextualized chronostratigraphies in distant regions (~3000 km) e.g., the sites of Taforalt (Morocco) and Haua Fteah (Libya). Significant gaps in our comprehension of North African cultural evolution persist, highlighting the necessity for further investigation of multi-scale spatiotemporal dynamics within the archaeological record to test competing hypotheses, especially about the influence of ecological factors on population demography, connectivity, and cultural transmission among individuals and across generations in this region.

Archaeological site distributions or dates-as-data approaches are often used as proxies to infer demographic patterns and build explanatory cultural scenarios [44–46], despite the limitations and challenges associated with such inferences and the difficulties of ensuring data integrity [e.g., [47]). Site clustering can be uses as an indicator of occupation density, although it is influenced by survey bias [48]. Attempting to model human population dynamics using climate proxies in this region while taking the archaeological record into account presents a significant challenge due to taphonomic processes and substantial disparities in fieldwork and sampling methods. Although archaeologists recognize these problems, their historical dimension is poorly considered so far. Acknowledging the dual dimension of the archaeological record as both an archive of past events and an archive of (sub)contemporary archaeological practices is crucial for building accurate models of the human past (cf. [49]). Various taphonomic processes (erosion is a prominent example for open-air sites) have unearthed ancient archaeological sites in Northwest Africa most of which consist of undated lithic scatters. Detailed information about archaeological assemblages has not been consistently produced or made readily accessible and generally, archaeological sites are deemed contemporary solely based on typological analysis.

In the context of Pleistocene Africa, there is a lack of research dedicated to evaluating and quantifying the heterogeneity of available archaeological information from a historical perspective (see [50–53] for such studies). Given the traditional perception of the archaeological record as cumulative, it becomes crucial to thoroughly and critically access it to understand the consistencies and variations in available information. The rise of digital technology has made this assessment easier through the centralization of information presented in grey literature like excavation reports, notes, maps, and monographs into computerized databases. Diverse type of data can be stored in digital archaeological databases, either in private computer files or in datasets published in online repositories. Geographical localization (geographical coordinates) and temporal framework (dates) of material culture constitute the major sources of information to understand and interpret past human settlements, practices, and activities. These spatial and chronological information are necessary for anyone seeking to understand the interpretive results of an archaeological study and to develop further analyses and interpretations of the archaeological record. Typically, these data are not readily available with a publication, and obtaining the information requires manual handling, which can lead to inconsistencies between studies (e.g. [54]). Datasets published in open repositories, associated with a critical examination of Pleistocene archaeological data, are available for other African regions [55–57], and for the Holocene in North Africa [58]. Two online platforms centralize and provide access to information regarding the Middle and Late Pleistocene archaeological records in North Africa : the collaborative database "BDA

– Base de Données Archéologiques" [59] and the ROCEEH Out of Africa database [60]. However, both databases are currently incomplete and, as of now, no previously published open-access digital database comprehensively covers both periods in North Africa.

Here, we present an updated dataset made as part of a PhD project (SB) that explores the relationship between human population settlements and ecological changes during the Late Pleistocene in Northwest Africa. The dataset provides a critical compilation of human presence along with chronological and cultural information for both dated and undated archaeological sites from the MSA and the LSA, ranging approximately between 370,000 and 8,000 years ago.

Aligned with the fundamental principles of open science [61] and the communist norm in academic research [62], which promotes sharing scientific results and methods freely, our goals are: i) to make North African archaeological site information widely available for research, and ii) to evaluate the quality of the archaeological record, especially chronological data. Both objectives are essential for understanding long-term cultural evolutionary processes at different spatial scales and the significant role of this African region in the development of our species, *Homo sapiens*.

SPATIAL COVERAGE

The dataset covers the current states of Algeria, Libya, Morocco, Tunisia, including Western Sahara and Ceuta. Figure 1 shows the spatial distribution of dated and undated MSA and LSA archaeological sites. The spatial coverage of our study is indicated as follows:

Northern boundary: 37°2 (Ras el-Koran, Tunisia – MSA)
Southern boundary: 19°2 (In Guezzam, Algeria – MSA)
Eastern boundary: 22° (Jebel Uweinat, Libya – MSA)
Western boundary: 27° (Laayoune, Western Sahara – MSA)

TEMPORAL COVERAGE

The temporal framework spans from Marine Isotopic Stage 10 to 1, including Middle and Late Pleistocene as well as Early Holocene period. The temporal boundaries documenting the most ancient and youngest human occupation are 374,000 +/– 52,000 years (MSA) and 8,010 +/– 40 years (LSA).

(2) METHODS

The creation of the database involved conducting a comprehensive review of literature sources, including journal articles, books, theses, and maps, to gather location and chronological information related to contexts identified as MSA, LSA, and/or related lithic taxonomic units (Figure 2). All bibliographical references used to build the database are listed in Table S5.

ARCHAEOLOGICAL SITE

Our survey inventory significantly expands upon previously published lists of sites [63–67], which include regional surveys. We use the term "archaeological site" to encompass all geographical locations where archaeological materials have been discovered and described as MSA and/or LSA, thereby including even places with a low quantity of archaeological content (see Table S1 – field "Comment"). The inventory includes the archaeological sites discovered and published up until August 2023, as well as those for which results are partially published due to ongoing fieldwork. We recorded variations in site names for a particular location to facilitate linking between site name, geographical coordinates, cultural attribution, and, when applicable, the name and date(s) of dated level(s). All variations of site names are documented in Table S1 and indicated within brackets in the field "Site name".

GEOGRAPHICAL COORDINATES

Dealing with various degrees of available information, we collected geographic information for each archaeological site. If these sites had freely available geographical coordinates, they were converted into decimal degrees using the WGS84 ellipsoid and standard latitude-longitude reference system. To ensure data quality control, a specific field called "Location Quality" was established. This field helped assess the accuracy of location information to published coordinates on a scale from A to D following [58]: Level A (the most accurate locations) designed sites that were easily identifiable on Google Earth or coordinates that were confirmed by colleagues who had conducted excavations at those sites. Level B concerns sites with published coordinates that were not independently confirmed by colleagues. While these coordinates are available, they are considered slightly less reliable than those of level A. Sites with no published geographical coordinates but displayed on figures in publications have been georeferenced manually and associated with Level C. Sites in Level D do not have precise geographical coordinates, they have not been mapped in literature but there is enough available information to give an approximate location. We reached out to the authors when there was a lack of information between site name identification and maps to obtain the geographical coordinates. When available, altitude information was also recorded. The main bibliographical reference used to identify and locate each site is provided, along with additional references to ensure cultural attribution traceability.

SITE TYPE AND FIELDWORK METHODOLOGY

We collected information about the type of site: sites located in caves and rockshelters were labelled "CaveRS", and sites found in open areas as "OpenAir". The methodology employed to collect material evidence was recorded to differentiate between excavation

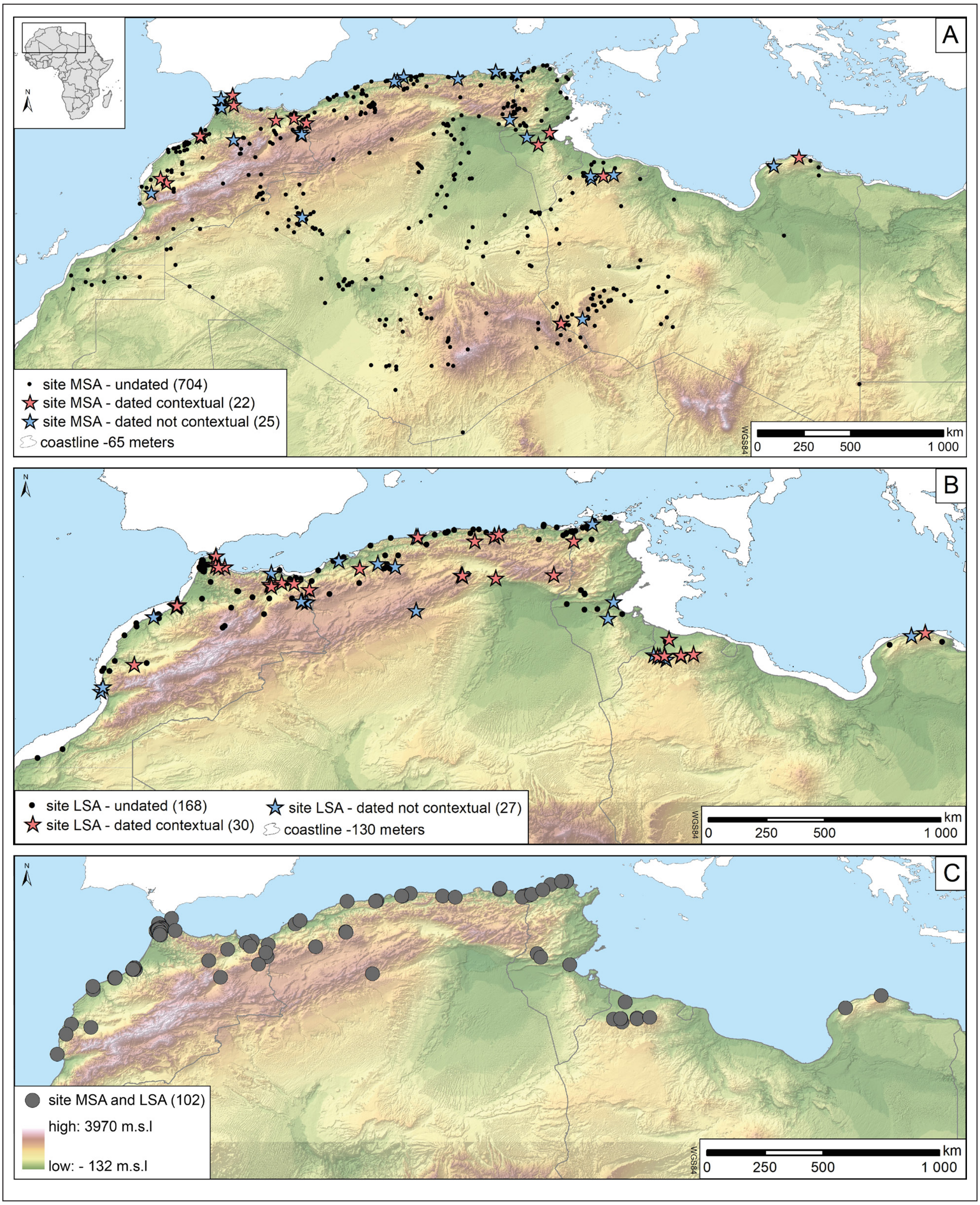

Figure 1 Maps of archaeological sites documenting MSA and LSA lithic assemblages in Northwest Africa. Sites with unknown geographical coordinates are not mapped (see section Geographical coordinates). **(A)** MSA archaeological sites; **(B)** LSA archaeological sites; **(C)** Sites documenting both MSA and LSA lithic assemblages. Sites with contextual dates (human occupation) and no contextual dates are highlighted. Coastlines reconstructions from [40] in (A) at –65 meters based on sea level reported during MIS 3 (45 ka): –60–90 meters [41] and in (B) at –130 meters during the Last Glacial Maximum (23-19 ka): 130 meters [42]. Base map: NASA SRTM Digital Elevation Model 30-meters resolution [43] with current geopolitical borders (grey line). Elevation is equivalent for all maps.

and collection: material collected during test pits and excavation was categorized as “Excavation”, while material collected from the surface and sections was categorized as “Surface” (Table S1). More specifically, “Surface*” is used for locations where contextual information is lacking in the consulted literature. In these cases, we have assumed that the archaeological material represents a surface collection, although confirmation of this assumption would need additional investigations. To assess sites within the “Surface” category in sections, refer to comments in

Table S1 and Table S2. When both test pits or extended excavation and surface collection were practiced, the methodology was considered as "Excavation".

CULTURAL LABEL

For all sites included in the database, the MSA or LSA attribution is based on the information available in the literature, relying on lithic taxonomic units (e.g., Aterian, Mousterian; Dabban; Iberomaurusian; Oranian) and the periodization of stone tool technologies (Table S4). We included LSA sites for which the chronoperiod has been defined as likely to be terminal Pleistocene or early Holocene (see Table S1 – "Comment"). We recorded the cultural attribution used to label lithic assemblages based on the literature consulted for georeferencing archaeological sites and compiling the chronological inventory. We documented the different cultural attributions and labels mentioned in the literature for each dated archaeological level, citing the respective sources for the date. When the cultural label was ambiguous, for example indicated as Epipaleolithic or Neolithic, we ensured that lithic assemblages exhibited characteristics (presence or absence of specific tools, such as the presence of microburins or the absence of pressure technique) matching major cultural taxa for assigning an LSA attribution, such as Iberomaurusian or Eastern Oranian. Layers that literature described as either MSA or LSA, and/or associated lithic taxonomic units, were labelled as "MSA or LSA" to indicate uncertainties. In cases of limited archaeological evidence with no clear cultural attribution within well-defined chronostratigraphic contexts, we designated them as "MSA/LSA".

CHRONOLOGY AND DATA RELIABILITY

The general inventory was meticulously compiled by including a comprehensive collection of published radiocarbon dates, OSL, IRSL, TL, ESR, combined U-series with ESR, and U-series dates associated with MSA and LSA contexts (Table 1). All published dates, whether reliable or not, were incorporated into the database. To

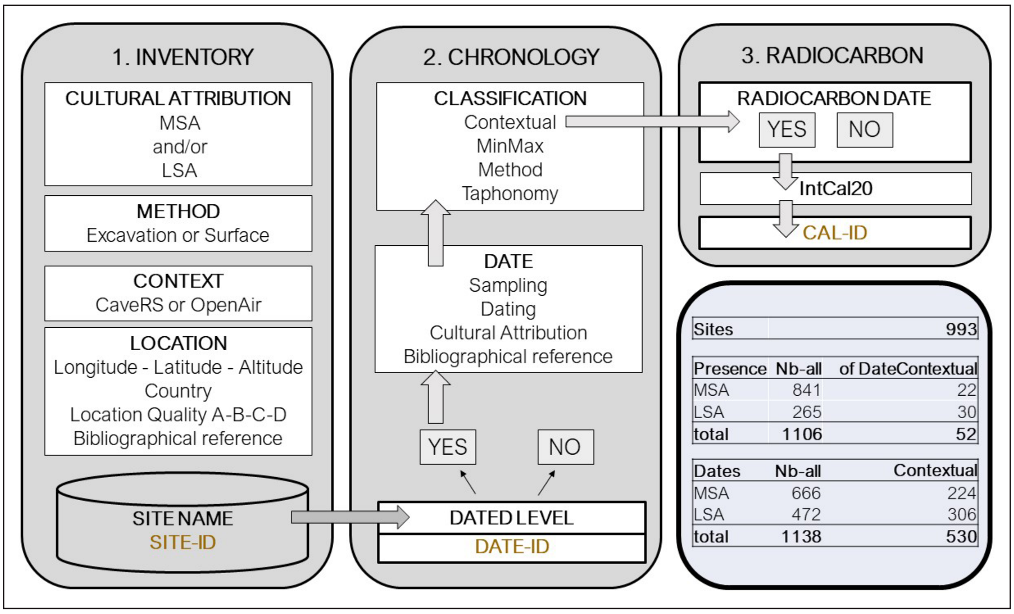

Figure 2 Database organization and general overview of the dataset. Only 1138 dates on the total of 1152 are clearly associated with a MSA or LSA cultural attribution (see below Cultural Attribution).

DATING METHOD	DATING CLASSIFICATION				
	CONTEXTUAL	METHOD	MINMAX	TAPHONOMY	TOTAL
^{14}C	289	171	24	37	**521**
OSL	133	82	76	24	**315**
IRSL	26	0	3	0	**29**
TL	44	59	0	1	**104**
ESR	0	74	0	2	**76**
Combined US-ESR	22	40	1	3	**66**
U/Th	18	5	18	0	**41**
Total	**532**	**431**	**122**	**67**	**1152**

Table 1 Table of all dates (n = 1152) per dating methods based on classification criteria established in this study.

Table 2 List of dated archaeological sites (n = 88). Dates are classified by labels defined in this study. Dates with uncertain cultural attribution – “MSA or LSA” (n = 12) and “MSA/LSA” (n = 2) – are not included.

SITE NAME	CONTEXTUAL		MINMAX		METHOD		TAPHONOMY		TOTAL	
	MSA	LSA	MSA	LSA	MSA	LSA	MSA	LSA	MSA	LSA
Afalou Bou Rhummel		5				2				**7**
Alain						2				**2**
Ain Bénian					1				**1**	
Aïn Maarouf			1		1				**2**	
Aïn Zharga – Ras el Wadi – Sj-98-27			3		1				**4**	
Aïn Zharga – SJ-90-12					1				**1**	
Al Marj – EM4			2						**2**	
AY202							6		**6**	
AY220							2		**2**	
AY254							3		**3**	
Benzu	3		1						**4**	
Bérard					1				**1**	
Bir el-Ater					1				**1**	
Bir Oum Ali						3				**3**
Bizmoune	13	4	4		9		1		**27**	**4**
Bou Hadid			3		4				**7**	
Cap Ghir				1						**1**
Chaâba Bayda 1				1						**1**
Chaâba Bayda 2				1						**1**
Chaperon Rouge 1	1		1						**2**	
Chemtou		1								**1**
Chetaibi			1		3				**4**	
Columnata						5				**5**
Contrebandiers	38		13		40	15	3		**94**	**15**
Dar es-Soltan 1	11		20	6	8		1		**40**	**6**
Dar es-Soltan 2	2	2			1		2	1	**5**	**3**
El Batn – SJ-03-83						1				**1**
El Hamel						1				**1**
El Haouita						1				**1**
El Harhoura 1	2		2				1		**5**	
El Harhoura 2	9	9	5		38			2	**52**	**11**
El Josh – SJ-06-87		1								**1**
El Kala					1				**1**	
El Mnasra	27		7		30		6	2	**70**	**2**
El Oncor						1				**1**
Es Sayar		1								**1**
Ghar Cahal		3								**3**
Grotte des Gazelles								2		**2**
Gueldaman 1		1								**1**
Hagfet ed-Dabba						2				**2**
Hassi Berkane 2		5								**5**
Hassi Ouenzga Open air		2								**2**
Hattab 2		1								**1**

(Contd.)

SITE NAME	CONTEXTUAL		MINMAX		METHOD		TAPHONOMY		TOTAL	
	MSA	LSA	MSA	LSA	MSA	LSA	MSA	LSA	MSA	LSA
Haua Fteah	27	91			28	27	2	5	**57**	**123**
Ifri Armas						1		5		**6**
Ifri el Baroud		47						4		**51**
Ifri n'Ammar	11	22	1	4	34	4			**46**	**30**
Kaf-that-el-Ghar		1								**1**
Kehf el Hammar		6				2				**8**
Jebel Irhoud	8				16		2		**26**	
Marja – Oued el Hay			2			1			**2**	**1**
Matmata						1				**1**
M'Doukal		1								**1**
Mugharet el Aliya					25				**25**	
Nefta					1				**1**	
Oued Charef				2						**2**
Oued Charef 2					1				**1**	
Oued el Akarit	2		4		26				**32**	
Oued Guettara II						1				**1**
Pointe El Majni				2						**2**
Rassel		1								**1**
Rhafas	15	2			6				**21**	**2**
Rolland						1				**1**
Saint-Trivier – Chabet el Houidga		2								**2**
Shakshuk – SJ-00-56		1		2						**3**
Shakshuk East – Ain Soda area			1	1					**1**	**1**
Shakshuk East – SJ-00-55		1				2				**3**
Shakshuk West – SJ-00-55 – Test 1						1				**1**
Shakshuk West – SJ-00-55 – Test 2		3								**3**
Shakshuk West – SJ-02-68 – Wadi Sel	2								**2**	
Sidi Saïd A					2				**2**	
Sidi Saïd B					3				**3**	
Station Météo 2					4				**4**	
Taforalt	41	80	6		21	27	3	10	**71**	**117**
Taghit Haddouch						1				**1**
Tamar Hat		7				7				**14**
Taza 1		2			1	3			**1**	**5**
TH 101 – Erg Uan Kasa			1						**1**	
Uan Afuda	3		1						**4**	
Uan Tabu	1								**1**	
Wadi Basina – 55-00-59				2						**2**
Wadi Derna (1817)						1				**1**
Wadi Ghan – SG-99-41		2								**2**
Wadi Lazalim – site 15/1	4		2						**6**	
Wadi Lazalim – site 16/15	1		1						**2**	
Wadi Lazalim – site 16/29	3								**3**	
Wadi Mezeraa		2								**2**
Wadi Noun			13		7				**20**	
Total	**224**	**306**	**95**	**22**	**315**	**22**	**32**	**31**	**666**	**472**

ensure data traceability, the bibliographical reference containing the original date was recorded, along with any additional references citing the date (Table S2). Each date is accompanied by the following:

- Sampling information, which includes details such as sector, level name, zone, depth, and stratigraphic correlation in cases where different fieldwork numerical systems were utilized.
- Dating information, including sample name (lab code and/or field code), dated element, taxon, and the method employed.
- Additional dating information, such as specifying single grain or multigrain analysis for OSL, or associated uncertainties (1 or 2 sigmas).

To identify the heterogeneity of chronological data and provide an updated overview of available chronological information, different rank criteria have been established and grouped under a single label. This step aims to address what was dated and whether the date is reliable. Each date is classified using the following four labels:

Contextual:

- Dates clearly associated with an archaeological layer, indicating a human occupation through the presence of cultural evidence (e.g., lithic artifacts), activities (e.g., hearths), and/or human remains (e.g., individual remains, burials)

Min–Max:

- Dates obtained below and/or above layer(s) associated with a human occupation, providing a *terminus ante* or *post quem* of a human occupation

Method:

- Dates considered as unreliable by the original authors or subsequent authors
- Dates lacking stratigraphic information
- Dates published without laboratory code
- Dates obtained from bulk samples
- Conventional radiocarbon dates considered obsolete regarding AMS dates
- Dates that are part of the finite date range used to calculate a weighted age
- Infinite dates including one or more of the above criteria

Taphonomy:

- Dates considered unreliable due to explicit taphonomic reasons (e.g., burrows)

QUALITY CONTROL

We applied the four criteria above as a quality control to ensure the reliability of archaeological sites and levels that possess a minimum-maximum and/or contextual age. All radiocarbon dates that have been classified as "contextual" are displayed with both uncalibrated and calibrated ages (Table S3). The calibration was done using OxCal 4.4 with the IntCal 20 Northern Hemisphere Radiocarbon Age CalibrationCurve [68]. We conducted multiple bibliographical crosschecks to trace the original publication of each date. Two fields were created in Table S2 to capture the contextual information and comments associated with dating. These fields include details from the original publication as well as subsequent publications. We included a personal comment on the dating to offer additional insights and explanations for data classification. Discrepancies in numbers, laboratory codes, and level names found in the literature were noted to identify errors between publications. A unique Site-ID was assigned, a Date-ID was assigned to each date, and a Cal-ID was assigned to each radiocarbon date to facilitate data use.

CONSTRAINTS

Numerous literature sources have been integrated to build this dataset. To evaluate the reliability of an archaeological context, we relied on the descriptive documentation found in literature and though these sources may still contain residual errors due to human interpretation. As such, we strongly encourage users of the dataset to report any errors they encounter so that we can make the necessary corrections and update the online repository. Uncertain geographical coordinates could be refined with additional information provided by authors.

(3) DATASET DESCRIPTION

We organized archaeological evidence based on predefined chronocultural periods to identify and confirm the presence of MSA and LSA archaeological materials. We created a freely accessible digital database to compile archaeological and chronological information. This database serves two main purposes: i) to provide an up-to-date overview of the prehistoric empirical record in Northwest Africa, and ii) to establish a comprehensive collection of dates to facilitate future archaeological analyses. We carefully reviewed over 400 published papers on the Pleistocene period in Northwest Africa to extract archaeological sites and chronological information. Among these, 220 references provided both site names and dates (Table S5).

We report a total of 993 sites with MSA and/or LSA archaeological materials. Currently, the database includes georeferenced information for 874 archaeological sites. Secure geographical coordinates are reported for 32 sites (level A) and 500 sites (level B). Uncertain geographical coordinates are reported for 330 sites (level C) and 12 sites (level D). Of the MSA and LSA archaeological assemblages reported, 119 sites located in Cyrenaica (Libya) were not georeferenced in the corresponding reference (cf. [69]) and are not mapped in Figure 1. Both MSA and LSA are documented in 113 sites, with 11 sites not georeferenced. MSA lithic assemblages are reported in 841 locations and LSA lithic assemblages in 265 locations.

A preliminary assessment of cultural attribution for undated and dated lithic assemblages (Table S1) shows: Aterian (n = 402); Mousterian (n = 251); Dabban (n = 7 sites) and Iberomaurusian (n = 142). For 265 sites, only a MSA and/or LSA cultural attribution is mentioned.

Open-air occupations are more prevalent with MSA lithic assemblages reported in 778 sites and LSA lithic assemblages in 207 sites. MSA archaeological assemblages are found in 63 caves/rockshelters and LSA archaeological assemblages in 57 caves/rockshelters. Based on these counts, 23 caves/rockshelters and 90 open-air sites are documenting both MSA and LSA archaeological assemblages. Surface collections dominate the archaeological record with MSA found in 666 locations and LSA found in 197 locations. Currently, MSA materials discovered during proper excavation are reported in 175 sites and in 68 sites for the LSA.

An evident bias regarding site distribution and chronological information is documented with a noticeable geographical pattern primarily influenced by countries and regions with longer histories of archaeological research. Sites with MSA lithic industries are observed along the Moroccan Atlantic coast, the Mediterranean coast, in southern Algeria and in some locations in Cyrenaica, as well as in the Libyan desert, specifically in the Tadrart Acacus region. Urbanized areas, which have been the focus of development projects, concentrate many sites. Only 8 archaeological sites document both MSA and LSA dated contextual occupations with a majority (n = 7) located in Morocco. Human occupations have been recorded in mountainous and desert regions; however, they are presently lacking sufficient chronological documentation. MSA archaeological sites are widely distributed across the Sahara and potentially align with ancient perennial and intermittent hydrographic networks. LSA lithic industries are mainly documented along the Atlantic and the Mediterranean littoral and extend further into the Atlas Mountains in Maghreb. Sea level fluctuations may have influenced the preservation of archaeological sites along the Mediterranean coast, particularly in the Gulf of Gabes and the Libyan littoral, potentially impacting our understanding of connectivity between the biogeographical areas of Maghreb and eastern Libya (Figure 1).

The number and classification of published dates for each archaeological site are presented in Table 2. Based on the classification criteria established in this study, dates labelled as Contextual and MinMax can be considered reliable. Dates associated with Method and Taphonomy labels are considered unreliable. Only ~10% of the sites reported in Table S1 have been dated and only ~4.5% have reliable dates (contextual) associated with a human occupation. Out of the total dated archaeological sites (n = 88), few archaeological sites (n = 43) have secured contextual dates. Few ages (n = 12) are correlated with uncertain cultural attribution based on distinctive interpretations found in literature, either "MSA or LSA". Only one site (ID 853 – Kehf El Hammar, Morocco) and two contextual dates (Date-ID 827/828) cannot be clearly related to a specific chronocultural period "MSA/LSA" due to limited archaeological evidence. The classification of dates by dating method and by chrono-cultural period is presented in Figure 3.

Of the 1152 dates reported, 46% are contextual, primarily obtained through radiocarbon and OSL dating methods. For the LSA (n = 472), contextual dates are more numerous, representing ~64% of the chronological

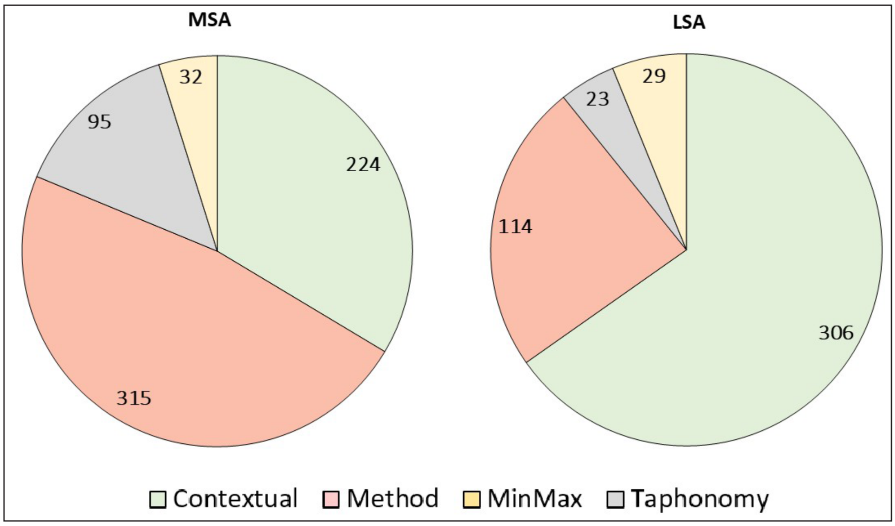

Figure 3 Number of MSA and LSA dates. Dates associated with levels either attributed to MSA or LSA (n = 12) and MSA/LSA (n = 2) are not included.

dataset. For all dates associated with MSA archaeological assemblages (n = 666), ~33% are considered as contextual. Ages considered as *terminus ante/post quem* of archaeological levels represent ~10% of all published dates. Approximately 36% of published dates present methodological issues, while those rejected for taphonomic reasons represent around 5% of published dates. We report a total of 289 radiocarbon ages distributed as follows: LSA = 268 dates; MSA = 20 dates; MSA/LSA = 1 date. Out of all calibrated radiocarbon ages (Table S3), four ages may extend out of range (Cal-ID 95/96/110/288).

OBJECT NAME

All data collected in this study have been centralized in a unique .xlsx file available online via the Canadian Dataverse Repository Borealis:

dataset_msa_lsa_nafr.xlsx

The file is made up of five tables, presented as follows:

Table S1 – Inventory
Table S2 – Chronology
Table S3 – Radiocarbon dates
Table S4 – Field Database
Table S5 – References.

DATA TYPE

Secondary data and processed data from originally published materials.

FORMAT NAMES AND VERSIONS

.xlsx

CREATION DATES

Data information has been created from September 2019 to August 2023. All the existing dates up to the date of submission of the article have been included.

DATASET CREATORS

SB coordinated the review of literature, data collection, data entries, and classification, with EBA providing guidance and confirmation for the chronological dataset.

LANGUAGE

English

LICENSE

REPOSITORY LOCATION

https://doi.org/10.5683/SP3/G8PNWR

PUBLICATION DATE

20/03/2024

(4) REUSE POTENTIAL

This dataset serves as a foundational resource for georeferencing Pleistocene settlements in Northwest Africa and offers a comprehensive revaluation, both quantitatively and qualitatively, of sites with known dates compared to those lacking chronological information. The classification of chronological data helps differentiate reliably dated from less reliable archaeological occupations, ensuring the appropriate utilization of chronological information in future archaeological studies. A preliminary chronological overview, including a density probability (DP) plot of ages, reveals several temporal overlaps of MSA and LSA archaeological dated levels (Figure 4). Further investigation is essential to explore diachronic and synchronic cultural persistence and innovation across distinct geographical scales within the MSA and LSA chronocultural periods. This can be achieved through research-historical analysis and new technological studies focusing on raw material procurement strategies and the social transmission of technical skills, as captured in lithic

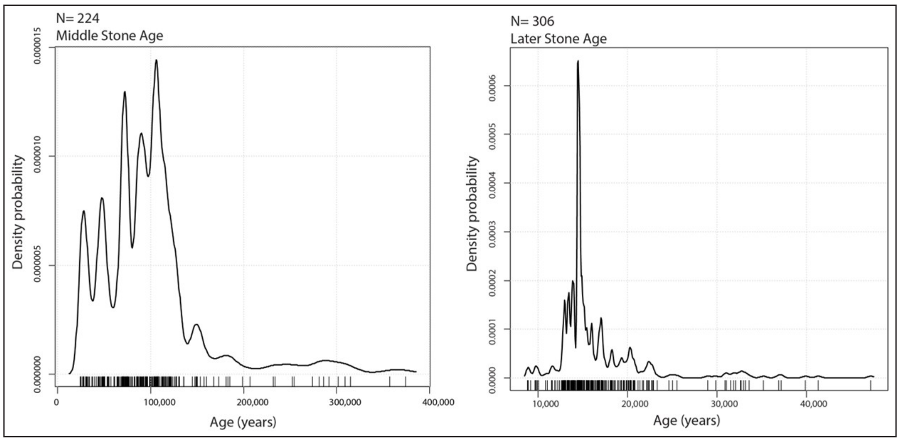

Figure 4 Density Probability (DP) plots of MSA and LSA dates, considering only contextual dates. Median age calculated from calibrated radiocarbon dates. Four ages potentially extending beyond the expected range were excluded from the MSA graph. Y-axis scale between the Middle and Later Stone Age slightly differs. Ages are expressed in years. (Generated using R software).

assemblages. The distribution of lithic archaeological collections among various researchers, institutions, and countries presents additional challenges to move beyond typological descriptions of lithic assemblages discovered during the early stages of archaeological research. Lithic taxonomic units have been reported here but have not been subject to any specific analysis. A notable observation is the use of different names to describe a same archaeological assemblage within both MSA and LSA periods. The issues surrounding the use and limitations of cultural taxonomies in archaeology extend beyond our study and resonate with broader discussions in African archaeology [70–73] and beyond [74, 75]. Our study can stimulate a deeper exploration of prehistoric cultural taxonomies in North Africa.

To our knowledge, the dataset presented here contains all available names and chronological information of archaeological sites located in Northwest Africa dated between approximately 370,000 to 8,000 years ago. This critical inventory highlights the heterogeneity of the chronological record illustrating the importance of a careful examination of published dates. The dataset can be integrated into existing online platforms such as the BDA "Base de Données Archéologiques" [59] and the ROCEEH Out of Africa database [60] to align with collaborative research trends (e.g., [76]). This critical database aims to facilitate the exploration of cultural evolutionary processes and demographic trends across various spatiotemporal scales in North Africa. It provides a baseline to be supplemented with additional empirical evidence, including environmental proxies (e.g., fauna, pollen) and paleoclimatic records, thereby opening new avenues for comparative perspectives in the study of long-term interactions between humans and environments in Africa.

NOTE

1 Based on radiocarbon ages reported in this study and presented in cal BP (IntCal20).

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COMPETING INTERESTS

The authors have no competing interests to declare.

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