The Geoarchaeology of Western Sahara.

Preliminary results of the first Anglo-Italian Expedition in the liberated zone

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Summary

This paper details the results of the first Anglo-Italian geoarchaeological expedition in the “liberated zone” of Western Sahara. In cooperation with the SADR (Sahrawi Arab Democratic Republic), and with the support of the Frente POLISARIO, we surveyed the unoccupied zone of Western Sahara, which until late 1991 was inaccessible as a result of the conflict with Morocco. The survey, although brief, yielded important evidence concerning the cultural heritage of the region, indicative of continuous human occupation (from the late Pleistocene up to the middle and late Holocene), particularly in terms of funerary monuments and rock art. Palaeoenvironmental evidence is indicative of significant variations in climate, which require further research. The survey suggested important cultural links with other Saharan regions and, as well as highlighting the problems of an area affected by conflict, has gone some way to filling the gaps in our knowledge of the the human past in northern Africa.

Riassunto

In questo lavoro si presentano i risultati della prima spedizione Anglo-italiana nella Zona Liberata del Sahara Occidentale. In accordo con la rappresentanza del RASD (Repubblica Araba Democratica Saharawi), e con il supporto di componenti del Frente POLISARIO, sono state riconosciute le regioni settentrionali del Sahara Occidentale, fino al 1991 interdette a causa del conflitto con il Marocco. La survey, seppur breve, ha messo in evidenza l’importanza del patrimonio culturale dell’area, testimoniata da insediamenti abitativi (dal Pleistocene finale al medio e tardo Olocene), concentrazione di arte rupestre, e aree funerarie. Le evidenze paleoambientali documentano importanti variazioni climatiche, che saranno oggetto delle prossime ricerche. L’importanza di questo progetto consiste nel tentare di valutare le relazioni con altre, meglio conosciute aree del Sahara, e di ottenere una articolata serie di informazioni in una area tormentata da conflitti, scarsamente nota nel panorama scientifico nord-africano.
1. Introduction

This report describes the findings of a preliminary geoarchaeological field survey in the Northern Sector of the liberated zone of Western Sahara, undertaken by a joint Anglo-Italian team between 24 September and 11 October 2002. Most of Western Sahara is currently administered by Morocco, which invaded the territory in 1975 when Spain, the former colonial power, withdrew from the territory. The areas that are not occupied by Morocco, situated in the east of the territory and commonly referred to as the liberated zone or free zone, are administered by the Frente POLISARIO\(^1\). The Frente POLISARIO constitutes the government-in-exile of the self-declared Sahrawi Arab Democratic Republic, and is based in refugee camps near Tindouf in southwestern Algeria, home to some 160,000 displaced Sahrawi. The liberated zone is separated from the Moroccan-controlled areas by a 1500 km wall (or berm), constructed by Morocco between 1980 and 1987 in order to close off some 80 per cent of Western Sahara from Frente POLISARIO guerrillas. The United Nations Mission for the Referendum in Western Sahara (MINURSO) has been attempting to organise a referendum on independence for the territory since the early 1990s, when the United Nations brokered a ceasefire between Morocco and the Frente POLISARIO. However, disagreement over voter registration has prevented the referendum from taking place, and this issue is unlikely to be resolved in the near future. For further information on the historical and political background of the region see Pazzanita and Hodges (1994).

The project was initiated after a visit by Margaret Raffin in October 2000, during which she received an invitation from the Sahrawi Minister of Culture to bring an archaeological team to the region. Fieldwork was carried out with logistical support from the Frente POLISARIO and in cooperation with local Sahrawi people.

The aim of this preliminary survey was to assess the potential for detailed work in the fields of archaeology and past environmental change in Western Sahara, and to initiate a long-term interdisciplinary research project based on longer annual field seasons. The ultimate aim of the project is to develop an understanding of the relationships between environmental and cultural changes in the western Sahara\(^2\), within the broader context of Saharan archaeological and palaeoenvironmental research. With few exceptions (Soler et al., 1999), very little archaeological research has been carried out in Western Sahara in recent years, principally as a result of the military and political conflict between the Frente POLISARIO and Morocco. The conflict and ongoing political uncertainty concerning its resolution have important implications for the preservation of archaeological sites.

From an archaeological perspective, Western Sahara is important for our understanding of prehistoric population movements and cultural transmission, particularly in terms of the geographical extent of such processes since around 10,000 uncalibrated years before present (BP). The region can also tell us much about the nature of past climatic and environmental changes in the Sahara. While there is a wealth of evidence for successive humid and arid phases throughout the Sahara over the past few hundred thousand years (e.g., Vernet 1994; Hassan 1997; Cremaschi 1998; Wendorf and Schild 2001), the extent to which these phases were synchronous is unclear (e.g., Hassan 2002), and Western

\(^1\) Frente Popular para la Liberacion de Saguia al-Hamra y Rio de Oro (POLISARIO Front). The Spanish acronym is used here. The Saguia al-Hamra and the Rio de Oro are the areas comprising Western Sahara; the study area lies between the Saguia al-Hamra, a large dry river channel, and the borders with Mauritania and Algeria. In the north of Western Sahara the boundary between the Moroccan and POLISARIO-administered zones follows the course of the Saguia al-Hamra.

\(^2\) The term “Western Sahara” is used to refer to the disputed territorial entity, while “the western Sahara” refers more generally to the western regions of the Sahara including southern Morocco, Western Sahara, Mauritania and western Algeria.
Sahara's position at the fringe of the Sahara means that research in this area may yield important results concerning the timing, extent and nature of past climatic variations. Preliminary radiocarbon results suggest that at least some parts of Western Sahara experienced similar broad changes in climate and environment to many other Saharan regions.

The preliminary field survey yielded important information concerning cultural connections with other Saharan regions; burials and rock art indicate links with the central Sahara, demonstrating that the far west was not isolated from the wider Saharan cultural complex during prehistoric times. New archaeological sites, including rock shelters containing a rich diversity of paintings, burials and other evidence of human activity in the vicinity of ancient river systems, were identified. All the major periods of Saharan prehistory are represented by the archaeological materials, and there is evidence of more-or-less continuous human occupation in the region from Palaeolithic times until the present, and particularly during the Holocene. “Proto-Berber” burial monuments indicate links with areas further north in later pre-Islamic times. Islamic burials and burials dating from the recent conflict (1975-1991) are also widespread.

2. Surveyed areas

The liberated zone is divided into two parts, the Northern Sector in the northeast of Western Sahara, and a strip of land in the east of the country stretching from north to south adjacent to the border with Mauritania. The preliminary field survey took place in the Northern Sector; the team was based in Tifariti in the south of the Northern Sector (Fig. 1). The main constraint on the areas visited was time, which precluded travel to the southern areas of the liberated zone. Nonetheless, the preliminary survey represented a reasonably comprehensive assessment of the landscape, geomorphology and archaeology of the Northern Sector.

A number of different environments were sampled, and sufficient information was gathered to associate different types of archaeology with different aspects of the physical geography of the region. Landsat Thematic Mapper (TM) satellite imagery was used to identify sites of interest from a palaeo-environmental perspective. In particular, TM imagery enabled us to locate dry lake beds which are often associated with archaeological remains and datable organic material (Fig. 2). Satellite images also allow us to understand the large-scale geomorphology of the region, including identification of the major drainage networks (Fig. 2).

Palaeolake sites were visited in the northwest, north and east of the Northern Sector in order to determine their potential for yielding datable material and assess associated archaeological sites. Research in the west and south concentrated on cave sites and rock shelters, some of which are associated with rock paintings and deposits suitable for dating. A team from the University of Girona has surveyed and described rock paintings at the sites of Erqueiz in the south and Irghayra in the west (Fig. 1), and has also examined rock carvings at Sluguilla in the east (Fig. 1), in a area rich in ancient river systems and dry lake beds (Soler et al., 1999). The University of Granada has also surveyed these sites, although at the time of writing no information on resulting publications is available to us. The Anglo-Italian team, with the assistance of their Sahrawi colleagues, identified a new rock painting site at Bou Dheir (Fig. 1), also associated with significant burial sites. The Bou Dheir site will be a focus of more detailed work in future seasons. The region containing the Wadis Erni, Tirnit and Dirt (Fig. 1) in the north exhibits a rich diversity of burials, and this region will form another focus for future work, including excavations.
Fig. 1. The “liberated zone” of Western Sahara, showing locations of sites mentioned in the text.
3. Environment and climate

The topography of the study area is subdued. In the south it has a high density of drainage networks supporting the headwaters of large ephemeral river systems (Figs. 1 and 2) The land between these rivers consists of outcrops of granite, limestone, sandstone and marl, gravel plains and occasional mesas, usually composed of sandstone unconformably overlying granite. To the north of the study area the land rises in a series of escarpments between which are found ephemeral rivers and playa lakes.

The area is currently arid but there is much geomorphological and archaeological evidence of a more humid environment in the past. During such humid periods the ephemeral rivers presumably would have formed perennial or seasonal watercourses flowing into the Atlantic Ocean to the west and towards the central Sahara to the south and east. The presence of extensive sheets of fluvial gravels containing Achulean and Mousterian lithics on the margins of these river systems and on the flanks of the surrounding hills suggests an even more extensive river system in the Pleistocene, and much channel migration during the last few hundred thousand years.

In places some of the rivers flow into depressions where they form delta systems that feed ephemeral lakes or playas. In a few instances these rivers terminate in closed basins, however, more commonly they exhibit open hydrological systems with both inflow and outflow channels. The sediments in the playas that exhibit open systems are composed of clay, and contain occasional specimens of the mollusc *Bulinus truncatus*, indicative of a permanent water body. AMS dating of
Bulinus truncatus shells yielded an uncalibrated date of 4020 ± 40 BP, coinciding approximately with the end of the last Holocene humid phase throughout most of the Sahara (e.g. Gasse and van Campo, 1994; Pachur and Rottinger, 1997).

Rock art is found on exposed rock surfaces and in the rock shelters that are occasionally found on the flanks of the mesas. The rock art is also indicative of a more benign climate during the Holocene. Depictions of animals dependent on a regular and reliable supply of water have been found at a number or locations (see below). The most notable animal in this regard is arguably the buffalo recorded at the Bou Dheir site (see Section 5.1), although pictures of elephant and rhinoceros suggest a savannah-type environment during the Holocene. In general the rock shelters are devoid of sediments, other than occasional small deposits in the deep recesses of a few caves. This suggests that there has been much deflation since the caves were occupied. One of the small deposits found in a cave recess (site RA18) at Irghayra contained much humic material and abundant land snail shells suggesting deposition in a more humid environment than the present. This humic material yielded an uncalibrated radiocarbon date of 6210 ± 80 BP, coinciding with the last Holocene humid phase throughout much of the Sahara (e.g. Yan and Petit-Maire, 1994; Jolly et al., 1998).

Further dating is required in order to develop a comprehensive chronology of environmental change in the study area. Proxies of past climatic and environmental change from adjacent Saharan regions provide a tentative context for studies in Western Sahara. However, as the study area is situated between two different rainfall regimes, both of which may have brought rainfall to Western Sahara in wetter periods, extrapolation from other Saharan regions must be undertaken with caution. To the south, rainfall is currently generated by the West African Monsoon, while to the north rainfall is associated with westerly Atlantic depressions.

Nonetheless, there is evidence throughout the Sahara, much of it from lake sediments, that a cool, dry and windy climate during and immediately after the last glacial period gave way to a relatively humid climate by around 10,000 BP (Fontes, 1985; Swezey et al., 1999; DeMenocal et al., 2000). It is believed that the onset of wet conditions was associated with a strengthened African Monsoon than penetrated deep into the Sahara, with the northern and central Sahara also benefiting from rainfall generated by mid-latitude weather systems in the early Holocene, until around 8000 BP. After about 8000 BP the Holocene humid episode continued until around 5000 BP or soon thereafter, with the local environmental response to the cessation of rainfall around this time depending on geographical location, topography and geology (e.g., Vernet, 1994; Hassan, 1997; Cremauchi, 1998).

To the south of the study area, in the coastal region of central Mauritanian, Kocurek et al. (1991) found evidence for wetter conditions than at present from 11,000 BP to 3000 BP with the possibility of a dry interval between 7000 and 6000 BP. Further north and west, in the Taoudenni basin of northern Mali, there is evidence of a grassland steppe and important surface water supplies during the Holocene as far north as 23-degrees (Petit-Maire et al., 1991). When these results are combined with those of this study they suggest a humid Sahara at all latitudes during the Holocene, due to a combination of a northwards extension of the monsoon belt and a southwards displacement of Atlantic rain-bearing weather systems. These systems still bring rainfall to Mediterranean North Africa in the winter, and to Morocco in late winter and early spring. Western Sahara still receives sufficient occasional rainfall from these weather systems for its inhabitants to have a concept of drought. However, it is not known at present how the position and intensity of these systems have varied throughout the Holocene.

The archaeological record, palaeo-environmental reconstruction from adjacent regions, the preliminary radiocarbon results, and our knowledge of the regional climate system, all indicate that Western Sahara experienced similar Holocene climatic variations to the rest of the Sahara. These climatic changes are likely to have played an important part in the development of human cultures in the far west, just as they did elsewhere in northern Africa. What is unclear is the exact timing of such changes in Western Sahara, and the response of the surface environment and human and animal
populations. While it appears that rainfall effectively ceased in the Sahara with the southwards retreat of the monsoon around or soon after 5000 BP, the subsequent process of environmental desiccation progressed at different rates at different locations. Where surface water remained available, human and animal populations would have persisted for some centuries or millennia after the cessation of rainfall. Indeed, relict animal populations from the Holocene humid phase survived into historical times in some locations (e.g., Fantoli 1933; Hachid 1998).

A number of abrupt drought events, lasting for decades or centuries, have been identified within the Holocene wet period throughout the Sahara (Lamb et al., 1994; Hassan, 1997; Cremaschi, 1998; Swezey et al., 1999). However, these appear not to have been synchronous throughout the Sahara, and at present it is not known how such events manifested themselves in the far west of the Sahara. The arid episode around 8000 BP (Hassan, 1997) was followed by major population changes and the adoption of domestic cattle in the Fezzan (Phillipson, 1993; Corradi, 1998), and we might expect such changes to have had profound impacts on prehistoric human populations throughout northern Africa.

In short, though it is clear that the study area experienced a more humid climate during the Holocene, further work is required in order to construct a more precise chronology of environmental change and to determine how this relates to human occupation in the area.

4. Archaeology

4.1 Pleistocene occupation

Scatters of lithic tools dating back to the Pleistocene are quite frequent in the surveyed areas, although they generally occur at very low densities. They mostly consist of Late Acheulean hand-axes, and Mousterian artefacts (cores, scrapers, points) of the Levallois tradition (Fig. 3). A single, trihedral point may indicate even earlier occupation, possibly representing evidence of a Middle Acheulean frequentation (according to Biberon 1961). The only real concentration of Pleistocene artefacts is Site ACH 1 at Erqueiz Lahmar, located in the gravel bars of a paleo-river bed. Here, several hand-axes of different typologies, Levallois cores, and heavily weathered flakes indicate a possibly prolonged use of this area. In this area we also found a sub-circular arrangement, some 2m x 1.5m in dimension, of rounded stones with dimensions of some tens of centimetres, whose function and age are yet to be determined. On the top of some mesas in the area of Erqueiz Lahmar, we found some tanged Aterian points, showing a Levallois technique (Fig. 3).

![Fig. 3. Lithic materials recovered at Erqueiz Lahmar (see text for description).](image-url)
The distribution of artefacts and their very low density, suggest the presence of highly mobile human groups during the Pleistocene, from perhaps 250,000 up to 60,000 years ago. However, the Pleistocene human population of the region appears to have been of lower density than in other parts of the Sahara where artefacts are more abundant, and may have been sporadic. This may have been due either to limited penetration of the region due to its geographical location, or possibly a result of a less benign climate than in much of the rest of the Sahara, although these must remain speculations at present.

4.2 Holocene occupation

4.2.1 Rock Art

The Northern Sector of the liberated zone is already well known for rock art. Engravings and paintings are quite widely dispersed, with some significant concentrations in the areas of Sluguilla and Erqueiz (Soler et al., 1999, Milburn, 1996, p. 112).

Fig. 4. Engraved panels at Sluguilla.
Fig. 5. Engraved elephant (a) and rhino (b) at Sluguilla.
Fig. 6. “Washed” rock surfaces at Erqueiz, demonstrating destruction of paintings as a result of “tourist” activity (site RA6).

Fig. 7. Damage to rock painting at Erqueiz resulting from removal of rock panel. (site RA6).
The site of Sluguilla features an important clustering of funerary stone monuments (mostly of the conical tumulus type), and dozens of engraved panels. Sluguilla is unusual in terms of rock art as it is an open air site, with the carvings almost exclusively on large weathered horizontal limestone slabs, showing ancient (and also recent) large cracks (Fig. 4). The majority of the engravings represents wild animals such as antelopes, giraffes, and gazelles, and domestic cattle are also represented. While such animals may exist in arid or semi-arid areas, they generally require a significantly wetter environment that exists in the region today. The whole assemblage suggests close links with the so-called Tazina style (e.g., Muzzolini 1986; Le Quellec 1998). Nonetheless, the abnormal elongation of some features of the subjects represented at Sluguilla (mostly legs, but also horns and necks) may indicate a specific local tradition (Fig. 4). An elephant and rhino were also recorded (Fig. 5). These, particularly the latter, exhibit a somewhat different rock varnish to the majority of the carvings, deep, rounded grooves and a distinct style, and may be related to the Bubalin style. The subjects are engraved in a naturalistic fashion, and both perspective and some kind of movement are competently depicted.

The Sluguilla area appears to be an important rock art site. Unfortunately, the main route connecting the camps in Algeria with Tifarrit (one of the most important military posts in the liberated zone of Western Sahara) cuts the Sluguilla site. This area is thus highly accessible, and the rock panels are vulnerable to damage resulting from a range of factors including frequent "tourist" visits and vibrations caused by the passage of heavy vehicles.

The Northern Sector of the liberated zone also contains important rock art sites with prehistoric and protohistoric paintings. Previous research by Spanish teams (principally the Universities of Gerona and Granada; Soler et al., 1999) has concentrated on the important sites of Erquez and Irghayra. The majority of fauna depicted at these sites are wild animals, but domestic cattle and possibly ovicaprids are also present. Human figures are also commonly represented in the paintings (but note their apparent absence from the Sluguilla carvings). Unfortunately, most of these painting are poorly preserved; in the majority of instances this is due to the repeated wetting of the surfaces (Fig. 6). Indiscriminate removal of parts of painted panels is also another, quite frequent, feature of the site at Erquez (Fig. 7), as well as several other forms of disturbance such as graffiti (Fig. 7). We were informed that, despite poor accessibility as a result of the current political situation, up to 4000-5000 persons per year normally visit the area, for different reasons and with probably quite distinct approaches to the environment, local tradition, and cultural heritage. Destruction of rock art is a serious problem for the preservation of the archaeology of this barely known artistic province, which appears to be endangered further by the increasing flux of visitors, and by other indiscriminate forms of rock art "use" (Milburn 2002).

The team also identified a previously unrecorded rock art site at a location known locally as Bou Dheir. As at Erquez and Irghayra, the rock art at Bou Dheir consists of paintings. Most of the images are located in a series of rock shelters on the highest part of a sandstone falaise (Fig. 8). The Bou Dheir paintings generally appear to be much better preserved than those at Erquez and Irghayra, and do not exhibit the widespread damage associated with recent human activity seen at these locations. We failed to find any traces of vanishing surfaces due to rock art washing, although it appears that some painted surfaces have been largely destroyed by natural rock falls in a shelter below the main site. We believe that this area, given its excellent state of preservation and its extraordinary richness (described in more detail below), may serve as an important example of Western Sahara rock art for the purposes of including the region in the UNESCO World Heritage Site list.

The focus of the Bou Dheir site is a large fresco depicting a variety of wild fauna (Fig. 9). The organisation of the fresco and the style of the paintings demonstrate a specific local style and a particular relevance of this site for prehistoric people. Compared with the majority of Western Sahara rock art sites we surveyed, this example exhibits a very distinct use of the wall morphology. The images appear to exploit a deep niche in the shelter, with a series of superimpositions and re-arrangements. Within this complex, the very elegant representation of a buffalo is worthy of note (Fig.
10), although the classification of the animal represented must remain uncertain (e.g., Soleilhavoup and Masy, 2000, pp 49-53). The quality of drawing recalls the Early Pastoral style of the Acacus mountains (Mori 1965). Another important, and rare, aspect of this site is the size of some painted subjects. Some depictions of animals are very large (up to 140 cm), much larger than those found at other sites in Western Sahara.

Human figures are also abundant at Bou Dheir, painted in recesses adjacent to the main fresco. Of particular note is a human figure exhibiting a hairstyle, or possibly a headress, in the form of a crest towards the front of the head that is also characteristic of painted figures in the Tassili and Acacus mountains in the central Sahara (Fig. 11). Both this aspect of the rock art and the quality and style of some of the faunal representations suggest possible cultural links between prehistoric populations of the Western Sahara and other Saharan regions.

The rock art of Western Sahara, to date barely mentioned in the scientific and amateur literature, represents an important addition to the corpus of Saharan rock art, which is found throughout northern Africa from the Eastern Sahara to the Atlantic Ocean. While the styles of many of the human figures and depictions of animals clearly identify the rock art of Western Sahara with the greater Saharan region, the quantity of rock art sites, and the impressive series of superpositions showing extremely different styles indicate a long tradition of rock art in the area, probably up to historical times. Therefore, the rock art of Western Sahara is of great importance in terms of archaeology, history and cultural heritage. The first, urgent, problem is its preservation; as in many other areas of Northern Africa a first step could be the inclusion of the area in the UNESCO list.

Fig. 8. Rock shelters at Bou Dheir (site RA26).
Fig. 9. The main Bou Dheir “fresco”, located in the largest rock shelter (site RA26).

Fig. 10. Buffalo at Bou Dheir (site RA26).
Fig. 11. Human Fig. at Bou Dheir, with distinctive hair style or head dress reminiscent of rock paintings in the Tassili and Acacus. (site RA26)

4.2.2 Settlements

Settlement sites were located and mapped. These consist of fireplaces, a common feature of Saharan nomadic pastoral groups (e.g., Gabriel 1987). In our study area, they occur both in isolation and clustered, usually along the margins of ancient river systems. The area of Erqueiz Lahmar proved to be particularly rich in settlement sites; at one site (F4) we mapped 9 fireplaces, all heavily deflated. Excavation of these sites yielded one sample of charcoal for radiocarbon dating. This yielded a very young date - 260 ±40 uncalibrated radiocarbon years – indicating that at least some of these sites originate with nomadic groups from relatively recent historical times. In a nearby site (F3) we unearthed undecorated pottery and some charcoal, which has not yet been dated. Further sampling is required to determine the period spanned by these settlement sites, although it may be expected that datable material is more likely to be found at younger sites that have been subject to less deflation than prehistoric sites.

Another, quite unusual archaeological context is the area of granite outcrops in the Achach area north of Tifariti (Fig. 1). Here, a small cave (site DEP1) has been used as a military site during the recent conflict. The cave has been completely emptied of its original filling. A rough analysis of this excavated material confirmed the prehistoric age of the materials (undecorated pottery, flint bladelets and cores, grinding equipment, ostrich eggshells, an unfinished ostrich eggshell bead, and small livestock bones). The original filling probably consisted of organic sandy sediment.

Scattered ceramic fragments are found throughout the region, and probably indicate a major human frequentation during the Late Neolithic. The main decorative patterns consist of impressions and (more rarely) incisions, which are similar to themes familiar from other Saharan areas, such as

As a first, very preliminary, impression, it appears that the main settlement systems exhibited significant variation during the Holocene, possibly due to major climatic changes. The evidence from Achach suggests an earlier, possibly Early/Middle Neolithic occupation, mostly recurrent in caves and shelters, as testified by the features of the stratigraphic deposits and by the geomorphology of the area (large caves and shelters are widely spread in the granite hills of the region). The area has been subjected to a considerable amount of aeolian deflation, and it is likely that most of the deposits have been destroyed; however, according to local informants, some caves still preserve their original sediments, which will be surveyed in the next field seasons. A later, possibly Late Neolithic, occupation is testified by the frequency of fireplaces in some of the surveyed areas. Both the location (on the margins of rivers) and state of preservation (highly deflated stone accumulations) might be interpreted as evidence of occupation by small nomadic groups, probably facing increasing aridity in the area.

4.2.3 Funerary archaeology

The most striking evidence of prehistoric and protohistoric occupation in the Northern Sector of the liberated zone of Western Sahara is probably the funerary and ritual megalithic architecture. Stone monuments of different types and diverse locations punctuate the landscape of the region around Tifariti. Such pre-Islamic monuments are a typical Saharan feature, dating back to the end of the 7th millennium BP (e.g., Milburn 1993; Gauthier and Gauthier 1999; Wendorf et al. 2001; di Lernia et al. 2001). Their use became more and more frequent in the later prehistoric period, particularly during the 5th and 4th millennia BP. Architectural features of the Western Saharan monuments clearly reflect those well known in more central regions.

During this first field trip, we mapped dozens of monuments, especially in the areas of Wadi Ternit and Bou Dheir. All these monuments use a dry stone technique, but both architectural features and typological aspects vary dramatically. The location of the monuments is also quite variable. They typically occur at the top or base of escarpments or isolated mesas, and along the edges of wadis, although they may also be found on flat plains. As concerns the architecture, the most frequent type is the conical tumulus (Fig. 12): such monuments may occur either in isolation or in clusters. In the former case, monuments may be 12 metres in diameter, and up to 1.5 metres in height. Some of these tumuli are associated with stelae. Other tumuli are also associated with standing stones, most dramatically at site STEL 2 at Erqueiz (Fig. 13).

A spectacular collection of some 65 stelae, the largest of which is some 1.5 metres in height, is located several kilometres north of Tifariti (site STEL 1, Figs. 14 and 15). The stelae have been arranged to form several distinct areas or enclosures. One line of stelae points precisely north (Fig. 15), with a line connected to this at right angles aligning within a few degrees of east. The entire arrangement is open to the east; there are no lines of stelae along the eastern edge of the site. Small pieces of white quartz crystal are scattered inside the arrangement; such material is available locally. The site is located approximately in the centre of a depression surrounded by low hills, in which there are a large number of conical tumuli. The age of the arrangement, and the provenance of the stelae (representing a variety of rock types) is unknown, although at least some of the rocks from which the stelae have been made are available locally. Concentrations of stelae, in some cases involving hundreds of monoliths, have been recorded since the beginning of the 20th century (Clerisse 1931; Reygasse 1950: 47-50), although generally their ages are unknown.
Fig. 12. Typical tumulus burial north of Tifariti (near site STEL1).

Fig. 13. Arrangement of stelae and linear stone arrangement associated with tumulus burial (right of frame) in the Erqueiz area (site STEL2).
Conical tumuli and stone stelae are just two examples of a rich diversity of stone monuments recorded in the study area. *Corbeille* platforms (Fig. 16) exhibit a range of sizes, up to some 10 metres in diameter. They are apparently much more diffuse in the northernmost region of the surveyed areas. Crescent-shaped burials were recorded at Bou Dheir and Erqueiz (Fig. 17); the burial at the former site was located above the main concentration of rock art. Axle-shaped monuments were recorded at Achach and in the vicinity of Erqueiz Lahmar; the former was located near two conical tumuli, and the latter was located at the base of a small mesa, adjacent to a conical tumulus and several Islamic burials (Fig. 18). Other tumuli were also located at the base of this mesa, on top and in the centre of which was a conical burial which had been subsequently built up as a landmark.

Of particular relevance in terms of cultural links with other Saharan regions is a V-type tumulus or antenna tomb in the area of Bir Lahmar (Fig. 19). Monuments of this type are common in parts of southern Libya and other central Saharan regions (di Lernia et al., 2001; Mattingly et al., 2001), although the team is not aware of any published descriptions of such features west of eastern Algeria, some 2000 km away.

In contrast with other Saharan areas, monuments generally exhibit a very good state of preservation, indicating scarce frequention in more recent times. Nonetheless, some plundered sites were visited, where pottery and jade beads were recovered. The manufacture and decoration of this pottery may point to a Late Neolithic age.

Differences in density, architectural features, and location may suggest a long lasting tradition, from prehistoric times probably from the Late Neolithic up to protohistoric phases. Indications of contact with northern African areas are well exemplified by Site SP1, a particular stone monument northeast of Wadi Ternit (Fig. 20). Other possible hints of cultural relations with the Mediterranean
region come from bazina types (Fig. 21), especially in the vicinity of Tifariti. On the other hand, corbeille, crescents, and conical tumuli point to the typical Saharan tradition.

Fig. 15. Northwards alignment of stelae at site STEL1.
Fig. 16. Corbeille monument in north of study area (site BP10).

Fig. 17. Large crescent-shaped structure above rock shelters at Bou Dheir (site RA26).
Fig. 18. Islamic graves, tumulus and axle-shaped prehistoric burials (site BP28).

Fig. 19. V-type tomb between Bir Lahmar and Bou Dheir. Members of the team are positioned at the central burial mound and at the end of each arm.
Fig. 20. Large (approximately 5 m height) stone monument in vicinity of Wadi Tirnit. (site SP1)

Fig. 21. Bazina-type monument at Erqueiz Lahmar (site BP24).
5. Impact of conflict on archaeological sites

The impact of the recent territorial conflict on the archaeology of the liberated zone is complex, leaving aside the dramatic human and social implications, not discussed here. Paradoxically, military conflict may have a ‘positive’ effect on archaeological sites as it means that few people visit a region. Provided sites are not directly damaged by military activity such as bombardment, they may be protected from practices such as souvenir hunting and, in the case of rock paintings, “washing” associated with “tourist” activity and amateur photography. Indeed the deterioration of many of the paintings at Erqueiz in particular over the past several years is extremely dramatic; this is the principal destination for what may be loosely termed as tourism, along with Sluguilla, where the carvings are somewhat less vulnerable to human activity. The impact is all the more dramatic when Erqueiz (and Irghayra) are compared with Bou Dheir, which to our knowledge has not been visited by significant numbers of people.

On the other hand conflict can create a regulatory and institutional vacuum in which no effort is made to protect important sites, as their preservation is understandably low on the list of priorities of the warring parties. If ownership of the land is contested, neither side may feel responsible for the preservation of archaeological sites. In addition, conflict and the associated institutional vacuum can provide an opportunity for the looting of archaeological materials; unsubstantiated claims are occasionally heard that various parties involved in the conflict in Western Sahara have removed valuable rock art for personal collections or for sale.

In terms of approaches to the landscape, Sahrawi fighters from the Frente POLISARIO undoubtedly feel a sense of ownership of the land, which the Sahrawi view as theirs by virtue of their long occupation, exploitation and management of it. The extent to which this sense of ownership and responsibility extends to the archaeological sites is debatable. While there is significant damage to rock art sites in terms of graffiti (much but not all of which is in Arabic), some paintings at sites that have been used by Frente POLISARIO soldiers are in reasonable condition. Indeed it is likely that most damage has been done since the end of the conflict, particularly as a result of “washing”, and this is probably related to visits by foreign groups rather occupation by military personnel.

The converted cave at Achach (Section 4.2.2 above) has been decorated with detailed colour scenes related to the life of the soldiers posted at this site. This “modern rock art” includes depictions of soldiers, military vehicles, a camp fire (Fig. 22) and the slaughtering of a camel.

The legacy of the recent conflict is clear at certain burial sites. In some instances burial mounds appear to have been re-worked as gun emplacements, with the stones from tumuli utilised to construct low protective walls and the centre of the burial hollowed out to accommodate military equipment and its operators (Fig. 23). A more poignant legacy of the conflict is the existence of many graves of Frente POLISARIO fighters.

The impact of the recent conflict on the archaeology of the liberated zone is variable. The implications of conflict vary from site to site, and depend on a variety of factors such as the strategic importance of the site, the approach of the parties involved and the nature of the archaeology itself.

The use by Frente POLISARIO fighters of such a large number of archaeological sites, such as caves, decorated rock shelters, and especially burial mounds, might be seen as a kind of ‘exercising of rights’ over the landscape and the territory’s cultural heritage. In some ways it is appropriate to view this kind of modern war-related use as a form of cultural continuity: in the context of this interpretation, the presence of soldiers’ burials among the prehistoric and earlier Islamic tombs is particularly notable.
Fig. 22. Modern paintings inside converted cave at Achach (site DEP1).

Fig. 23. Burial site re-worked as a gun emplacement near Wadi Tirnit (site BP14).
6. Conclusions and future work

The results of this preliminary survey illustrate the richness of the archaeological record in Western Sahara, demonstrating that the region has not been excluded from the mainstream of human evolution and cultural development over the past several hundred thousand years. All the major archaeological phases commonly recorded at other Saharan sites are represented, and there is some tantalising evidence of very early occupation. While the distribution of Pleistocene archaeological materials suggests that occupation in this epoch may have been sparse and somewhat transient, the Neolithic archaeological record is extremely rich, particularly in terms of funerary monuments and rock art. Rock paintings and burial sites indicate that the western Sahara was strongly linked to the wider Saharan cultural complex in Neolithic times, and it appears that the region was permanently occupied in this period, during which time population densities may have been relatively high. The presence of V-type tombs and certain stylistic features of rock paintings are indicative of cultural connections with the central Sahara in the mid to late Holocene, and bazina-type monuments suggest links with other North African regions in later prehistoric or early historical times. Nonetheless, many questions remain regarding patterns and timings of human migration to the region, as well as the precise timing and nature of changes in the physical environment.

As a result of the preliminary survey, the team signed an agreement with the Sahrawi Ministry of Culture concerning future geoarchaeological work in Western Sahara.

Future work will be focused initially on the Bou Dheir site and the northern region around Wadis Tirnit, Erni and Dirt. Work at Bou Dheir will consist of sampling and analysis of datable materials from burials, rock shelter deposits and paintings, provided that this can be achieved without damaging the rock art. The depiction of large humid-climate fauna that are believed to represent the early Holocene elsewhere in the Sahara makes this site particularly important. The preservation of rock art sites will be addressed via contacts with ICCROM and UNESCO; it is hoped that areas of rock art, particularly the Bou Dheir site, can be included in the UNESCO World Heritage Site list.

Excavations of selected burial sites will be undertaken in the northern region. Of particular interest are corbeille, crescent, antenna and axle-shaped burials, although other burial types will also be examined. Comparisons with funerary remains from the Canary Islands may also be considered, subject to the availability of resources and funding; there is evidence that the Canary Islands were settled by Berber peoples from the Sahara, and similar burial styles are observed in the Canaries and Western Sahara (Mercer, 1980; Reid, 1999).

A major aim of the project is to raise awareness in the academic community of the archaeology of Western Sahara, and of the relevance of this region for both archaeological and palaeoenvironmental studies.

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**Note on place names**

Where place names appear on maps or in existing literature, the accepted English transliterations have been used. “New” place names have been rendered in English in a manner that is consistent with existing transcriptions where such and approach is appropriate. For example, Bir Lahmar might be more accurately transcribed from Arabic as Bir al Ahmar but, as Bir Lahmar is an accepted spelling on regional maps, another site name has been rendered as Erqueziz Lahmar rather than Erqueziz al Ahmar for the sake of consistency. The word “Erqueziz” is a phonetic rendering of a local name, which is sometimes spelt as “Rekeiz” but might also be rendered as “al Rakaa’iz” or “ar Rakaa’iz”. In future seasons, a consistent naming system will be developed, based on a standardised transcription of local names from Arabic. This will involve the recording in Arabic of all place names while the team is in the field.

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