

# New data on the stratigraphy and chronology of the prehistoric site of Prazo (Freixo de Numão)

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**A B S T R A C T** The Prazo archaeological site is located near Freixo de Numão (Vila Nova de Foz Côa, north-eastern Portugal). The site, discovered in the early '80s, initially revealed a significant historical record, having been a Roman *villa* whose occupation continued through part of the Middle Ages. In 1996, fieldwork there uncovered Neolithic layers. They were excavated from 1997 to 2001, revealing also the existence of a pre-Neolithic occupation. This paper presents the geoarchaeology and chronology of the prehistoric succession of Prazo, which is arranged as follows: an upper Pleistocene complex formed of slope waste sediments, featuring upper Palaeolithic finds and structures; an early to mid Holocene succession, also composed from slope waste deposits, containing Epipalaeolithic/Mesolithic and Early Neolithic archaeological assemblages and features; and an upper Holocene complex, corresponding to occupations in the Roman and Middle Ages. The available data – deriving from the geoarchaeological survey at the site and from an extensive range of radiocarbon dates – are presented as part of a preliminary discussion of the environmental evolution and the settlement strategies at the site.

**R E S U M O** O sítio arqueológico do Prazo situa-se na freguesia de Freixo de Numão (Vila Nova de Foz Côa, Nordeste de Portugal). Após a sua descoberta, no início dos anos 80, o Prazo foi alvo de várias campanhas de escavação orientadas para o estudo da *villa* romana e dos vestígios medievais existentes no local. Em 1996, os trabalhos de campo puseram a descoberto níveis datados do Neolítico Antigo. Entre 1997 e 2001, as escavações realizadas centraram-se na análise destes níveis pré-históricos, revelando a existência de uma espessa sequência estratigráfica que, para além de conservar depósitos residuais plistocénicos, incluía igualmente sedimentos atribuíveis a grande parte do Holocénico antigo e médio. Este artigo pretende apresentar a geoarqueologia e a cronologia da sequência pré-histórica do Prazo, que se organiza essencialmente em três conjuntos: um conjunto do Plistocénico superior (conjunto PS), constituído por depósitos de vertente, e contendo um registo arqueológico (artefactos líticos e estruturas antrópicas) datado provisoriamente do Paleolítico superior; um conjunto atribuído ao Holocénico antigo e médio (conjunto HA), igualmente composto por

sedimentos de vertente e que forneceu elementos arqueológicos do Epipaleolítico/Mesolítico e do Neolítico Antigo; um conjunto do Holocénico recente (conjunto HR), correspondente às ocupações romanas e medievais do local. Neste texto discutem-se igualmente as datações radiométricas disponíveis. Estes dados, embora preliminares, visam esclarecer questões relacionadas com a evolução ambiental do local e com as estratégias da sua ocupação durante a Pré-história.

## 1. Introduction

The archaeological site of Prazo is located in north-eastern Portugal, in the region of Freixo de Numão (fig. 1). This village is within the municipality of Vila Nova de Foz Côa, which, in recent times, has been one of the main centres of archaeological research and debate in Portugal. The area features one of the better preserved Palaeolithic open-air rock-art complexes so far known (*e.g.* Zilhão et al., 1997; Zilhão, 1998a; Baptista, 1998), as well as, among others, a number of Upper Palaeolithic sites in the Côa Valley (*e.g.* Aubry, 2001; Aubry et al., 2002). Moreover, in the Freixo de Numão and Horta do Douro areas, Copper Age to Bronze Age sites such as Castanheiro do Vento and Castelo Velho (*e.g.* Jorge, V.O. et al., 2002; Jorge, S.O., 2002), as well as Roman and Medieval sites (*e.g.* Coixão, 1996, 1999, 2000a, 2000b), are to be found.

Prazo is a relatively complex site that is mainly known for its Roman and Medieval remains (Coixão, 1996, 2000a, 2000b, n/d). Prehistoric layers are found in the area that was subsequently occupied in historical time and in two rock-shelters — Abrigo 1 and Abrigo 2 — located a few hundred meters upslope (fig. 1 and 2). A preliminary study of the prehistoric occupations of the site was recently published by one of us (Monteiro-Rodrigues, 2000, 2002).

Here we present some data on the prehistoric stratification of Prazo's Sector I, with special reference to its pedo-sedimentary and stratigraphic layout and to its chronology, including some information on the archaeological sequence and record. These are the subject of a Ph.D. thesis (Monteiro-Rodrigues, in progress).

Though some data are still preliminary — *e.g.*, the analysis of archaeological assemblages is incomplete and the micromorphological observation on soil and sediments has yet to be undertaken, it seems useful to present some of the information on the site's stratigraphy and chronology. Prazo represents a critical place for the study and understanding of the process of Neolithization in northern Portugal and in the region of the northern Sub-Meseta, as its stratigraphic succession spans between the beginning of the Holocene and the Early Neolithic. Below the Holocene succession, an upper Palaeolithic record is also present: its study might help us to understand regional settlement patterns during this phase, especially if one considers the proximity of the Côa Valley's rock art and archaeological record.

## 2. History of research

Archaeological research at Freixo de Numão began about twenty years ago with the work of A.N. Sá Coixão, whose main aim was to study the Romanization of the area. His survey led to the identification of around 200 sites dating to prehistoric and historical times, thus exceeding the chronological limits of his study (Coixão, 1996, 2000a, 2000c, n/d). Among these sites, those of

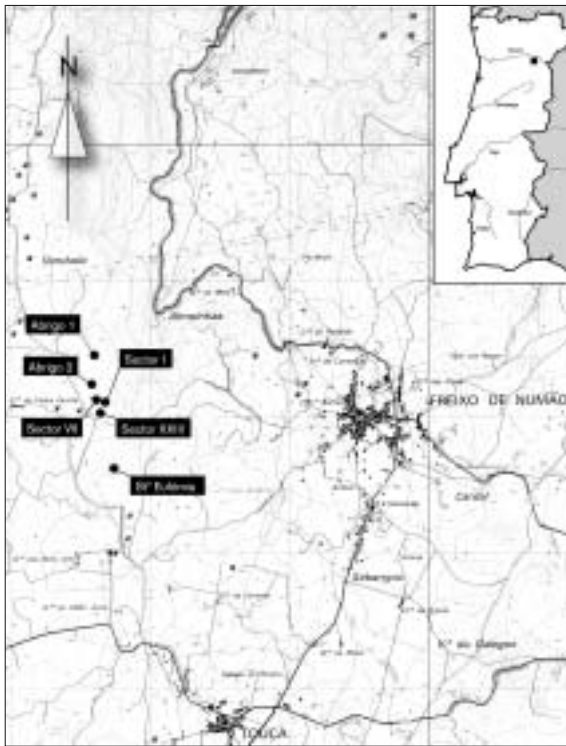


Fig. 1 Location of the archaeological site of Prazo and of the excavated sectors mentioned in the text (modified from Monteiro-Rodrigues, 2002, p. 118 – topography from the *Carta Militar de Portugal, escala 1:25 000, n.º 140 - Touça*).

Prazo, Castelo Velho and Castanheiro do Vento – all of them found in the early ‘80s – are remarkable for their size, importance and degree of preservation. In this preliminary phase of fieldwork, Prazo was only identified as a Roman and Medieval site. Systematic excavations started in 1995 and, during the 1996 campaign at the *villa*, lithics and potsherds were found in the sediments underlying Roman structures, namely in Sector I (Fig. 2), indicating the existence of pre-Roman occupations (Coixão, 2000a, 2000c, n/d). The decorative patterns of the collected pottery allowed S. Oliveira Jorge to assign the assemblage recovered to the Early Neolithic. In the same year, fieldwork in Sector I confirmed the existence of layers featuring Early Neolithic pottery preserved near some granite boulders. During a subsequent visit, one of us (S.M-R.) detected layers containing only lithic artefacts.

From 1997, fieldwork concentrated in Sectors VII (1997 and 1999), I (1997 to 2001) and XXIII (1997), those characterised by a



Fig. 2 Prazo. Aerial view of the site, with the Roman structures and the location of Sectors I and VII.

thicker pre-Roman stratification, while soundings were opened in two small rock-shelters (1999-2000), in the place named Prazo II, under the direction of S.M-R.

The present situation, after several years of excavation at the site, confirms that Prazo was intensively occupied during the Roman and the Middle Ages, while some sectors show evidence of prehistoric occupations as follows:

- Sector VII, with a well documented and radiometrically dated Early Neolithic record (see *infra*);
- Sector XXIII, with a possible Bronze Age occupation, whose attribution is based on the radiocarbon dating obtained on charcoal fragments from the infilling of a posthole (840-520 cal BC, see *infra*), even without an artefactual assemblage; it should be noted that there is a Bronze Age site a short distance from Prazo, at Monte de Santa Eufémia (Monteiro-Rodrigues, 2002);
- Prazo II (rockshelters 1 and 2), with a possible Late Neolithic Copper Age human occupation, whose attribution – not yet supported by radiometric dating – is based on the archaeological assemblages collected during the excavation. Evidence for Roman and Middle Ages occupation is also detected (Monteiro-Rodrigues, 2002), the former being radiometrically dated to 50-220 AD;
- Sector SI, with its stratigraphic succession featuring upper Palaeolithic, Epipalaeolithic/Mesolithic and Early Neolithic records, with clear stratigraphic and chronological evidence.

### 3. Site context

Prazo is adjacent to Freixo de Numão, in the Alto Douro region (north-eastern Portugal). The geographic coordinates of the site are 41° 04' 20" N and 07° 14' 36" W and its mean altitude is 560 m a.s.l (Fig. 1).

Three main lithologies outcrop in the area surrounding Prazo, all related to formations belonging to the morphostructural unit of the Hesperic massif.

The site's stratification lies on the granite of the Freixo de Numão massif. This is a small, sub-circular, intrusive body, showing fairly homogeneous lithological characteristics all over its outcrop area. The granite, containing two kinds of mica, exhibits a medium-grained, porfiroid texture.

The granite is intruded into the metasedimentary formations of the Complexo Xisto-Grauwauquico, mostly formed of phyllites, dating to the Precambrian - Cambrian.

Both the granite and the embedding rock are crossed by quartz, pegmatite and aplite sills following the main regional tectonic axes, which are mostly oriented NNE-SSW and, subordinately, WSW-ENE or WNW-ESE (Ribeiro, 2001).

Geomorphologically, the area around Prazo is part of the so-called "central plateaux" system, which is composed from a juxtaposition of extensive peneplanation surfaces mainly dating to the Cenozoic. The central plateaux are located between the Iberian Meseta – whose western edge is represented by the tectonic alignment Vilarica-Bragança, a few km E of Prazo – and the western pre-littoral chain (Ferreira, 1978). The Freixo de Numão area occupies a planation surface between 550-600 m ("superfície inferior, nível mais alto" according to Ferreira, 1978; see also Fig. 3), mainly dipping W, with local undulations due to tectonic activity (for details on the regional tectonic dynamics: see Cabral, 1995). Residual hills are found locally on the main peneplanation surface, often related to the outcropping of harder lithotypes.

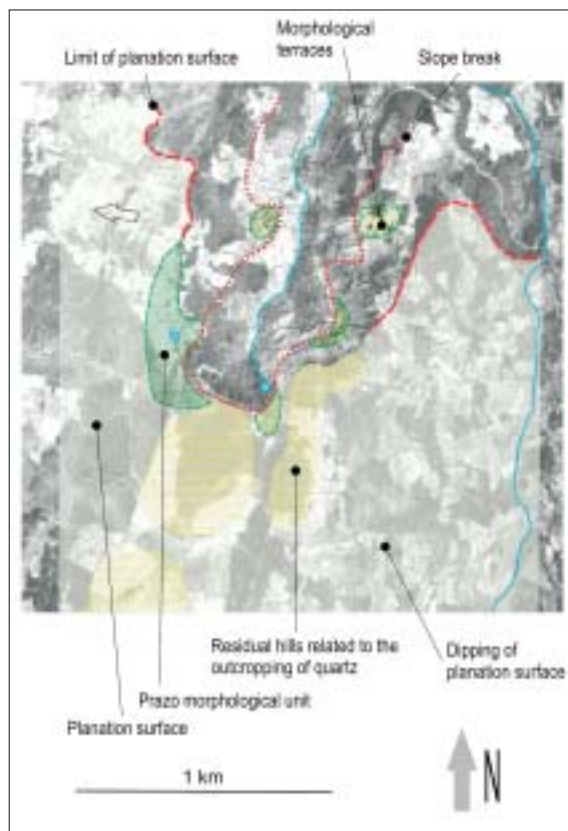


Fig. 3 Geomorphological sketch of the Prazo surroundings.

Both the central plateaux system and the Meseta's surface are dissected by a deeply incised hydrographic net that is a tributary of the River Douro, which flows some hundreds of meters below the highest planation surfaces.

Prazo is situated along a gently dipping NE surface, a few meters lower than the above-mentioned planation surface, almost at the head of the left hydrographic hillslope of the S. João Valley (Figs. 3 and 4). This valley is rather incised and oriented along the Murça fault, which follows a NNE-WWS axis. The Freixo de Numão granite outcrops all around the site, while a NNE-SSW oriented quartz sill may be found a few hundreds of meters to the S, along the Murça fault, forming the Alto de Santa Eufémia residual relief. To the W and S of the site, the almost flat and subhorizontal planation surface is found.



Fig. 4 View of the S. João Valley from the South. A part of the Prazo site can be seen close to the left lower corner of the picture.

## 4. Stratigraphy and archaeology of Sector I

### 4.1 The position of Sector I

Prazo's Sector I occupies a surface located upslope from the S. João Valley incision (Fig. 2). This is the area occupied mainly by the Roman and Middle Ages settlements (Coixão, 1999, 2000b) and, being strongly affected by human impact, the prehistoric evidence is restricted to residual areas that were not modified during these periods.

The excavation area where the pre-Neolithic and Neolithic records were detected is located close to granite boulders, which probably constituted an obstacle for the expansion of Roman and Medieval buildings and, at the same time, for slope erosion processes — especially run-off. Moreover, during the Roman and post-Roman periods, this sector was partly buried under a thick waste for artificial terracing, which enhanced the preservation of the prehistoric succession.

Both Sectors VII and XXIII have a prehistoric record and are also found close and among large granite boulders, a few tens of meters upslope from Sector I.

### 4.2. The pedo-sedimentary succession

The archaeological deposit (see cross-sections in Figs. 5, 6, 7 and 8) is described according to a system based on sedimentological and pedological descriptions (e.g. FAO-UNESCO, 1990; Langohr, 1989; Sanesi, 1977; Keeley and Macphail, 1981) modified to incorporate features relating to human activity. The units used for the description are those recognised during excavations. They were grouped into “geoarchaeological complexes”, which are essentially defined by their boundaries, being three-dimensional bodies physically included among major discontinuities or boundaries of any kind (details in Angelucci, 2002). They may correspond to the

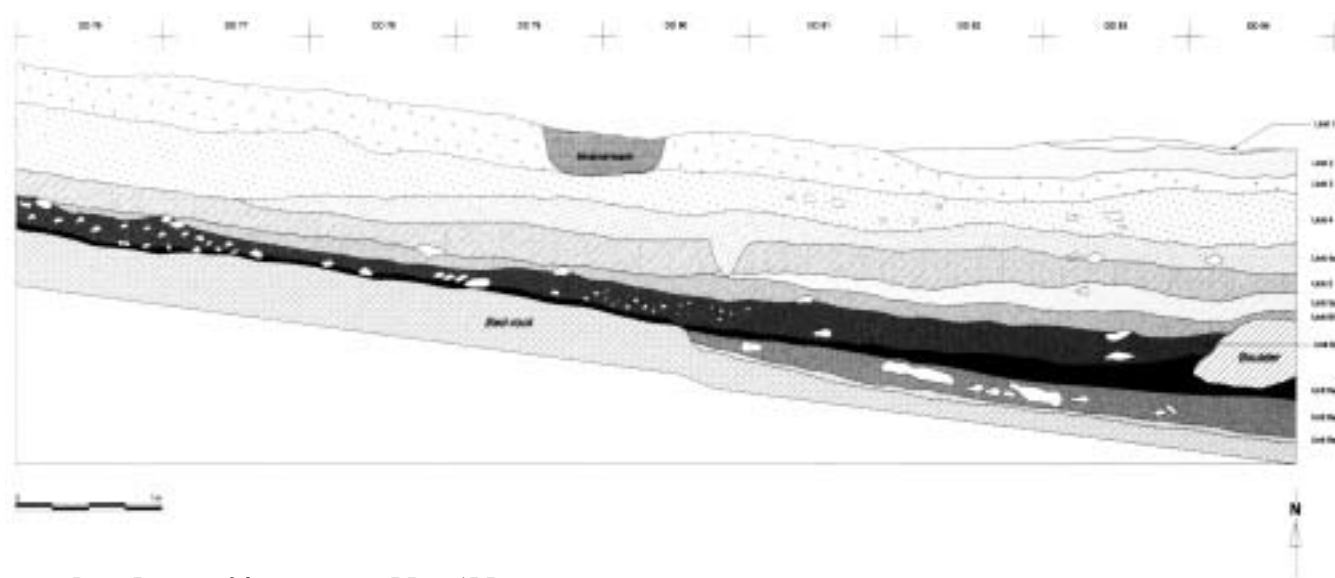


Fig. 5 Prazo. Drawing of the cross-section DD 76 / DD 84.

allostratigraphic unit used by Quaternary geologists (Salvador, 1994) or to the sequum employed by soil scientists. After field description, undisturbed samples were collected for micromorphological analyses.

The entire succession may be divided, according to the unit characters, features and geometry, into three geoarchaeological complexes, which are described as follows (Fig. 9).

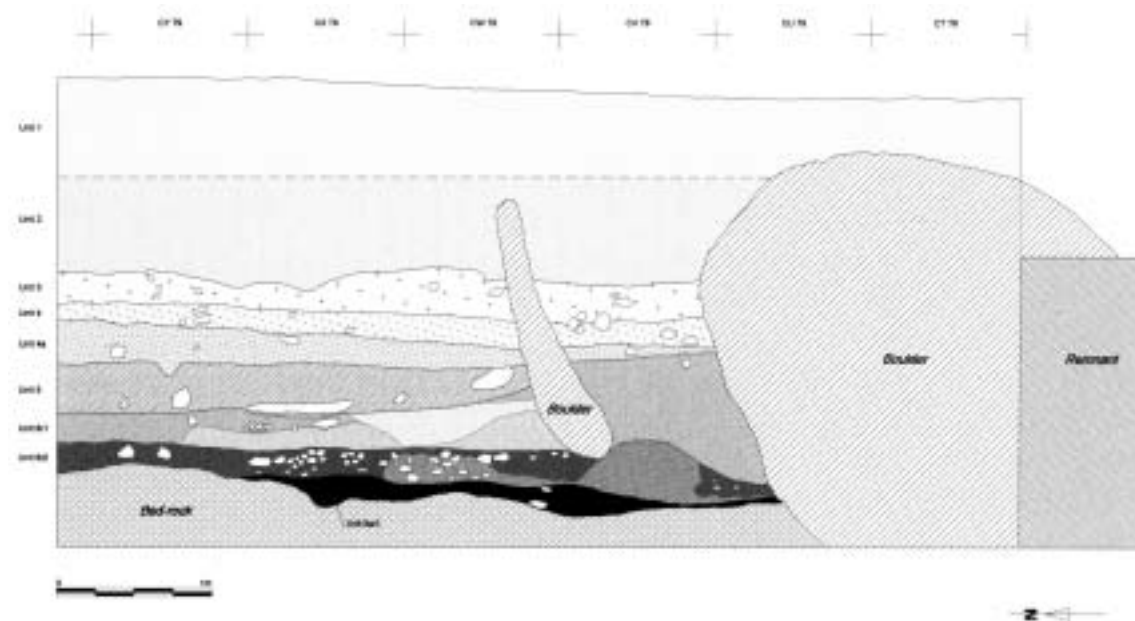


Fig. 6 Prazo. Drawing of the cross-section CY 79 / CT 79.



Fig. 7 Prazo. The cross-section CY 79 / CT 79 after micromorphological sampling.



Fig. 8 Prazo. The cross-section DD 76 / DD 84.

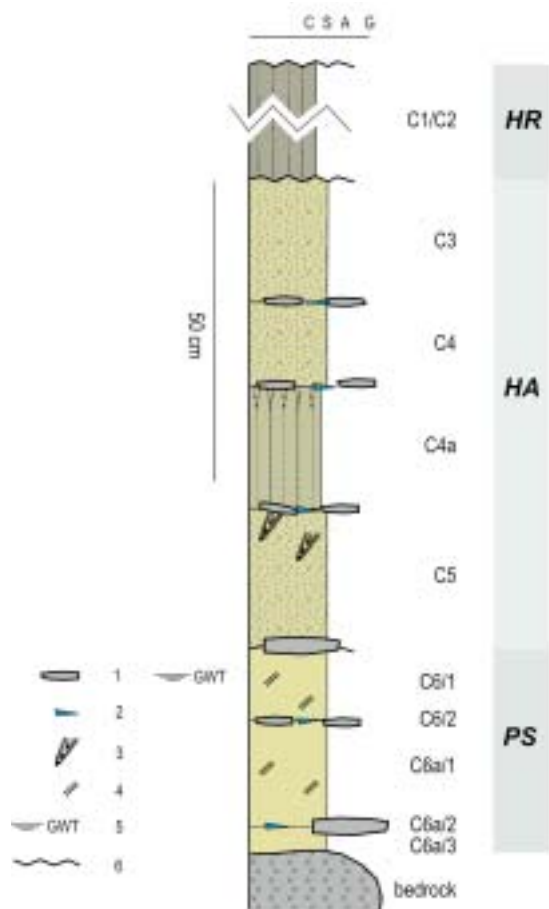


Fig. 9 Prazo. Simplified stratigraphic column of the archaeological succession in Sector I. Key: C - clay, S - silt, A - sand, G - gravel; 1 - granite slabs (larger stones) and stone-lines (smaller stones), 2 - main position of recovery of archaeological material, 3 - bioturbation, 4 - hydromorphic features, 5 - present-day level of groundwater table, 6 - erosional surfaces. The letters and numbers on the left side indicate respectively the archaeological units and the ge archaeological complexes.



#### 4.2.1. *Geoarchaeological Complex HR*

The top geoarchaeological complex is essentially anthropic and is not considered here. Complex HR corresponds to the Roman and post-Roman layers that are widespread all around the Prazo geomorphological unit. In Sector I, complex HR consists of units 1 and 2, which are mainly related to the dumping of human refuse and materials during Roman and Middle Ages. The composition of the sediment varies, on average strongly organic silty sand, with a variable content of stones and archaeological objects. The lower boundary of unit 2 is erosional and irregularly truncates the prehistoric succession (units 3 to 6).

#### 4.2.2. *Geoarchaeological Complex HA*

Complex HA is formed from a set of relatively homogeneous tabular layers dipping E, that is, parallel to the present slope. The complex contains variable amounts of archaeological objects and features and its base is erosional, truncating the underlying PS complex. Complex HA includes four units.

##### *Unit 3*

Unit 3 is formed of light olive brown (1Y5/3, moist) silty loam, including a fine gravel fraction. The sand fraction ranges from fine to very coarse and is mainly composed of quartz, feldspar and mica (both biotite and muscovite) fragments and crystals. Stones are very scarce and formed of subangular and angular fragments of granite and quartz. Organic matter is, on average, scarce, but may vary locally, with areas of slight organic staining clearly related to anthropic features. Field observation did not reveal any pedogenic structuring or sedimentary features. The lower boundary to unit 4 is poorly distinguishable from the pedo-sedimentological point of view, but clearly recognisable archaeologically, due to the almost continuous distribution of artefacts and manuports with a subhorizontal orientation pattern.

##### *Unit 4*

The pedo-sedimentary characters of this unit as observed in the field are essentially the same as unit 3. The distinction between the two units is mostly archaeological, due to the substantial continuity of sedimentary features between them.

##### *Unit 4a*

This unit is a very dark olive brown (1Y3/2) silty sandy loam featuring very few stones (fragments of granite and quartz ranging 1-4 cm). No aggregation is visible in the field. Organic matter is, on average, common and well incorporated in the mineral fraction, and its content may vary laterally. The lower boundary is gradual and well defined due to the presence of archaeological material with a subhorizontal orientation pattern.

##### *Unit 5*

Unit 5 is silty sand, with almost no stones and the sand fraction ranging between fine and medium classes. Its colour is light olive brown (1Y5/3) with some irregular large very dark olive brown (1Y3/2) mottles, related to the occurrence of burrows infilled with sediment from unit 4a. The lower boundary is abrupt and marked by the presence of mostly tabular granite fragments

with an orientation parallel to the interface. It is an erosional surface dipping N-NE with a relatively low angle.

#### *Unit 5a*

Unit 5a shows characteristics similar to unit 5, even if with a slightly darker colour. The unit was present only in a small area of Sector I and, due to the destruction of the remnant by natural events, it was not possible to observe it during later fieldwork at the sites.

### *4.2.3. Geoarchaeological Complex PS*

The lowest stratigraphic complex corresponds to excavation layers 6 and 6a, which were divided, for geoarchaeological purposes, into five units. This complex lies on the granite bedrock and contains a variable amount of archaeological material. In Sector I, the complex thins northwards and dips, on average, NE.

#### *Unit 6/1*

Unit 6/1 is laterally rather heterogeneous. Its bulk is formed mainly of slightly silty medium to coarse sand, with very few stones. Its colour is pale olive (3.75Y6/3) with common, large irregular, olive brown (2.5Y4/4) mottles and few fine dark yellow brown (10YR4/4) mottles. Poorly stratified concave or subhorizontal lenses of fine gravel and coarse sand, as well as thin intercalations of silty sand, were observed during excavation and in the cross-sections. The lower boundary is clear and linear.

#### *Unit 6/2*

Unit 6/2 is a coarse layer containing common lithic artefacts. The unit is mainly formed of angular fragments of quartz and granite, ranging from 2 to 15 cm, sometimes showing fractures and cracking related to fire activity. The unit is present over a wide area of the site, mainly as a stone-line thickening towards S-SW, reaching 20 cm thickness. According to the variable thickness of the underlying layers and to the microrelief of the bedrock, it may cover unit 6a/1 or lie in direct contact with the granite.

#### *Unit 6a/1*

This unit is similar to unit 6/1, except for the presence of light greenish grey mottles (10Y7/1).

#### *Unit 6a/2*

This is the lowest unit containing archaeological finds. It is a fine interface delimiting units 6a/1 and 6a/3, characterised by the presence of decimetre-size tabular fragments of local granite with subhorizontal orientation pattern.

#### *Unit 6a/3*

This lowest stratigraphic unit exhibits characters and features similar to unit 6/2 and 6a/1. Unit 6a/3 is discontinuous and fills the shallow depressions of the granite bedrock.

#### 4.2.4. Discussion

The succession observed in Sector I documents the evolution of the left hydrographic slope of the S. João Valley during the late Quaternary. Both the PS and the HA complexes mostly derive from the reworking of slope waste resulting from the alteration of the granite.

Field characters indicate that complex PS was mainly laid down through mechanisms of debris-flow or overland flow. Slope sedimentation occurred, at least, at two different times separated by short hiatuses corresponding to the earliest human occupations recorded at the site. The age of deposition of the complex is so far unknown and may partly correspond to the slope waste sediments recorded in some localities of the nearby Côa Valley, which are dated between c. 22 and 10 ka BP (Meireles, 1998). The present features of complex PS are mostly related to post-depositional processes. The complex, dipping NE, is cut by an erosional surface. Its upper unit (6/1) exhibits features (namely, the brown colour and slight weathering) that may relate to soil formation processes that occurred before the truncation and might indicate the existence of a soil profile – now missing – at the top of the complex. Finally, the hydromorphic features observed in the complex are related to water infiltration and seasonal water-logging at the contact between the bedrock and the Quaternary sedimentary succession, which are still active today. Hopefully, micro-morphological observation will yield more data on the sedimentary dynamics and the post-depositional processes that affected these units.

The interface between complexes PS and HA is erosional. The truncation represents an as yet undefined time span and is clearly discordant with the present-day sloping. The surface is the physical record of an erosional phase redrawing the S. João Valley slope, with an angular unconformity between complex PS, dipping NE, and the upper complexes, which are parallel to the present sloping (eastwards). Though detailed geomorphological studies on the area are still lacking, it may be hypothesised that the erosion corresponds to a period of generalised down-cutting of the hydrographic system, with consequent slope retreat along the valley slopes and head. This evidence matches other data from the Côa Valley, where a phase of down-cutting – leading to the individualisation of the 6 m alluvial terrace – is recorded at c. 10 000 years BP (Zilhão, 1998b).

Complex HA is formed of slope waste material apparently accumulated by run-off mechanisms, with periodical interruptions of sedimentary accumulation. The sedimentation is almost undifferentiated in the course of time, and, often, only the presence of archaeological finds and structures permit the identification of the different layers. Slight organic staining and the incorporation of organic matter, frequently related to human inputs, were observed in unit 4a. This attests to the occurrence of a short biostatic phase, with the interruption of sedimentation processes and the slight development of soil formation processes.

Units 4 and 3 present very similar characteristics between them and some of the features observed (bioturbation, slight organic staining, absence of abrupt boundaries) may indicate that these units were submitted to slight soil formation as C horizons underlying B or A horizons. The truncation of the complex HA succession does not allow us to verify this statement and to understand what the continuation of the sedimentary processes responsible for the deposition of HA complex was. The erosional surface existing between complexes HA and HR represents a discontinuity and a hiatus related to human intervention and, with the deposition of complex HR, the sedimentary system begins to be almost exclusively controlled by human actions.

### 4.3. Archaeology

#### 4.3.1. Geoarchaeological Complex HA

Units 3 and 4 revealed Early Neolithic assemblages.

The pottery in this complex is mainly represented by types featuring incised decorative patterns and may be generally affiliated to the “*Neolítico Inicial de Trás-os-Montes e Alto Douro*” (Sanches, 1997; Valera, 1998; Carvalho, 1999).

The lithic assemblage was mainly produced using local raw materials and features microlithic characteristics, mostly with non-geometric types. Quartz, available at a very short distance from the site is the most frequently represented raw material. Opal and flint are rarely used and allochthonous; the analysis of the *chaîne opératoire* of the latter does not show any evidence of *in situ* knapping or existence of by-products, being the represented artefacts “finished products” (e.g. small blades or bladelets, and segments).

Most of the tools were produced from flake blanks, usually reduced in size, as well as from bladelets and indeterminable fragments. The percentage of splinted pieces – some of them very small – is noticeable, probably the result of the production of items used as projectile armatures. Some of the splinted pieces were produced by means of a *chaîne opératoire* that, by exploiting the natural shape of quartz crystals, aimed to obtain relatively elongated blanks (Ramil Soneira and Ramil Rego, dl 1997).

Polished stone tools are rare. They are represented by two axes – one made of amphibolite and the other, very small, in fibrolite – some quartzite pebbles and fragments of schist, sometimes quartzitic schist, showing traces of polish. Millstones are scarce, reduced in size and sometimes show evidence of shaping. They were mainly obtained from granite and, to a lesser extent, from quartzite pebbles (the latter as upper, mobile millstones).

Concerning the archaeological features relating to these occupations, the excavation revealed small pavements made of irregular granite slabs. The features are located among and around granite boulders and were probably related to small huts built of perishable materials. Some hearths and a small storage pit were also detected. All these archaeological features show a somehow “precarious” and “expandable” characteristic, recalling the structures built by nomadic or semi-nomadic hunter-gatherer groups.

According to the available data, the Early Neolithic occupants of Prazo were probably few in number and mainly subsisted by hunting and gathering, with some caprine husbandry (Monteiro-Rodrigues, 2000). Though the existence of agricultural practices cannot be excluded – being documented at least in one archaeological site of northern Portugal during this phase (Sanches, 1997) – the data indicate that such activity could have played a minor role in the subsistence strategy of the Neolithic occupants of the site (Monteiro-Rodrigues, 2002).

Regarding the regional archaeological context, the Neolithic record of Prazo may be compared to the Quinta da Torrinha site, in the Côa Valley (Carvalho, 1999), and to the sites of the inner Mondego River Basin (Valera, 1998; Valera, 2002-2003).

Unit 4a is, stratigraphically, the more recent ceramic layer and contains an archaeological assemblage attributed to the Mesolithic, which was a period unknown in the inner areas of the western part of Iberia (eg. Zilhão, 2000, p. 144; a site was recently found in the inner Alentejo region, at Barca do Xerez de Baixo – see Almeida et al., 1999; Araújo and Almeida, 2003).

The unit revealed a lithic assemblage that is, as far as its overall features are concerned, similar to the one found in the Early Neolithic layers, that is, a microlithic assemblage with a very sub-

ordinate geometric component (only a trapezoid tool was collected in the unit), mainly produced from local raw materials. Among them, a variety of filonian quartz outcropping at the Monte de Santa Eufémia and showing beige to dark green colours, due to the presence of microscopic inclusions of smectite, was used, similar to those observed in unit 4. This fine-grained quartz shows perfect conchoidal fracture and is well suited for knapping. Allochthonous raw materials such as flint are scarce.

Several archaeological features were detected in the unit, among them a hearth, a pit and some stone “pavements” whose function is unclear so far. These structures are similar to those found in unit 4 and are located in the same site position, probably indicating a relative likeness of the intrasite settlement pattern between the occupations of units 4a and 4.

The archaeological assemblages collected from units 5 and 5a show an increase in the percentage of flake blanks and a decrease of microlithic elements when compared with the overlying layers, as well as the absence of geometric tools (the analysis of these assemblages is still in progress). The lithics were obtained from local milky quartz and from quartzite pebbles probably coming from the Douro Valley and the Teja Valley.

Well-preserved archaeological features were found in unit 5, namely: a stone “pavement”, whose function could not be determined; and two hearths — one of them in a hollow, with (probably) intentionally placed in quartz thermoclasts, and the other formed of a cluster of imbricated medium to large granite slabs.

#### 4.3.2. Geoarchaeological Complex PS

Archaeological units 6 and 6a gave lithic assemblages made of milky quartz, hyaline quartz and, to a lesser extent, flint. Stone structures were found in unit 6, some of them probably representing hearths.

The scarcity of the lithic tool-kit, its atypical features and post-depositional disturbance, especially in unit 6a, prevent us from assigning the assemblages to a specific chronocultural horizon, or comparing the assemblages of units 6 and 6a.

## 5. Radiocarbon chronology

Several samples of bone, tooth, charcoal and other vegetal material, collected between 1996 and 2001, were submitted for dating to the Sacavém (Portugal), CSIC (Madrid, Spain), Gröningen (the Netherlands) and Uppsala (Sweden) laboratories, using both conventional and AMS methods, the latter also including dating of structural carbonate in bone mineral (Lanting et al., 2001). Samples were collected from different excavation sectors, contexts and layers, in order to establish a chronological framework for the prehistoric site's succession. The results of radiocarbon dating are presented here; the systematic information on the samples and results are given in table 1.

**Prazo (Freixo de Numão) - Radiocarbon dating**

Sample Ref.	Exc. Unit	Exc. Sector	Exc. square(s)	Lab Ref.	Met.	Result (a BP)	Age (a cal BC 1σ)
<b>Sector I</b>							
97-4	C3	SI	DC-DD79 DC-DD80	CSIC-1421	C	<b>2153±27</b>	350-310 (21,5%) 230-220 (3,7%) 210-160 (38,2%) 130-120 (4,8%)
S71	C3	SI	CV78	Ua-20494	AMS	<b>6055±50</b>	5030-4900 (53,7%) 4890-4850 (14,5%)
97-1	C4	SI	DD80	CSIC-1420	C	<b>1431±30</b>	604AD-612AD (9,8%) 616AD-653AD (58,4%)
97-3	C4	SI	DE81	CSIC-1515	C	<b>4730±43</b>	3630-3560 (28,1%) 3540-3500 (16,9%) 3430-3380 (23,2%)
S61	C4	SI	CY79	Ua-20493	AMS	<b>5640±50</b>	4540-4440 (48,5%) 4430-4360 (19,7%)
S50	C4	SI	CY79	Ua-20492	AMS	<b>5735±50</b>	4680-4630 (12,1%) 4620-4490 (56,1%)
S3	C4	SI	DB83	GrA-16131	AMS	<b>5760±40</b>	4690-4630 (24,8%) 4620-4540 (43,4%)
S3c	C4	SI	DB83	GrA-15367	AMS*	<b>6040±60</b>	5030-5010 (1,8%) 5000-4840 (62,8%) 4820-4800 (3,6%)
S91	C4	SI	CV79	Ua-20496	AMS	<b>6100±50</b>	5210-5180 (5,5%) 5070-4930 (58,7%) 4870-4850 (4,0%)
S15	C4	SI	DD82-83	GrA-18866	AMS	<b>6980±70</b>	5980-5950 (8,8%) 5920-5770 (59,4%)
A4	C4	SI	DC86-87	CSIC-1622	C	<b>7204±35</b>	6160-6140 (8,2%) 6080-6010 (60,0%)
S12	C4	SI	DE83	GrN-26398	C	<b>7240±110</b>	6220-6000 (68,2%)
97-2	C4	SI	DD78	CSIC-1514	C	<b>7353±50</b>	6240-6150 (43,1%) 6140-6090 (25,1%)
S45	C4a	SI	DD82	GrA-19081	AMS*	<b>4440±50</b>	3330-3230 (23,8%) 3180-3150 (3,4%) 3120-3010 (32,3%) 2980-2960 (3,5%) 2950-2920 (5,2%)
S4	C4a	SI	DC82	GrA-15984	AMS	<b>5990±50</b>	4940-4800 (68,2%)
S21	C4a	SI	DC82	GrN-26400	C	<b>6710±50</b>	5710-5690 (3,6%) 5670-5610 (42,7%) 5590-5550 (21,9%)
S22	C4a	SI	DF81	GrA-18787	AMS	<b>6950±50</b>	5880-5730 (68,2%)
S4c	C4a	SI	DC82	GrA-15369	AMS*	<b>7460±60</b>	6390-6240 (68,2%)
A1	C5	SI	DC78	CSIC-1620	C	<b>7608±35</b>	6462-6428 (68,2%)
S30	C5	SI	DE-DF81	GrN-26402	C	<b>8380±60</b>	7540-7420 (47,0%) 7410-7350 (21,2%)
A2	C5	SI	DC83	CSIC-1621	C	<b>8397±38</b>	7540-7450 (59,1%) 7390-7370 (9,1%)
S2	C5a	SI	DA84	GrA-15861	AMS	<b>9410±70</b>	8800-8590 (64,1%) 8580-8550 (4,1%)
S73	C5- C6/1	SI	CY78	Ua-20495	AMS	<b>9525±70</b>	9120-8990 (32,1%) 8920-8870 (8,6%) 8860-8740 (27,5%)
S5	C6	SI	DE81	GrA-15986	AMS	<b>8370±70</b>	7540-7340 (68,2%)
<b>Sector VII</b>							
S9-VII	C3	SVII	ED44-45	GrA-18817	AMS	<b>1540±45</b>	430 AD-570 AD (65,1%) 590 AD-600 AD (3,1%)
S7A-VII	C3	SVII	DZ39	Ua-20491	AMS	<b>5550±50</b>	4450-4340 (68,2%)
S7-VII	C3	SVII	DY-DZ38	GrN-26404	C	<b>5630±25</b>	4500-4440 (44,2%) 4420-4400 (20,9%) 4380-4370 (3,1%)
97-5	C3	SVII	EB39	CSIC-1422	C	<b>6502±34</b>	5510-5500 (1,9%) 5490-5460 (21,8%) 5450-5380 (44,6%)
<b>Sector XXIII</b>							
Coixão	C3	SXXIII		Sac-1489	C	<b>2590±50</b>	830-750 (51,0%) 690-660 (6,5%) 630-590 (7,2%) 580-560 (3,5%)
<b>Abrigo 1</b>							
A5		Abr.1	exterior	CSIC-1623	C	<b>1892±26</b>	70 AD-135 AD (68,2%)

**Table 1.** Prazo (Freixo de Numão) – Radiocarbon dating. Remarks: 1 - the sample includes: *Arbutus unedo*, *Cistaceae*, *Gymnosperma*, *Pinus pinaster* / *pineta*, and other undet.; 2 - the sample includes: *Pinus pinaster* / *pineta*, *Quercus suber*; undet.; 3 - the sample includes: *Capra* / *Ovis* sp., *Sus scrofa*, *Cervus elaphus*, *Oryctolagus cuniculus*; see also Monteiro-Rodrigues, 2000; 4 - the sample includes: *Pinus* sp. (pinecone fragment), *Pinus pinaster* / *pineta*, *Quercus suber*; 5 - from evergreen oak species;

Sample Ref.	Age (a cal BC 2σ)		Material	Sample Provenance	Rm
<b>Sector I</b>					
97-4	360-290 (29,0%)	260-90 (66,4%)	Charcoal fr. ( <i>Pinus pinaster / pinea</i> )	Combustion structure with dolium and baked clay	
S71	5210-5180 (2,1%)	5070-4790 (93,3%)	Charcoal fr.	Hearth	1
97-1	560 AD-670 AD (95,4%)		Charcoal frr.	Medieval hearth	
97-3	3640-3490 (61,0%)	3470-3370 (34,4%)	Charcoal frr.	Charcoal concentration	
S61	4600-4350 (95,4%)		Charcoal fr. ( <i>Quercus suber</i> )	Hearth	
S50	4710-4450 (95,4%)		Charcoal fr.	Hearth	2
S3	4720-4490 (95,4%)		Charred bone	Hearth	3
S3c	5210-5180 (2,2%)	5070-4770 (93,2%)	Charred bone	Hearth	3
S91	5210-5160 (9,8%)	5150-4840 (85%)	Charcoal fr.	Oval structure (hearth?)	4
S15	5990-5940 (15,2%)	5930-5720 (80,2%)	Charcoal fr. ( <i>Pinus pinaster / pinea</i> )	Below hearth	
A4	6200-6190 (1,1%)	6170-6130 (14,2%)	Charcoal fr. ( <i>Quercus</i> sp.)	Among granite boulders	5
		6110-5990 (80,1%)			
S12	6400-5800 (95,4%)		Charcoal frr. (from fruits)	Pit in C4, in contact with a pit in C4a	6
97-2	6380-6280 (13,3%)	6270-6060 (82,1%)	Charcoal frr.	Charcoal concentration	
S45	3340-3150 (39,5%)	3140-2910 (55,9%)	Tooth ( <i>Ovis</i> sp.)	Next to combustion structure	
S4	5000-4770 (91%)	4760-4720 (4,4%)	Charred bone	Hearth	3
S21	5730-5520 (95,4%)		Charcoal frr.	Charcoal concentration outside hearth	
S22	5980-5950 (4,6%)	5920-5720 (90,8%)	Charred seed	Charcoal concentration	7
S4c	6440-6210 (95,4%)		Charred bone	Hearth	3
A1	6500-6400 (95,4%)		Charcoal fr. ( <i>Pinus pinaster / pinea</i> )	Base of posthole infilling	
S30	7580-7310 (93,0%)	7220-7200 (2,4%)	Charcoal frr.	Hearth (in a hollow)	8
A2	7580-7330 (95,4%)		Charcoal frr.	Hearth	
S2	9150-8950 (10,9%)	8900-8450 (84,5%)	Charred pinecone fr.	Charcoal concentration	
S73	9250-8600 (95,4%)		Charcoal fr. (cf. <i>Fraxinus</i> sp.)	Below granite boulder	
S5	7580-7300 (90,2%)	7230-7180 (5,2%)	Charcoal fr. ( <i>Quercus</i> sp.)	Hearth in a hollow related to layer C5	5
<b>Sector VII</b>					
S9-VII	420 AD-620 AD (95,4%)		Charcoal frr.		9
S7A-VII	4500-4320 (92,9%)	4280-4250 (2,5%)	Charcoal fr. (from wood and seeds)	Charcoal concentration	10
S7-VII	4540-4360 (95,4%)		Charcoal fr. ( <i>Arbutus unedo</i> )	Charcoal concentration	
97-5	5530-5360 (95,4%)		Charcoal frr.	Charcoal scatter (about 1m <sup>2</sup> )	
<b>Sector XXIII</b>					
Coixão	840-520 (95,4%)		Charcoal frr.	Posthole	
<b>Abriço 1</b>					
A5	50 AD-220 AD (95,4%)		Charcoal frr.	Hearth located out of rockshelter	

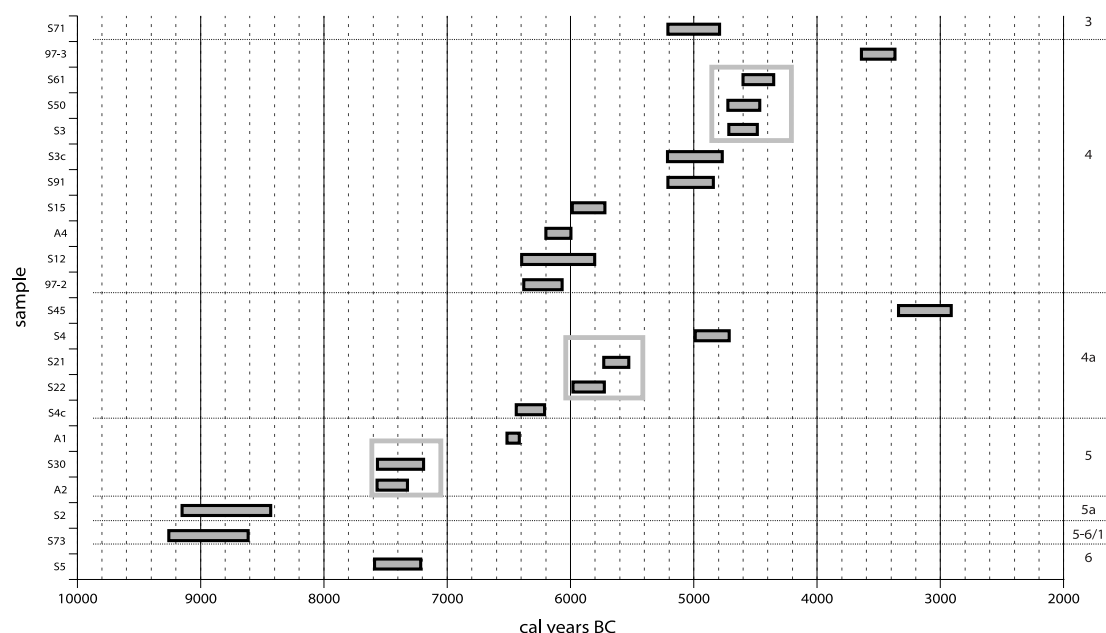
6 - the sample includes: fruit fragment (*Crataegus monogina?*), *Quercus suber*, *Pinus pinaster / pinea*, undet.; 7 - undet. *Gymnosperma*, undet. seed fragment; 8 - *Quercus* sp. (evergreen species), *Pinus pinaster / pinea*, *Arbutus unedo*, and other undet.; 9 - the sample includes: *Arbutus unedo*, *Arbutus unedo* (fragment of fruit), *Cistaceae*, undet.; 10 - the sample includes: undet. bolb, *Cistaceae*, *Erica* sp., *Fabaceae*, *Quercus* sp. (evergreen species).

### 5.1. Dating from Sector I

There are twenty-four dates available from Sector I so far (Fig. 10).

Unit 3 is represented by two dates (see table 1). The result from sample 97-4 (2153±27 BP) does not match the archaeological attribution of this unit to the Early Neolithic. This is probably due to the fact that the specimen was collected at the top of the unit and from a position immediately underlying a hearth containing a dolium and some baked clay, related to a much younger occupation. Thus, the dated charcoal fragment probably refers to that structure, being infiltrated in layer 3 as a result of post-depositional disturbance.

The sample S71 (6055±50 BP, to which corresponds the 2σ time interval 5070-4790 [93,3%] cal BC<sup>1</sup>) comes from a relatively isolated context — a well-preserved hearth, located in square CV78. Nonetheless, the value obtained seems to be rather ancient, as it fits with other dates from layer 4.



**Fig. 10** Prazo. Calendar years 2σ interval (the entire interval between the older and younger values obtained, and not the probability distribution, is plotted) of radiocarbon dating. Samples 97-1 and 97-4 are omitted. The grey squares indicate the data considered as most probable for units 4, 4a and 5.

Eleven samples were dated from layer 4.

Sample 97-1 was collected from a hearth that, despite the absence of archaeological material in it, was interpreted as being Neolithic during the excavation. Later observation in cross-section showed that this feature was intrusive, as confirmed by the result of the dating (1431±30 BP).

Another outlier in the group of dates from layer 4 is sample 97-3 (4730±43 BP). It was collected from a concentration of charcoal and dated using the conventional method. The younger age may be due to the mixing of charcoal fragments of different age in the sampled context.

The other available measures from layer 4 cluster into two groups, a younger one (S61, S50, S3, S3c and S91) and an older one (S15, A4, S12 and 97-2).

In the first cluster, there are three dates that are statistically almost identical, all obtained using the AMS method: S61 (5640±50 BP, corresponding to 4600-4350 cal BC) and S50 (5735±



50 BP, 4710-4450 cal BC), from charcoal coming from the same hearth; and S3 (5760±40 BP, 4720-4490 cal BC) from a single charred bone – where the dating was obtained from the bone collagen. According to these values, the occupation of layer 4 would lie around the middle of the V millennium BC (Fig. 10). Another date was obtained from the same S3 sample, by dating the carbonate fraction in the bone mineral, which gave a slightly older age (S3c: 6040±60 BP) than that obtained from the AMS standard method. The AMS standard dating of the sample S3, as the one of the sample S4 (see *infra*), was obtained from “charcoal-like fragments” found in the bones. It should be noted that both the bones (S3 and S4) were not cremated, but simply burned. Finally, the value of 6100±50 BP was measured for sample S91, taken from charcoal fragments preserved in an archaeological feature whose function is not clear.

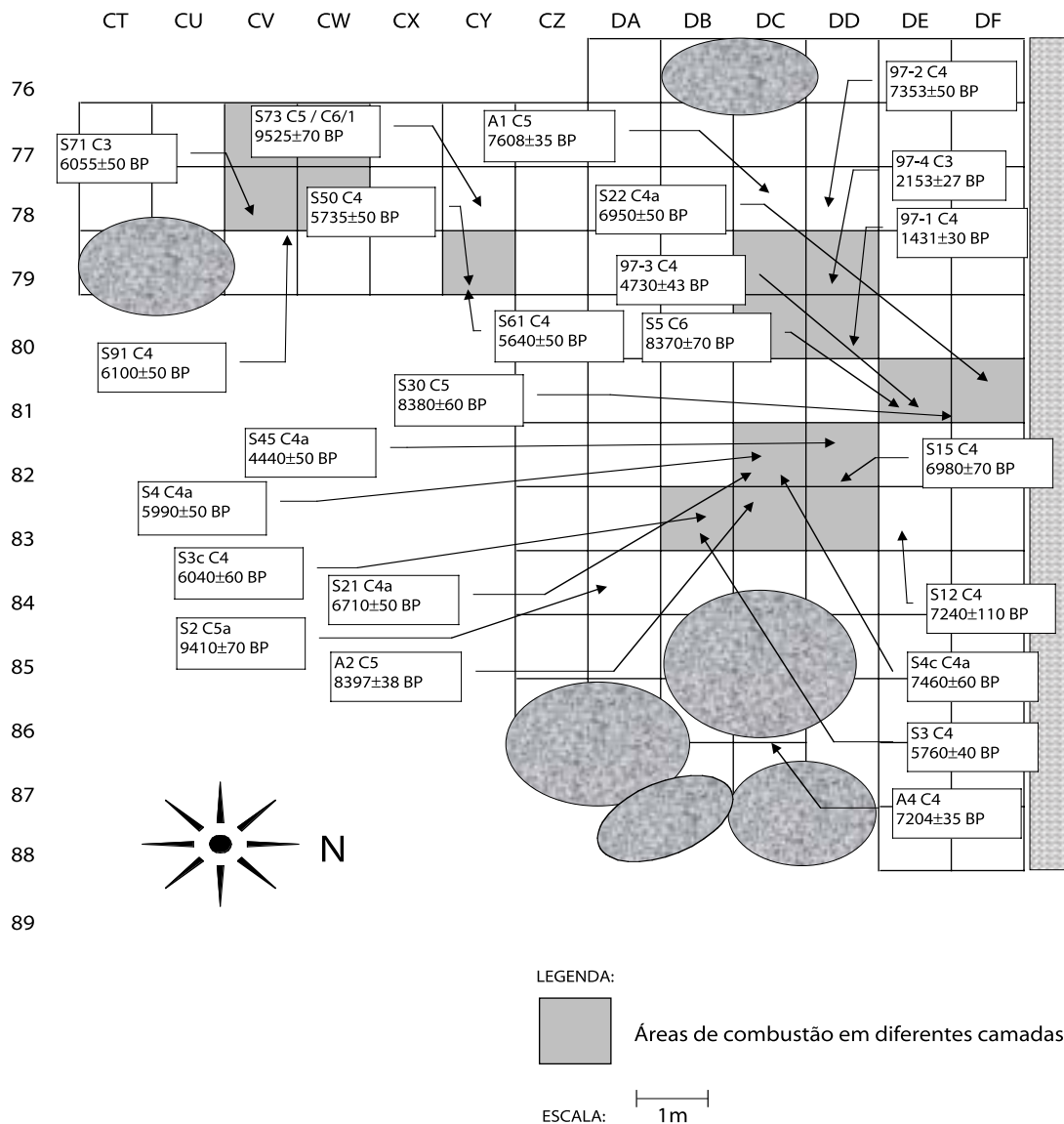


Fig. 11 Prazo. Location of dated samples from Sector I.

The second group of dates clusters into an earlier time span. Among these, there are three dates obtained on charcoal fragments using the conventional method: A4 (7204±35 BP); S12 (7240±110 BP); 97-2 (7353±50 BP). It should be noticed that sample S12 was collected at the bottom of a pit dug in layer 4a, thus probably involving archaeological materials derived from that unit. A similar problem may explain the values obtained from sample 97-2, which was collected in an excavation square where the boundary between units 4 and 4a was not clear, with possible sampling errors, and from sample A4, coming from the interface between units 4 and 4a. The fourth date (S15: 6980±70 BP) was also obtained on a charcoal fragment, but using the AMS method. This sample was collected under a hearth in squares DD 82-83, which is in contact with an underlying combustion feature referred to unit 4a (Monteiro-Rodrigues, 2000, figs. 14 and 15). Thus, this second group of dates should be considered with some precaution due to stratigraphic problems or for the possible mixing of wood fragments of different age.

The age of the last Mesolithic occupation at Prazo (layer 4a) is given by five dates showing rather different results. Two of them come from the same charred bone, from which both the bone collagen (S4: 5990±50 BP) and the carbonate fraction (S4c: 7460±60 BP) were analysed, giving different results. The date obtained from sample S45 – a burnt tooth collected next to the combustion structure in square DD83, whose carbonate fraction was dated – is much younger than the other ages obtained from layer 4 (4440±50 BP – 3340-2910 BC cal 2σ). The younger age obtained from this sample may relate to the method used, by dating the structural carbonate fraction. The tooth was burned, not cremated, and it was dated using this method because it did not yield collagen. The other two dates are similar to one another: S21, taken using the conventional method on charcoal (6710±50 BP, 5730-5520 cal BC); and S22, obtained by the AMS method from a single charred seed coming from a charcoal concentration (6950±50 BP, 5920-5720 cal BC). Both come from a sealed and well-defined archaeological context. Thus, we consider the last two values as the most likely for dating unit 4a, whose formation would have occurred, according to this hypothesis, during the 1<sup>st</sup> half of the VI millennium BC.

The Mesolithic layer 5 is dated by three conventional radiocarbon dates, all of them on charcoal fragments collected in anthropic features. The sample A1 (7608±35 BP) was taken from the infilling of a posthole – lately recognised as opened from layer 4a. The dates from samples S30 (8380±60 BP, 7580-7310 cal BC [93,0%]) and A2 (8397±38 BP, 7580-7330 cal BC) are almost identical and, due to the stratigraphic position of their collection, are probably those representing the age of layer 5, whose occupations would chronologically be located around the middle of the VIII millennium BC.

Unit 5a is the most ancient Holocene layer at Prazo. Its age is given by the sample S2 (9410±70 BP). Another sample, S73 (9525±70 BP), was collected on the erosional surface between units 5 and 6, under a granite boulder, in square CY78, and was therefore stratigraphically attributed to unit 5a.

The two measures referred to unit 5a are partially overlapping, thus indicating the probable age of the most ancient Holocene occupations at Prazo as occurring at the very beginning of the IX millennium BC.

Finally, a sample was labelled as unit 6, even if later stratigraphic verification showed that it was related to a hearth dug in layer 5 (S5: 8370±70 BP), to which the date should refer.

## 5.2. Dating from other sectors

More radiocarbon dates are available from other parts of the excavation of Prazo.

Four charcoal samples were dated from Sector VII, unit 3, which was attributed, on the basis

of its archaeological assemblage, to the Early Neolithic. Among the four dates, there are two statistically identical, one of them particularly significant as it was obtained by the AMS dating of a seed: S7A-VII (5550±50 BP); and S7-VII (5630±25 BP). These dates partly correspond to one of the chronological clusters detected for the dating from unit 4 of Sector I.

Another date is older than the previous ones (97-5: 6502±34 BP). This date was obtained from burnt wood by the conventional method, and might be related to residual charcoal fragments present in the Early Neolithic occupations layer.

The last date probably refers to the thick layer with evidence of intense fire (unit 2), attributed to an undifferentiated Roman – Middle Ages horizon (S9-VII: 1540±45 BP).

The sample “Coixão” was collected during the excavation of a test trench in Sector XXIII, in 1996. The dated sample comes from the infilling of a posthole dug in unit 3 and it gave the result of 2590±50 BP.

Finally, one more radiocarbon conventional measure was obtained from “Abrigo 1” (rockshelter 1 at Prazo II site, see Fig. 1), in an area that was temporarily occupied during prehistoric times and also in the Roman epoch, as indicated by the same date (1892±26 BP, corresponding to 50-220 AD – see also Monteiro-Rodrigues, 2002).

## 6. Discussion

The prehistoric site of Prazo occupies an ecotone, *i.e.* a location where different landscape units (at least three) and ecological habitats converge, thus allowing its occupants to exploit various resources located in a relatively restricted area. Furthermore, the location is characterised by the presence of lithic raw material and abundant water at a short distance (see also Monteiro-Rodrigues, 2002).

The Prazo succession starts with the PS complex, whose morphostratigraphic features seem unrelated to the present land setting of the position. Unfortunately, the age of this complex is still unknown, as well as the chronocultural attribution of the archaeological assemblages found in it. Nonetheless, the sedimentological features of the units belonging to complex PS and the stratigraphic relations with the overlying deposits indicate its Pleistocene age, and its lithic assemblage shows characteristics that may indicate an upper Palaeolithic affiliation. More data are required to understand the chronological position and formation processes of this complex, which is especially important as it represents a remnant of Pleistocene archaeological deposit in a morphological position where sediments of this period are not often preserved. The presence of archaeological features emphasises once more the importance of this Pleistocene remnant, which was occupied, probably temporarily, by groups of Palaeolithic hunter-gatherers in a “strategic” location, between the extensive upper plateaux and the valley incision.

The surface dividing the complexes PS and HA corresponds to an extensive erosional phase that redrew the configuration of the S. João Valley. The surface might coincide with the time span around the LGM, which was a moment of extensive erosion in Portugal (Angelucci, 2002), or to the Pleistocene – Holocene boundary, or it may even represent a longer hiatus.

The early Holocene sedimentary system at Prazo is formed of repeated cycles of slope waste sedimentation, mainly fed by the regolith developed from the granite bedrock. Sedimentary inputs are mainly coming from the W, *i.e.*, consistent with the configuration of the present slope. No information is available on the sedimentary mechanisms, which were probably related to surface movements such as run-off, overland flow or debris-flow. The Mesolithic archaeological record

and the available dates allow us to understand the rate of slope waste sedimentation, by indicating the periodical interruption of sedimentary pulses. The available dates for the early Holocene may be grouped into two clusters: an early one in the Preboreal (unit 5a), and a second one during the Boreal zone (unit 5). During this time span, Prazo was occupied by groups of Mesolithic hunter-gatherers who settled at the site more or less temporarily (probably on a seasonal basis?) and built dwelling structures.

The sedimentary and cultural pattern described above continued at the beginning of the mid Holocene, as attested by unit 4a. The continuous interval of the dates obtained and the pedo-sedimentary evidence indicate that the beginning of the Atlantic period was a time of geomorphological stability and biostasy, which led to the formation of a weak soil. After that, the sedimentary succession documents a relative absence of record until the appearance of Neolithic communities, attested in units 4 and 3. From a sedimentary point of view, this mid Holocene deposit does not show any significant difference when compared to the early Holocene stratification, attesting to a similarity of environmental dynamics during the Holocene. At the same time, the archaeological features observed during the excavation and the lithic assemblages collected, especially if one compares units 4 and 4a, do not show any clear difference. The data, even if preliminary (for a wider discussion on this topic and the regional context see Monteiro-Rodrigues, 2000, 2002), may point to a relative continuity in the settlement and subsistence strategies between the Mesolithic and the first Neolithic occupants of Prazo, a hypothesis that needs to be confirmed and reinforced by future studies.

Unfortunately, the upper portion of the prehistoric succession at Prazo was truncated by the Romans, leaving unsolved questions about the dating of unit 3 and the development of the Neolithic settlement at the site.

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## NOTES

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<sup>1</sup> All the calibrated time spans from now onwards are referred to the  $2\sigma$  interval.

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