TOMB LOCATION AND GRAVE GOODS: CONTINUOUS USE AND DESTRUCTION IN THE RIO DE GOR MEGALITHIC NECROPOLEIS

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Abstract

Rio de Gor Megalithic necropoleis are one of the most important funerary clusters in Southern Iberian Peninsula. We attempted to study megalith and settlement characteristics in relation to social organization according to the scarce and old available data. Firstly, an evaluation of previous unsystematic surveys and looters destructions of monuments has been made by taking into account location of preserved tombs. Visibility GIS analysis, with the help of ancient cartographic data, have let us to suggest a hypothetical location of graves that have disappeared. GIS techniques have been used to geo-reference old archaeological maps in order to identify their approximate position. Secondly, analysis of topographic location, Total Viewshed and Cumulative Viewshed Analysis using GIS was performed to evaluate the role of visual dominance over the entire terrain. The results have shown that graves were used to mark routes in two ways, from South to North along the river course and from the valley to the plateau. Settlements were located near the valley bottom although there are some chronological and hierarchical differences. Thirdly, we have seen that tombs were not only used for a long period of time but also that they were probably arranged in groups around some of the most monumental examples, those containing rich grave goods and marking the river course in the Chalcolithic period. Probably routes from the valley to the plateau were generated by the addition of tombs from the beginning of the Late Neolithic and the system was completed with the building of great trapezoidal tombs during the third millennium BC. Fourthly, tomb reuse has been proven in the Middle and the Late Bronze Age, when there was not only pursuit for justification by tradition but also redefinition of territorial control linked to elite. This is shown by the fact that the Late Bronze Age use of the megaliths was only in relation to rich burials as can be inferred from the great amount of silver ornaments they contain.

Introduction. Preserved and destroyed megalithic tombs in Rio de Gor area

This work was possible thanks to the data from the intensive and systematic surveys of middle and lower course of the banks of the Gor River (Fig. 1). The survey was financially supported by the *Consejería de Cultura de la Junta de Andalucía* in order to create a Special Registration File of the megalithic necropoleis located along the river for the Andalusian Inventory of Archaeological Sites (*Inventario Andaluz de Yacimientos Arqueológicos)*.

The aim of the inventory of the tombs was twofold: first, to establish their precise location using GPS on the appropriate cartographical base (Fig. 2), which could then be handled using a Geographical Information System to facilitate their control for the future restoration and consolidation within existing tourist-archaeological itineraries and to protect them from farming development; and second, to produce a complete contextualisation of the graves, both in legal-administrative and preservation terms (cadastral information including ownership, type of cultivation and other data, degree of deterioration of the components, ease of access, etc.) and in archaeological terms (clear demarcation of the grave groups, relationship among theses groups and settlements, etc.).

The area under consideration is characterized by the presence of the Sierra de Baza in the Southeast and the Guadiana Menor River valley to the North. An extensive plateau gently slopes down from Sierra de Baza to the Guadiana valley, although erosive processes have completely affected the plateau in the area near the Guadiana valley, creating a badland landscape. The River Gor has excavated an impressive canyon, cutting the plateau and offering a natural connection between the lowlands to the North and the mountain range to the Southeast (Fig. 3).

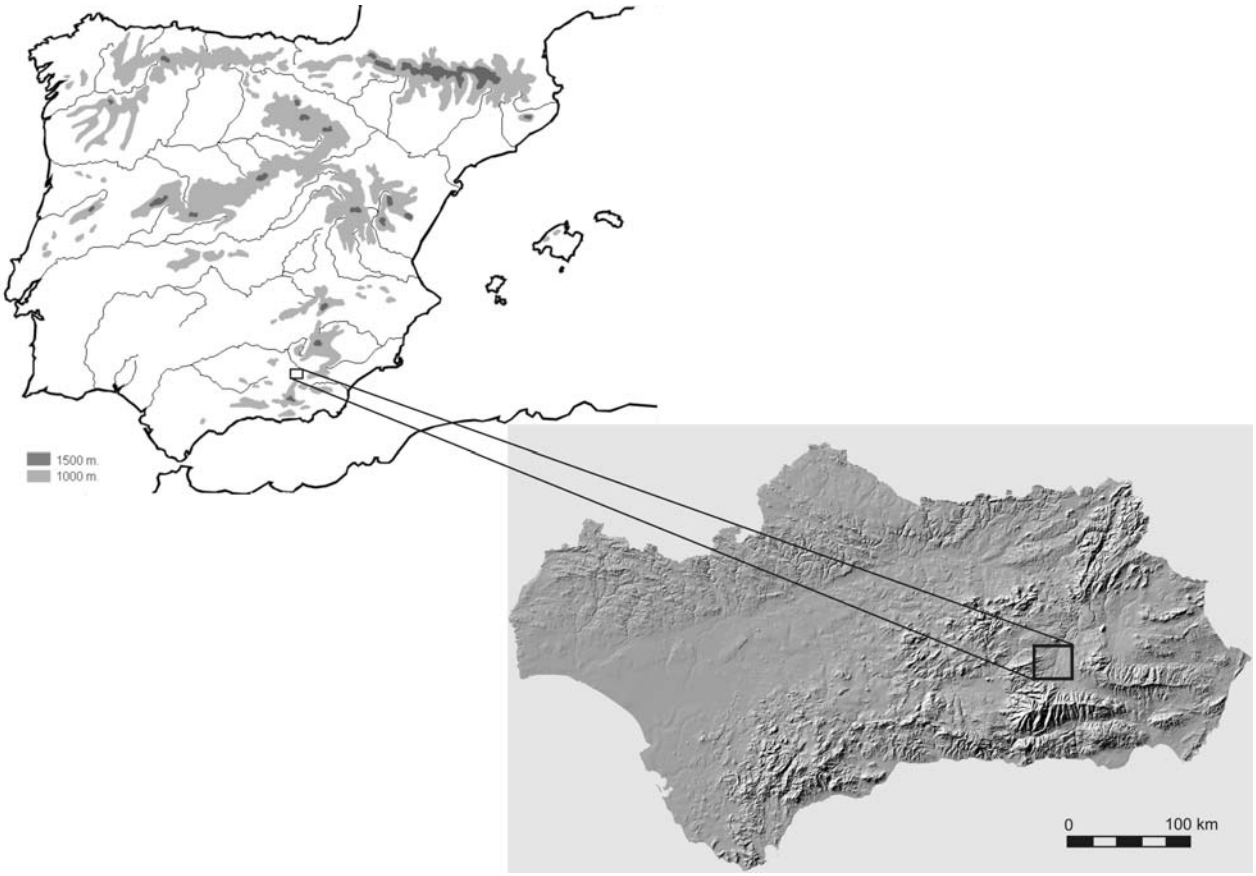

Fig. 1. Location of the Río de Gor necropoleis

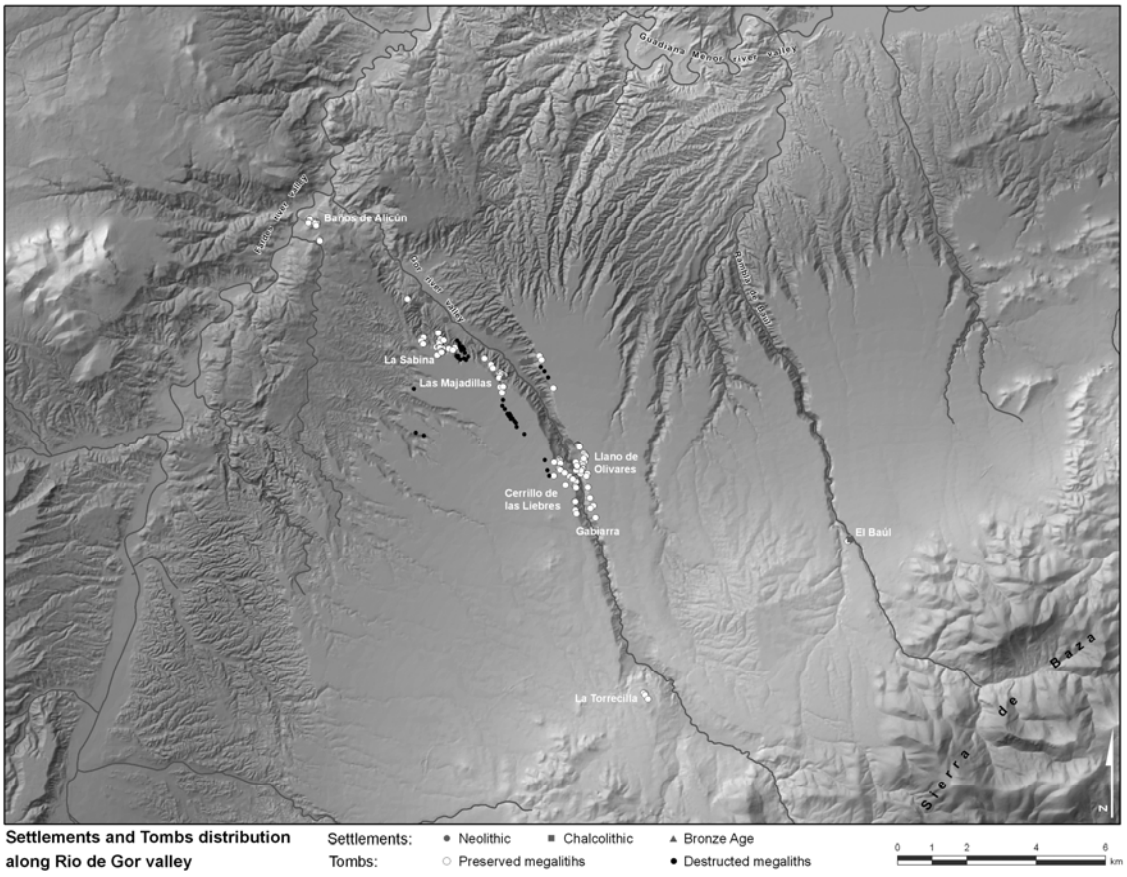

Fig. 2. Distribution of tombs in the Rio de Gor region

142 graves and 20 prehistoric settlements have been identified through intensive surface survey. Destruction rhythms can be calculated although there are many problems in relating the preserved tombs to the previously published ones. Around 198 sepultures were found and recorded by M. García Sánchez and J.C. Spanhi (1959). This sample is supposed to be between 72,26 % or 83,19 % regarding L. Siret's and G. and V. Leisner's data, depending on whether or not correlated tombs are considered as newly discovered tombs or as graves recorded by the previous researchers but nowadays heavily damaged. Taking into account these problems, we can say that destruction rhythm could reach between 2,5 and 4,75 graves per year; if we take the year 1943 as an initial reference and 1959 as the end (although fieldwork is in both cases older). In order to estimate destruction from 1959 till now, we face the same problems. As we consider that the 142 preserved graves were all known previously, we should say that the 71,71 % of tombs recorded by García and Spanhi would have been preserved, and according to the problems of correlation which have previously referred, between the 51,82 % and 59,66 % of the originally recorded by Siret/Leisner. Destruction rhythm would be lower than the previous - 2,17 tombs per year - but three facts must be taken into account: first, the destruction of tombs located on the plateau has been very high (all of them have disappeared), secondly, as we have said above, 1943 and 1959 are ideal dates, thirdly, recent destruction has been underestimated because some newly identified graves were not referred by García/Spanhi but perhaps were localized by Siret/Leisner. Taking into account these problems, we think that the preserved tombs are between 46,71 % and 52,98 % of the recorded amount (even less than the original number if we considered that many of them would be destroyed before the first scientific works). Recent rhythm of destruction would be around 2,8 tombs per year, similar to the rhythm suggested for the two first thirds of 20th century, mainly caused by farming activities, although plundering is also present.

The sepultures located by Garcia and Spanhi were recorded in an archaeological map published in 1959. This map has been digitized and geo-referenced using the corresponding aerial photographs known as "Vuelo Americano". This was the first photogrammetric systematic flight performed in Spain and was done by the United States Air Force and the Spanish Air Force during 1956-1957 for cartographic purposes. Recently, the Junta de Andalucía (Autonomous Government of Andalucía) digitized, geo-referenced and processed these aerial photographs to produce an impressive series of ortophotographs representing the whole territory of Andalusia as it was back in 1957.

Objectives of our research and data limitations

Our main objective in this paper is to show the relation between megaliths distribution and territorial control in Gor River area, and which kind of environment features were considered more important in order to be marked and controlled. Secondary aims include the analysis of differences between tombs regarding this control and the relation that these differences has with other characteristics of tombs such as shape, size and graves goods. Finally an explanation of the causes and ways of megalith reuse in Bronze Age is presented.

As the available data have different sources and quality, we have used them in a different way in order to get a better picture of territorial control in Gor River area during Late Prehistory. Some of the ancient data are absolutely necessary in order to get an adequate image of certain factors, as tombs distributions in the plateau and their grave goods. We must say that data from García Sánchez and Spanhi (1959) are enough good and some of them can be tested according the results of recent surveys (location of many tombs, shapes and sizes...).

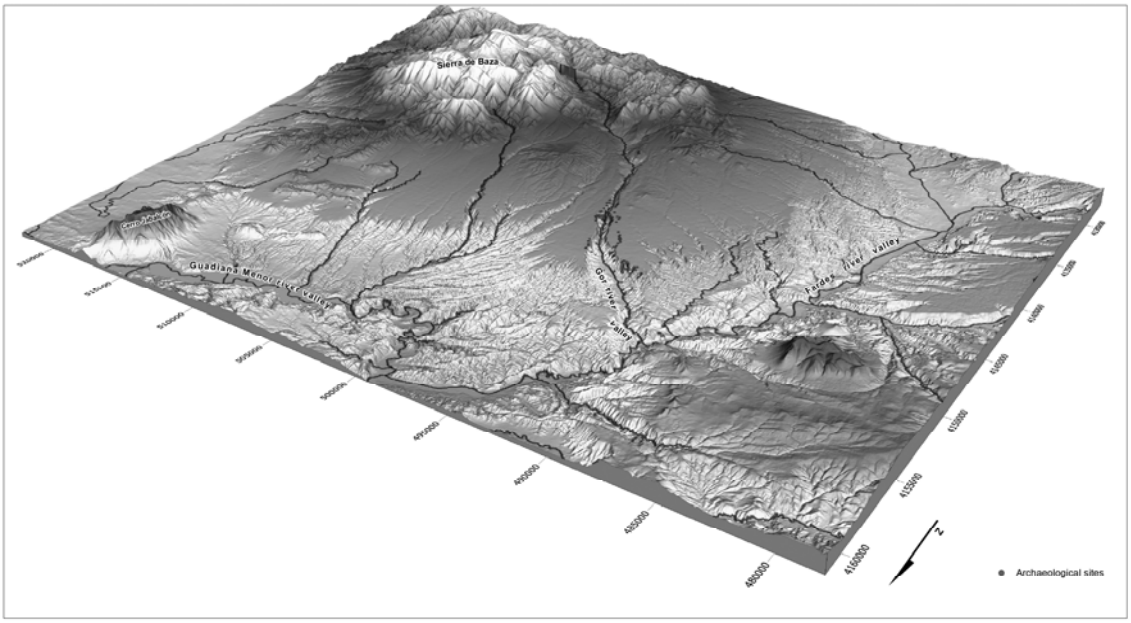

Fig. 3. Regional context of Rio de Gor necropoleis

By using the ortophotographs of 1957 as a base map, it was possible to identify ground control points and thus geo-reference the archaeological map by García and Spanhi. This allowed the identification of the approximate location of now disappeared graves, many of them with important available data about size, shape and contents. As discussed later, the cumulative viewshed analyses show that most of the destroyed tombs were located following the pathways, in those areas visually connected to the preserved graves.

Territorial study of the sites using topographic location data

Methodology

We have decided to study the position of each tomb individually within their regional context as an initial step, before interpreting their role in each necropolis, or rather, in each type of necropolis (concentrated or disperse, in a valley, on a hill or on the high plateau). This will allow a better exploration of the different functions played by every kind of necropolis (cohesion, delimitation and exhibition) and, within them, by the different types of tombs according to their location (as here), their formal characteristics or their contents.

When a study of the territorial pattern of archaeological sites is undertaken, one of the main problems is to establish their contemporary nature (Llobera 2007). In this respect, dolmens and settlements must be handled differently.

The basic hypothesis is that at the end of the Copper Age, all funerary monuments – although they were not being used as containers for new corpses – built up a ritual space with specific functions that were partially followed or transformed during the Bronze Age. This process is shown by the introduction of dead bodies and grave goods in some tombs (Góngora 1868; Siret 1906, 1994, 2001; Leisner and Leisner 1943; Ferrer 1978; Lorrio and Montero 2004; Lorrio 2008). Given this, problems to define the specific chronology of each grave, which different authors have tried to assess in our study area from the grave goods or the formal typology of the tombs (García and Spanhi 1959-60; Manarqueoteca 2001; Afonso *et al.* 2008), are irrelevant in order to discuss their role in territorial control, although a good set of radiometric data (Scarre 2010; Schulz-Paulsson 2010) would be important in order to discuss other social aspects. The time that every necropolis was in use, then, acquires more importance, and this justifies its analysis along with settlements of very different chronologies (Afonso *et al.* 2006).

In the case of the settlements, it must be kept in mind that we are far from being able to establish if the settlements were strictly contemporary and occupied at the same time, even if they have been dated in the same cultural period.

The territorial analysis proposed here from topographic location data is based on the methodology for the Analysis of Settlement Patterns developed by the Andalusia Late Prehistory Study Group (*HUM-274*). It involves the use of a series of indices that consider visual dominance and gradient, in addition to the suitable conditions for occupation provided by the area occupied by the settlement (Nocete 1989; 1994). Furthermore, its methodological potential to distinguish the ways of demarcating the itineraries and the appropriation-delimitation of the territory has been proven (Spanedda 2007). However, taking into account the results of earlier analyses about megalithic monuments distribution in the region (Cámara 2001) and, given that, the usefulness of the comparison had already been shown (Nocete 2001), the graves and settlements have been integrated into a single group for analysis.

Although a radius of 1 km around each site has been proposed as a useful tool for evaluating the surrounding environment, both as natural condition of production and as the place which must be controlled for production activities, it is clear that it is the more immediate surrounding area within 250 m radius that is mainly used for intensive production, especially farming (Ruiz *et al.* 1986), and it is also this area which must be analysed regarding the specific geographic features for settling.

In order to distinguish sites that exert a strong territorial control and sites that are only located in places that let them control land for farming, the following indices have been used:

1) A set of indices referring to the organisation of the settlement within a 1 km radius:

a) YCAIP (geomorphologic area gradient index). This is obtained by dividing the difference between the maximum and minimum height of the 1 km radius area around the site by the distance between the two. This determines the relationship of the site with the elements that surround it within 1 km radius and specifically the influence of the topographic characteristics of the surrounding area with the subsistence resources, but especially with the possible existence of obstacles to strategic capacities and control.
b) YCAI1 (visual dominance index 1). This is obtained by dividing the height of the site by the maximum height of the 1 km area to discover to what point the choice was motivated by strategic objectives. This is complemented by the following index.
c) YCAI2 (visual dominance index 2). This is obtained by dividing the height of the site under study by the minimum height of the 1 km area, which is of special interest in the determination of dependent sites.

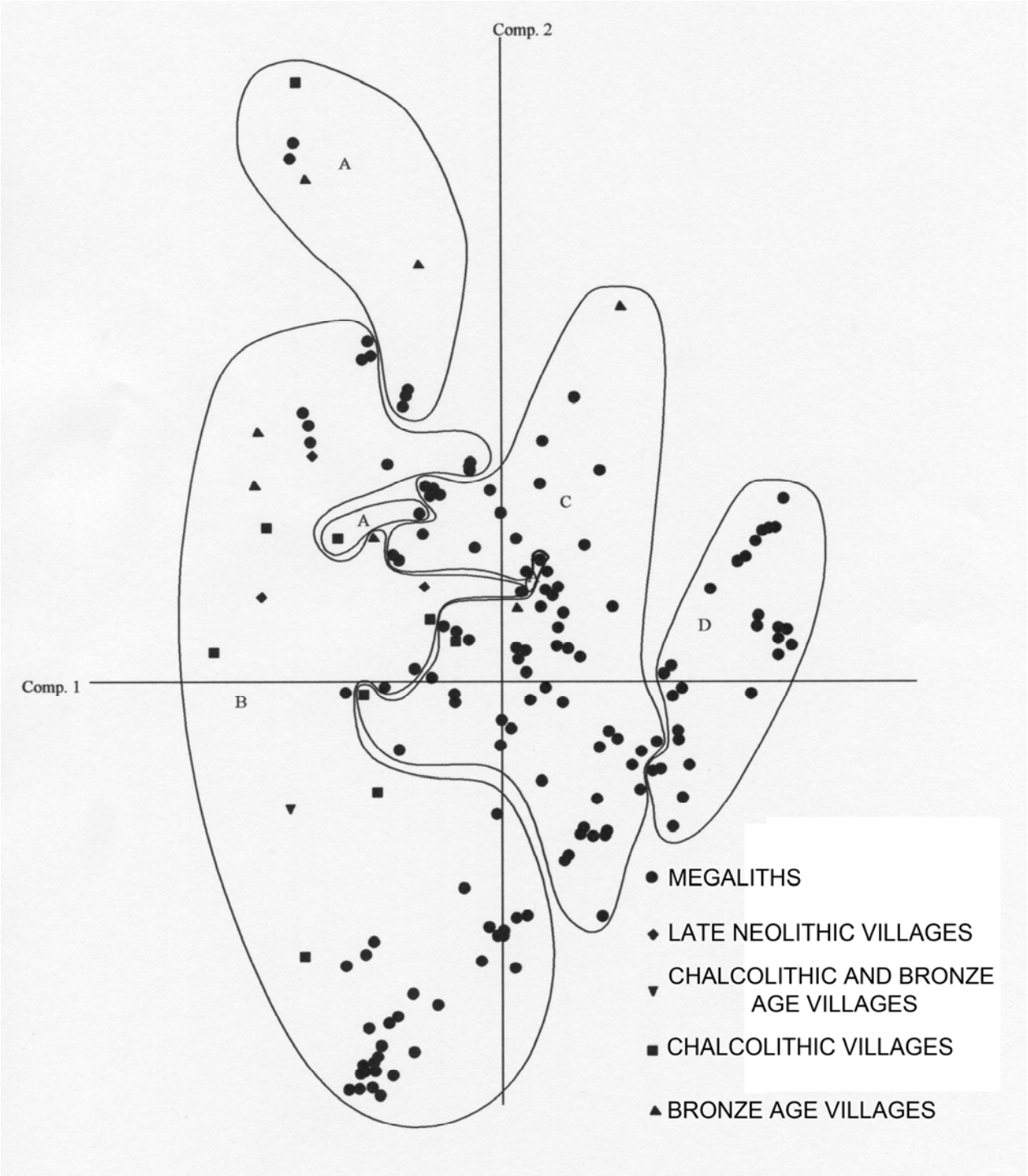

Fig. 4. Topographic analysis of Río de Gor graves. Principal Components Analysis. 1st and 2nd Components Graphics

2) A second set of indices refers to the relation of the settlement within 250 m radius.

a) YCAUIP (250 m geomorphologic area gradient index). This is obtained by dividing the difference between the maximum and minimum heights of the 250 m radius area around the site by the distance between the two. This determines the relationship of the settlement with the elements that surround it within 250 m radius and specifically the influence of the topographic characteristics of the surrounding area over the habitability and defensibility of the selected location.

b) YCAI1 (visual dominance index 1). This is obtained by dividing the height of the site by the maximum height of the 250 m area to discover to what point the choice was motivated by strategic objectives. This is complemented by the following index.

c) YCAI2 (visual dominance index 2). This is obtained by dividing the height of the site by the minimum height of the 250 m radius km area, which is of special interest in the determination of dependent sites or those where visual control was rejected in favour of other variables, such as the distance to certain resources.

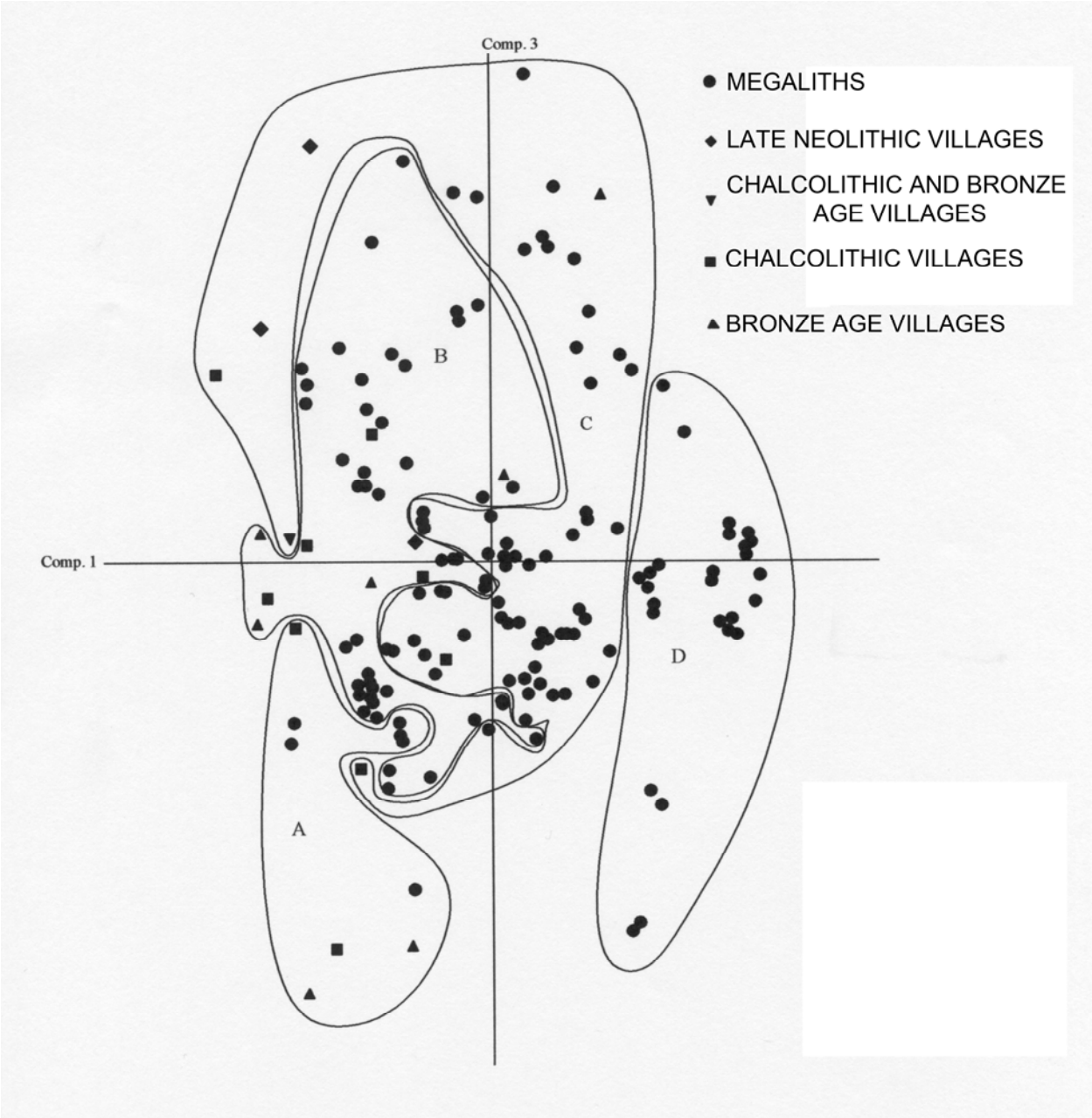

Fig. 5. Topographic analysis of Río de Gor graves. Principal Components Analysis. 1st and 3rd Components Graphics

These indices have been processed with two multivariate statistical analysis techniques, Principal Components Analysis and Cluster or Group Analysis. The results of these two techniques were combined. The first technique especially tends to show the differences among the processed cases through searching for the most pertinent variables, fully transformed into new variables known as components. The second tends to look for similarities among cases or among sets tending, in the end, to consider that, to a greater or lesser extent, all the cases are similar.

Data analysis

The first two components of Principal Components Analysis explain the greatest part of the variance (75.75%), with values that are already highly significant, but if we look at the third component, it is possible to explain 87.65% of the variability. The correlations show that each 1 km area index is closely related to the corresponding 250 m area index, which is the case with the ratio between the relative height indices 1 (0.682) and 2 (0.736). In turn, the ratio between the two 1 km area relative height indices is quite high (0.583) and neither of them is related to the gradient, indicating that the choice of the high points is not conditioned by the general topography. In the 250 m area, the depth of the ravine does have a bearing on that in YCAUI2, which creates a high ratio with the gradient (0.649).

Index	Component 1	Component 2	Component 3
YCAIP	0,303	0,755	0,522
YCAI1	0,702	-0,594	0,120
YCAI2	0,896	5.812E-02	0,224
YCAUIP	0,635	0,486	-0,539
YCAUI1	0,543	0,696	0,278
YCAUI2	0,869	0,237	-9.681E-02

Table 1. Component matrix

The distribution of indices values along the different components (Table 1) can be also read in the different graphs. In the dispersion graph of the first and second components (Fig. 4), we find that settlements with greatest control over the surrounding area are on the right and are generally located at the highest points, or in the case of this analysis, near the deepest points of the Gor River ravine which creates important differences in altimetry. This would especially affect the sites plotted in the highest part and on the right of the graph where we find the settlements located in areas with a greater gradient. In the graph of the first and third components (Fig. 5), the sites plotted in the upper part of the graph show higher gradients in the 1 km area while those plotted in the lower part show higher gradients in the 250 m area because of their greater closeness to the ravine.

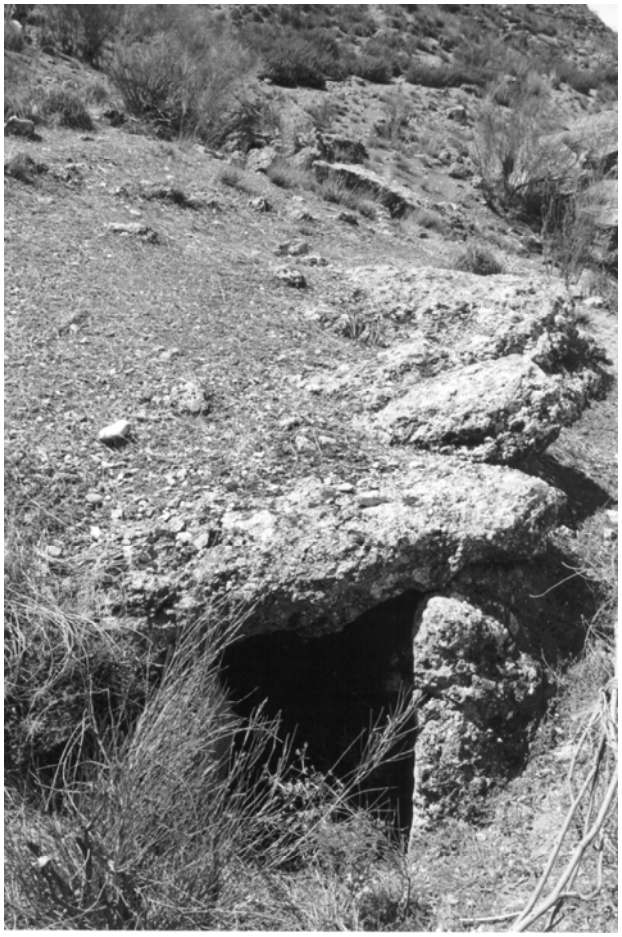

Plate I. Dolmen 131. Hoyas del Conquín. Subgroup C1.

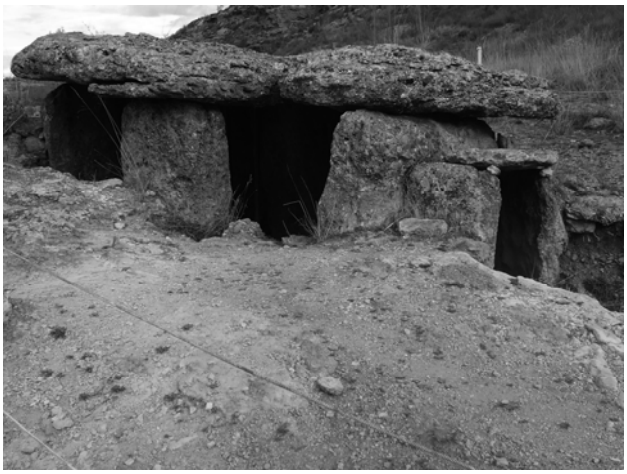

Plate II. Dolmen 134. Hoyas del Conquín. Subgroup C1

An analysis of the hierarchical groups (clusters) was also made to facilitate the classification of the groups (90% similarity), subgroups (92-93%) and sets (95-96%) as can be seen in the dendrogram (Fig. 6). Correlation between these groups and the dispersion in the principal components analysis graphs presents some difficulties, especially with group A. Some of the problematic cases are, without a doubt, the result of the projection of an n-dimensional space into two dimensions, while in other cases, as can be seen in the component graphs 1-2 (Fig. 4) and 1-3 (Fig. 5) (grave 240 and settlement P-49, cases 109 and 173 in the analysis), this explanation is less satisfactory and we must take into account that certain values has been emphasized by Component Analysis . However, the comparison of the numerical values of the cases included in each of the groups, subgroups and sets supports this classification.

Classification

In accordance with these premises, it is now possible to discuss the nature of the obtained groups, both with respect to their index values under consideration and their topographic meaning as far as the necropoleis defined earlier (García and Spanhi 1959) are concerned, and their better or worse characterisation.

Group A is characterised by low gradients in the 1 km area but by high gradients in the 250 m unit. The values of the relative height indices are high in respect to the relationship with the highest point of the surrounding area (YCAI1 and YCAUI1) and low in relation to the lowest point of the surrounding area (YCAI2 and YCAUI2).

These are necropoleis with tombs concentrated in low, flat areas and settlements near the river valley. Subgroup A1 differs from A2 because it has a very high YCAU1 and a slightly higher YCAU2.

Group B is characterised by its low or very low gradients in the 1 km area and medium gradients in the 250 m unit except in the B2b set where they are low. For the relative height indices, in the 1 km area the YCAI1 is high-very high, placing these settlements near the highest point in the area and the YCAI2 is low, which indicates that these sites are located in the high points but stand out very little in their surrounding area, i.e., they are located in the flat and high plain areas far from the ravines, which is confirmed by the fact that in the 250 m unit, the YCAUI1 is also high-very high while the YCAUI2 is low-very low. Subgroup B1 is distinguished from B2 because the latter has a higher YCAI1. The B1a and B1b sets differ because of the tendency to increase the values of the YCAI2 and the unit gradient (YCAUIP), because the sites slightly closer to the ravines include in the second type. The B2a and B2b sets are distinguished by the lesser gradients and YCAUI2 values of the second set. These are also necropoleis concentrated in the low areas that are slightly less flat and settlements that are slightly further from the river valley in Subgroup B1 and plateau settlements in the areas where the ravine is less deep in Subgroup B2.

Group C is characterised by low or medium gradients in the 1 km area and medium or high ones in the 250 m unit, because of relative height 1 indices that are high and very high and relative height 2 indices that are medium in the 1 km area and low for 250 m. This group includes tombs located on hills that rise up from the ravine to the plateau and the sites far from the valley. The high values in the 1 km area are explained by the fact that this wide circle includes not only the hills but the spaces that surround them, i.e., the bottom of the valley, and large differences in height are created in relatively short distances. Subgroup C1 (Plates I & II) differs from C2 (Plate III) by the greater gradients in the first group in the 250 m unit.

Group D has low and medium gradients in the 1 km area, but has the highest values in the rest of the indices. This homogeneity means that we can only distinguish two sets, Da and Db, separated by the greatest gradient of the 250 m radius unit around the settlement in the second one (Plate IV). This includes the megaliths located on the plateau but very near the edge of the ravine in the areas where this is very deep. The progressive elevation, slow but constant, of the plateau explains how the gradient values of the 1 km area while still high, are lower than those of the 250 m area.

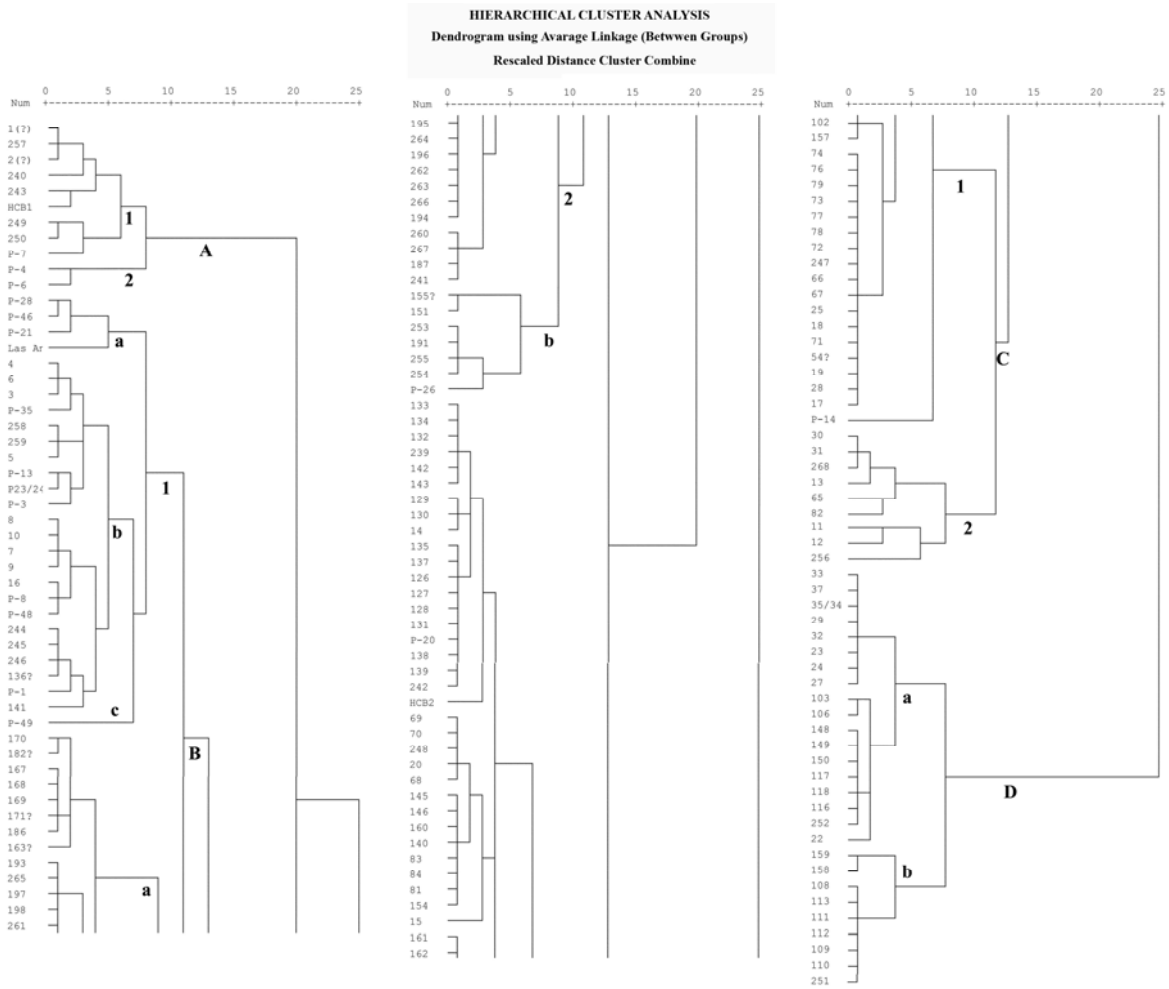

Fig. 6. Topographic analysis of Río de Gor graves. Cluster Analysis. Dendrogram

Territorial organisation in the Gor River Valley during Late Prehistory

Most of the Neolithic settlements, are located in group A and especially in subgroup B1a, with the least control over the 1 km area, even when they are located in units with relatively high gradients (group A). The gorge shape of the valley may explain the slight differences in the position of the prehistoric settlements to the point that many of those in the Bronze Age were located on the front line of the terrace (P-4 and P-6), although as with other nearby areas (Esquivel *et al.* 1999), the interest lays in the intervisibility between them which enables complete control over the river course. It is possible that the greater variability in the Copper Age corresponded to a greater differentiation among the settlements, with those located in sets B1b (P-1 and P-8), B1a (Las Angosturas, which lasts even to the Iron Age) (Plate III), B2b (P-26) and C1 (P20, HCB2 and P14) at the pinnacle of the hierarchical system, but it is also possible that there are chronological differences, especially because we find associated settlements - both earlier and later - that might suggest movement (from one to another) in restricted areas.

Plate III. Dolmen 65. Majadillas. Subgroup C2

The megaliths, like in other areas on the Iberian peninsula (Maldonado *et al.* 1991-92; Vaquero 1995; Villoch and Criado 2001; García 2004; Fabián *et al.* 2006; García *et al.*, 2006; Wheatley and Murrieta 2008; Bueno *et al.* 2008), mark the routes of movement, in this case, especially along the backs of gullies to gain access from the bottom of the valley to the high plain, and on the other hand mark the limits of the valley with respect to the plateau, defining a longitudinal route parallel to the river, leaving the arrival points marked by the concentration of megaliths. In the first case, especially, the link to traditional routes is evident, as with La Cuesta de la Sabina and the Cuesta del Almial, and there are even signs – i.e., separation of tombs in the groups and typology of the monuments – that suggest the placement of the first and the last tomb in line with the oldest moments of the construction sequence, an aspect argued for other areas (Blas 2000). These routes, according to old documentation (Leisner and Leisner 1943; García and Spanhi 1959), continued on the plateau and coincided again with traditional roads and with greatest visibility as shown by GIS analysis.

Plate IV. Dolmen 111. Llano de Olivares. Subgroup Db

The dispersion, in this respect, mustn't be considered in isolation and we have already referred (Afonso *et al.* 2006) to the fact that the set of tombs at Río de Gor (Baños de Alicún, La Sabina, Gabiarra, etc., groups) (García and Spanhi 1959) must be studied together with the graves at Fonelas-Laborcillas (García and Spanhi 1959; Molina 1983; Ferrer *et al.* 1988). In this set of necropoleis, the dispersion from the bottom of Rio de Gor valley to the limits of the surrounding plateau (the Cuesta de la Sabina group in the Gor River, for example) must be linked to the demarcation of a North-South route along the river flanks, in order to gain territorial control. This second part of the strategic pattern is shown by the arrangement of the most important tombs (regarding grave goods, shape and size) according to the results of micro-topographic analyses carried out for some necropoleis such as those at Las Majadillas and Las Hoyas del Conquín (Afonso *et al.* 2010). It is also confirmed by the continuity of the system to Las Angosturas (Gor, Granada) (Botella 1980) which control, in the South part of study area, the access to Sierra de Baza where many Chalcolithic settlements and metallurgic development have been recorded (Sánchez 1993; Carrión *et al.* 2007). Although some circular graves are located in a large part of the distribution (Ferrer 1980), the greatest concentration and the only preserved

cases are located next to Las Angosturas, thus showing their importance, already suggested by their continuity and the results of the analysis of the topographic dominance undertaken here.

Viewshed Analysis

GIS viewshed analyses have been performed to evaluate the visibility patterns not only among archaeological sites and but also between sites and the entire terrain under consideration. Visibility techniques involve Cumulative Viewshed and Total Viewshed analyses.

Cumulative viewshed analysis accounts for visibility between archaeological sites, as it computes individual viewshed for each archaeological site to obtain a final map where each value represents the number of sites from which it is visible.

Total Viewshed or Inherent Viewshed is a variant of visibility analysis that attempts to avoid the limitations in the archaeological sample, as it accounts for visibility not only from archaeological sites but from every sample point within the entire terrain under consideration. The viewshed is calculated by taking each cell of the Digital Elevations Model (DEM) and combining them to obtain a map that represents "a first description of the visual structure for an entire terrain" (Llobera 2003:34). This fact results in very high computational intensity required to calculate the viewshed, for example, in this case more than 50.000 individual viewshed were processed to obtain the total viewshed.
Once the final map is obtained, the values distribution can be analyzed and a classification of visual relevance can be established to identify areas of visual prominence.

This quantitative variable range can be classified by applying different classification methods, in this case standard deviation has been used, as it allows the assessment of those sites that in relative terms assume a visual prominence greater or less than average within the study area. The obtained visibility maps were classified into 8 classes and were represented using a two-colored ramp that emphasizes values above (shown in green) and below (shown in red) the mean (Fig. 7).

Total viewshed allows identifying whether the visual dominance over the entire terrain was a main factor in the site location strategies of past societies. Combined with Cumulative Viewshed Analyses it can lead to understanding of the visual relation between archaeological sites and their surroundings and between archaeological sites themselves (Llobera *et al.* 2004; Montufo *et al.* 2010).

Data used in GIS analysis included a Digital Elevations Model (DEM) produced by Andalusia's Cartography Institute with a 20 m resolution, while the location of archaeological sites was established through fieldwork using a Leica GX1230 GPS. Aerial ortophotos and digital topographic maps have been also included in the GIS.

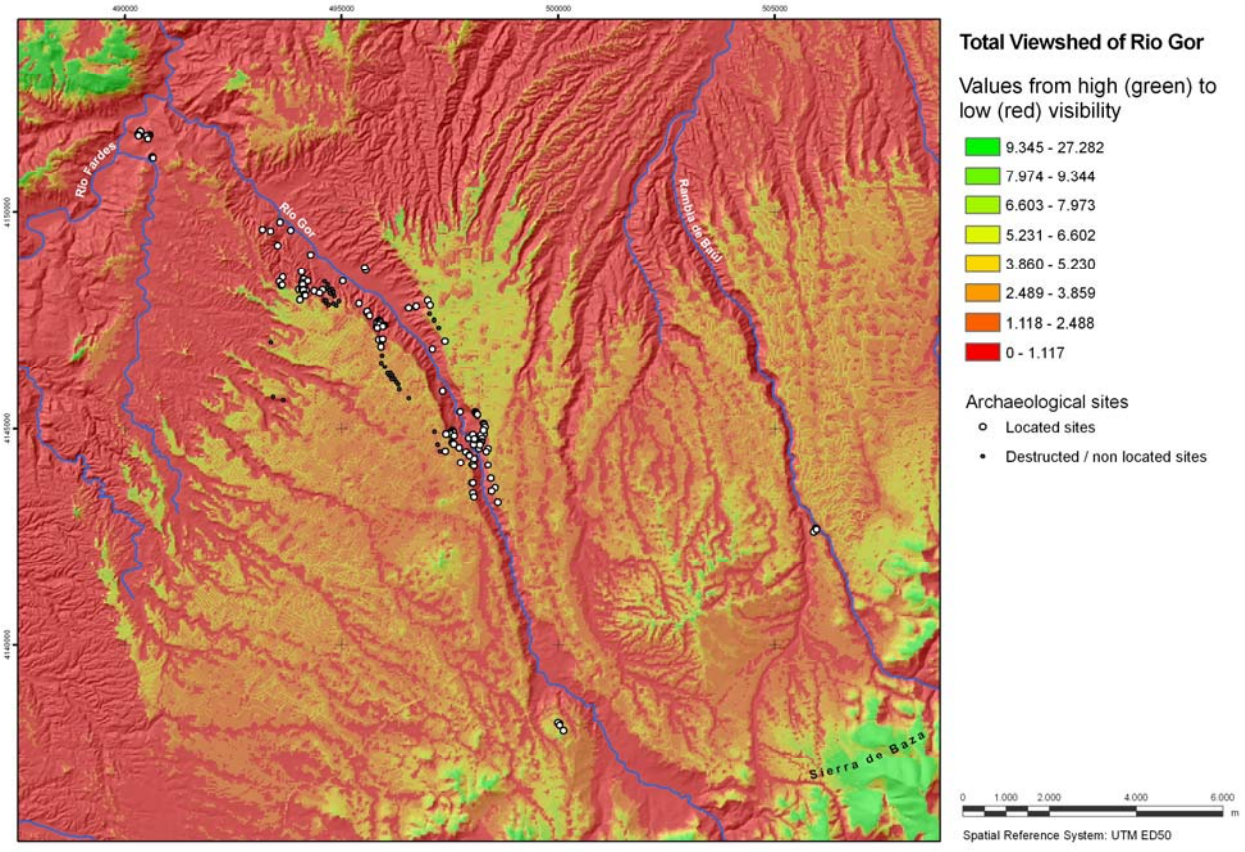

Fig. 7. Total Viewshed of Rio de Gor necropoleis

Visual Relevance	Area km2	% of Study Area	Number of Sites	% of Sites
Class 1 (lowest)	287,2336	56,25	107	56,32
Class 2	95,1536	18,63	47	24,74
Class 3	57,3264	11,23	22	11,58
Class 4	29,3104	5,74	4	2,11
Class 5	14,944	2,93	2	1,05
Class 6	7,9552	1,56	7	3,68
Class 7	4,632	0,91	1	0,53
Class 8 (highest)	14,1264	2,77	0	0,00
TOTAL	510,6816	100		190

Table 2. Sites presented in every defined area according to visual relevance

The area of the necropoleis along the river Gor is characterized by very low visibility values, with only Sierra de Baza mountains and hills around the river Fardes standing out as visual referents. As shown on figure 7, most of the terrain is depicted in reddish tones, corresponding to areas of low visibility, while only small zones are shown in greenish tones, as they present the highest visibility values. The plateau presents medium to low values, shown as yellowish tones. In quantitative terms, more than 50% of the study area presents very low values (1 to 1118) meaning that those areas are visible from a maximum of 1118 pixels from the total of 52140 (less than a 2.14% of the entire terrain), while areas with highest values area visible from 27282 points (a 52% of the study area) .

The archaeological sites are located mainly in the areas with lower visibility values (Fig. 7); more than 80% of sites are located in total viewshed classes 1 or 2. Nevertheless, sites distribution shows the same pattern as the total viewshed values, in fact, the number of sites within each total viewshed class correspond to the expected value according to the area percentage of each one. As shown in the table below (table 2), percentage of sites within each total viewshed class matches virtually exactly to the area percentage of each class.

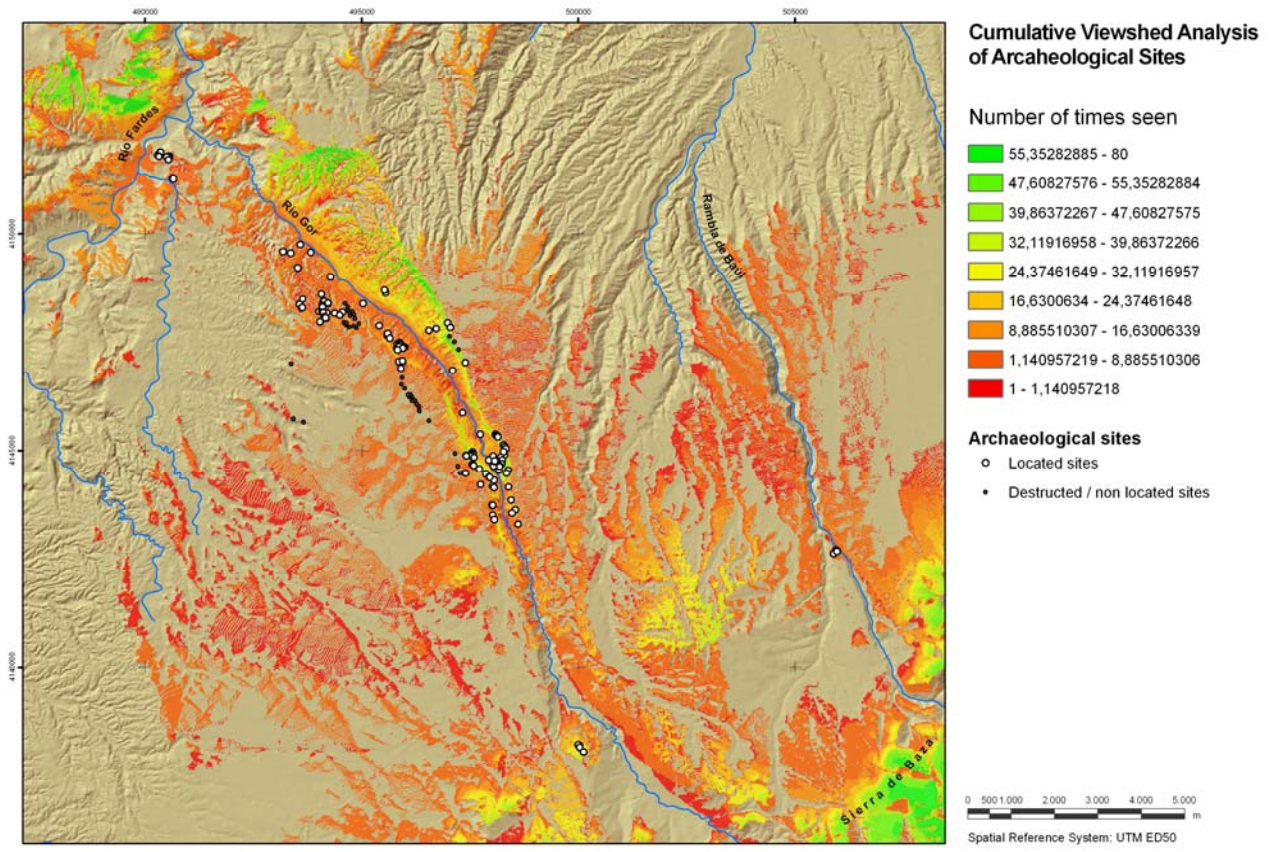

Fig. 8. Cumulative viewshed of Rio de Gor necropoleis

Cumulative viewshed analysis (CVA) has been performed using the location of archaeological sites. The resulting map is shown on figure 8, where the areas highly visible from archaeological sites are depicted in greenish tones, while those of lowest visibility are shown in reddish tones. Viewsheds from sites mainly face towards the Gor river valley, an area with low visibility values when considering the total viewshed, indicating the importance of controlling this natural pathway between the lowlands and mountains of Sierra de Baza. The hills around the river Fardes and Sierra de Baza show high visibility values, as expected bearing in mind that they are the most visible areas according to the total viewshed analysis, while the plateau, with middle visibility in the total viewshed, shows low visibility values, and even most of the plateau is invisible from the sites, indicating that visual control of the plateau was a minor factor in sites location strategies (Fig. 8).

The location of archaeological sites according to CVA results indicates a clear, visual connection between them, with all the sites been located in visible areas, at least, from a few sites. Although some megaliths were located in the boundaries of the plateau, the approximate location recorded for destroyed graves shows that they also follow this pattern, as they would be located following the pathways in visible areas.

An approach to social hierarchical organisation from the graves. Location and contents.

Problems and methodology

Even with the paucity of data due to not very systematic and intermittent archaeological excavations (Góngora 1868; Siret 1906; Leisner and Leisner 1943; García and Spanhi 1959; Castellano *et al.* 2002), the frequency of plundering and the lack of morphometric and technological analyses of the archaeological materials deposited in museums, we can attempt to understand the process of social differentiation using the Gor River megalithic graves. This is especially crucial if we consider that the data from the settlements, even the excavated ones (Botella 1980), are especially scarce. Here, we only want to make a contextualised evaluation of the elements listed by the excavators, thanks, undoubtedly, to the correlations made between the tombs and grave goods. Additionally, it must be borne in mind that not all of the grave goods belong to the same period, although, given the continuity in the use of the graves, we prefer to consider them all as contemporary, only separating the materials that clearly belong to the Bronze Age, especially the Final Bronze Age (Lorrio and Montero 2004:102-105; Lorrio, 2008). There are also problems in the correlation of the numbers given to the graves by different authors, a fact which probably affects some specific attributions but not the overall evaluation that we are pursuing. Another problem is whether or not the elements that we define as having special social meaning were indeed such for those burying their dead in Late Prehistory. In this respect, there seems to be a tacit agreement to emphasise the elements of greater technical complexity and objects made of scarce or non-local raw materials (Giardino 2002; Nocete and Peramo 2010), although we can find items that are not related to social position (Aamont 2006; Miari 2006; Katz 2007; Fahlander y Oestigaard 2008), or can have different meanings according to the type of society, as ornaments, for example (Nikolova 2010). Two more problems must be considered: first, we must remember that, as in other areas (Kruk 2006; Langouët *et al.* 2007; Sjögren 2010; Scarre 2010), not all tombs are known or preserved, and secondly it is possible that not all of the people had the right to be buried in megaliths (Cámara 2001; Scarre 2010; Turek 2010).

In this context, we have distinguished three levels of grave goods. The first (9.81 % of the considered graves) includes different elements of a certain technical complexity (metal) used for coercion (weapons) and some other elements related to this activity (abundant arrowheads), in addition to frequent symbolic elements (idols). However, the proportion of graves which can be considered at this level according to their grave goods descends to 8% if we bear in mind the tombs that contain items from the Final Bronze Age.[1] The second level has some metal elements (but no weapons) and fewer arrowheads and idols. The third level is characterised by the presence of a certain variety of other items but with a strong scarcity of those found in the two earlier levels (in most cases absent, except some arrowheads). For us, this level incorporates the lowest social layer. The tombs with no data have been considered as indeterminate. The elimination of materials from the Final Bronze Age means a reduction in the proportion of tombs of the first level, and especially, an increase in indeterminate tombs.

Fig. 9. Majadillas necropolis. Tomb types according to micro-topographic analysis

[1] In some cases, even when the materials from the Final Bronze Age are eliminated, these tombs should be attributed to this first level, especially because of the concentration of arrowheads, most notably in Las Majadillas 81, but also in La Sabina 49.

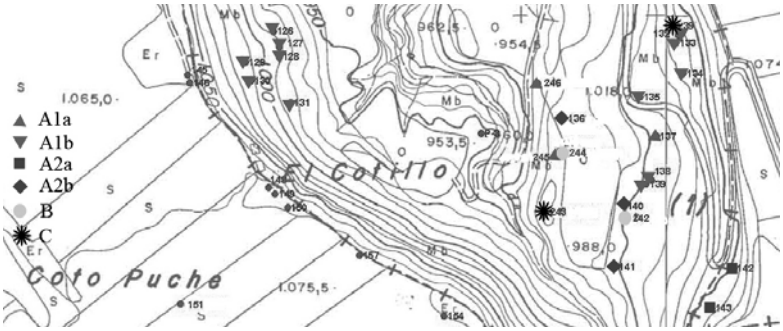

Fig. 10. Hoyas del Conquín necropolis. Tomb types according to micro-topographic analysis

This qualitative approach, which serves, as we have noted, merely as a guideline, would only be credible if it showed some relationship to other differences between the tombs. In this respect, we have used a simplified typology (tombs with polygonal, trapezoidal, rectangular and circular chambers), a morphological typology (Afonso *et al.* 2008), the size of the graves (separating large from small), the number of burials documented, the necropoleis in which they are situated and the locational data, according to the results of the analysis which we have previously discussed.

Evaluation

Regarding the sepulchral typology, only the graves with a circular chamber and corridor seem to have a clear and exclusive association with the two first grave goods levels. There are, however, some exceptions, perhaps because of plundering, like graves Nos. 204 and 220 at Baños de Alicún and Las Angosturas respectively, which had already disappeared at the time of the excavations by M. García Sánchez and J.C. Spanhi and which, therefore, could not be studied anew. Differences within each necropolis must be also suggested and in a necropolis where *tholoi* predominate, like Las Angosturas, these differences are clear. Most of the rectangular tombs have materials (Lorrio and Montero 2004) that indicate that they were reused in the Final Bronze Age, perhaps with structural transformations of the graves that also usually include Chalcolithic elements like arrowheads. Most of the tombs with a trapezoidal or elongated shape (Afonso *et al.*, 2008), have wealthy grave goods, although these are not exclusive.

Among the larger graves, only numbers 8, 19, 85 and 97 have no important grave goods.

The number of burials, always low as a consequence of the nature of the archaeological excavations, generally has no relationship to the wealth of the grave goods. Among the graves with more than twenty individuals most (50 %) fall within the first level, but there are others that are considered as indeterminate given the absence of grave goods. Additionally, it is possible that when more grave good items appeared, the excavation was performed more carefully, as was the collection of bones. This may explain the higher number of children's and animal remains in the first categories, since these are not absent from the lowest categories or even from the tombs that we considered to be indeterminate because they lack grave goods.

Regarding the association to the necropoleis, the tombs with more grave goods are frequent in the necropolis of Las Hoyas del Conquín, especially graves Nos. 129 and 141, one on each side of the river (Lower and Upper Conquín respectively), but we also find a grave with a slightly lower level (e.g., No 131) as well as others on a second level (e.g., No 134). Other important tombs, according to grave goods are relatively further away on the plateau, such as No 151 at Cerrillo de Las Liebres and Nos. 116, 184, 185, 186 and 189 at Southern Llano de Olivares, where No 112 seems to be the highest-ranking grave, if we accept a relation between grave goods and social levels.

The same pattern can be observed around La Sabina, although the first-level tombs are located in the area of Los Castellones and towards Cuesta del Almial.

Las Majadillas, however, is the necropolis that has the highest number of graves with a high social level (Nos. 64, 66, 67, 69, 70, 71 and 72, considering only those of the first level, although the last tomb has objects from the Final Bronze Age that distort the analysis). This necropolis is located opposite some Chalcolithic settlements, and does not exclude graves of low social level, especially further to the East. Although it is impossible to relate and locate some of the graves at La Gabiarra, ancient data show most of them had a great amount of grave goods (Siret-Gabiarra 64, 78, 79, 113 for example, although the third of them containing materials from the Final Bronze Age that represent almost all of its wealth). They are in another area of important concentration of graves, none of which, unfortunately, has been located in recent investigations, and many of which have disappeared in the 1950s.

The richest tombs of Baños de Alicún (Nos. 4 and 6) and La Torrecilla (No 191 has Final Bronze Age materials whose exclusion does not affect its characterisation) and Pino Baúl (Nos. 194 and 197) fall into level 2. The latter case can be explained by the fact that we have located numerous graves undocumented by M. García Sánchez

and J. C. Spanhi – some apparently not plundered – that may have important grave goods unrelated or even still intact. In this sense, for the first two cases we must also refer to the graves excavated by L. Siret, which have disappeared and were not found by M. García Sánchez and J. C. Spanhi (1959) like No 202 at Baños de Alicún, with Final Bronze Age goods, and Nos. 230 and 232 at Las Viñas, near La Gabiarra, in addition to the Las Angosturas *tholoi* mentioned above.

Finally, our typology of grave locations shows that practically all level 1 graves that are still present are located in subgroup C1 which is also the most numerous in the analysis, while level 2 has tombs from all of the subgroups. These associations also suggest that tombs with more grave goods (and as we have previously said usually larger tombs) have an important role in surrounding control, even if visual dominance is restricted to river valley as have been shown by the results of GIS analysis. Anyway, this relation between tombs with the richest grave goods and visual dominance is better understood when a specific analysis is performed for every necropolis (Afonso *et al.* 2010).

In conclusion, this preliminary analysis deals only with correlations observed between tomb sizes and grave goods and to a lesser degree between the formal typology of the tombs and the grave goods, related in only a limited way to the hierarchical nature of most of the *tholoi* and to some elongated graves. Special mention should be made of the distribution per necropolis; all of them have central tombs and tombs from the second level especially on their outer limits, which is of exceptional importance for the Los Castellones-Cuesta del Almial group in La Sabine. However, the spatial location of the hierarchical tombs within the necropoleis has only been correlated with a specific topographic location in the case of Las Majadillas (Fig. 9) and Las Hoyas del Conquín (Fig. 10) from a specific analysis (Afonso *et al.* 2010) since locational heterogeneity in the overall context of the Gor River tends to conceal differences between tombs in terms of location when we study all the available sample. In these two necropoleis it has been also shown how the hierarchical tombs were used to demarcate the North-South line and were located in flat positions suitable for erecting large monuments (types A1b and A2b respectively), thus complementing the results presented here.

Continuity and reuse in Río de Gor megaliths

Bronze Age reuse introduced a few changes. There are some tendencies to exclude certain social classes from burial and only some tombs were used, mainly linked to strategic control by:

- An emphasis on tombs that let to mark easily North-South routes, through the reuse of many main graves, mostly rectangular ones
- Location on slopes with low and middle gradient but with a great control, far from contemporary sites at the bottom of the valley, which tend to control river valley with an important inter-visibility

The presence of Final Bronze Age ornaments and some Bronze Age weapons as grave goods shows that reuse is related to the elite classes, who assure themselves as representatives of the community by exhibiting their ability to mobilize wealth in tombs. Thus, only their tombs are important as territorial markers.

Link of ritual to one social class and use of the past to legitimate social order by creating an imaginary relation to ancestors shows how memory is anchored in monuments (Burström 1996; Holtorf 1997; Thomas 2001; Wickholm 2008; Harris 2009; Kilmurray 2009; Zsidi 2009; Mengoni 2010; McAnany 2011) and is used as a way to consolidate power and avoiding social changes.

Conclusions

In summary, control over the river course routes was the main aim of the megalithic distribution in the Rio de Gor area.

The chronological approach suggests that already from the Neolithic all the lines of the ritual landscape were predefined and that special attention was paid to the formation of a system that led from the valley with its settlements– by and large located on the left bank at this time – to the plateau passing through certain slopes with high gradient (La Sabina, El Almial, etc.). Moreover, the topographical and micro-topographic study in relation to the contents of the graves suggests that the hierarchical tombs were responsible for marking the North-South line of movement, at least from the Chalcolithic period onwards. These hierarchical tombs thus completed the formation of a hierarchical territory in which the arrangement of the settlements on terraces and spurs very near the Gor River has also emphasised the importance of this route of movement. Special mention must be made for Las Angosturas, the only pass to the Sierra de Baza where, again the settlements, placed in the mountain valleys, developed the function of controlling this area rich in summer pastures and mining resources.

In the Bronze Age, the importance of the ‘river’ route provoked an increase in the intervisibility between the settlements. This coincides with repeated deposition - always of wealthy grave goods - in hierarchical tombs, even until the Final Bronze Age that continues the tendency to use tombs to mark North-South routes, and show the definitive appropriation of the representative nature of the community and the private territorial appropriation by the elites, thus terminating any masking (Cámara 2001). This greater emphasis on the control over the ‘river’ route provides an alternative explanation to the homogeneous nature of the locations of the Bronze Age settlements that, generally and as in other areas of the Southeast, was a result of planned colonisation (Cámara 2001). It is designed to exhaustively cover the area of interest, in this case that of intensive exploitation and to

abandon certain areas like the plateau and, surprisingly, also the areas that had been densely occupied in the Sierra de Baza in the Chalcolithic times (Sánchez 1993).

Finally, it must be also considered that the focus on the control over the river course, instead of using alternative routes, was due to new environmental conditions (Rodríguez *et al.* 1996; Carrión *et al.* 2001, 2007; Fernández *et al.* 2007; Nachasova *et al.* 2007; Yanes *et al.* 2011) that required a greater control over water courses that, despite their small size, were considered important in periods of environmental stress.

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