

## **Slope orientation of rock art sites in the Côa Valley, Portugal: A case study in the spatial distribution of open-air Upper Palaeolithic rock art**

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**Abstract:** *Considering that there is a proportional distribution of aspect (around 25% for each class - North, East, South and West) in the total area where the Côa Valley Archaeological Park is located, the discrepancies found in the orientation of slopes that contain Upper Palaeolithic rock art panels will be discussed. For instance, almost half of the rock art sites have an Eastern orientation against less than a tenth which are Northerly faced. Can geomorphologic and differential conservation issues completely explain the discrepancies or, on the other hand, can cultural factors have determined the preferential choice of Eastern facing slopes by Pleistocene engravers?*

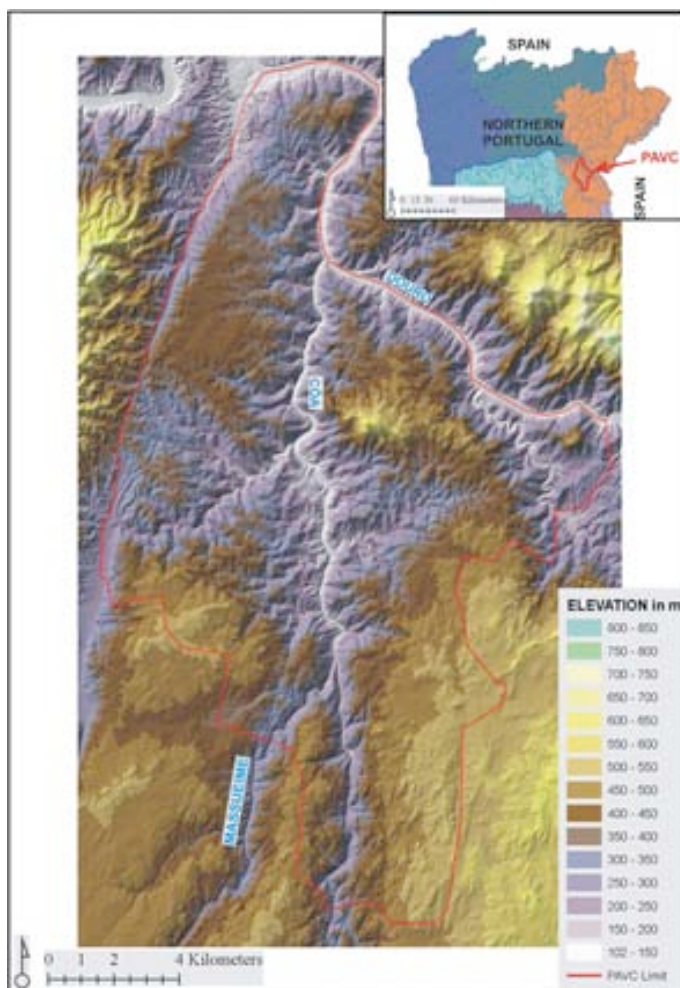
**Résumé :** *Orientation des pentes pour le site d'art rupestre de la vallée du Côa, Portugal : Étude de cas portant sur la répartition spatiale des sites d'art rupestre de plein air paléolithiques*

*Considérant qu'il existe une répartition proportionnelle d'orientation des versants (environ 25 % pour chaque catégorie – nord, est, sud et ouest) dans la superficie totale où le Parc archéologique de la Vallée du Côa est situé, les discordances dans l'orientation des versants qui contiennent panneaux d'art rupestre du Paléolithique Supérieur seront discutées. Par exemple, presque la moitié des sites d'art rupestre ont une orientation vers l'est alors que moins d'un dixième sont orientés vers le nord. Subséquemment, les raisons géomorphologiques et de conservation différentielle peuvent-elles totalement expliquer les divergences ou, d'autre part, les facteurs culturels peuvent-ils avoir déterminé le choix préférentiel de versants orientés à l'est par les graveurs du Pléistocène ?*

Located in North-eastern Portugal (see Fig. 1), the Côa Valley open-air rock art complex possesses almost a thousand engraved outcrops (Baptista & Reis 2008). Motifs found in the Valley belong to distinct eras such as the Upper Palaeolithic (UP), the Neolithic, the Iron Age and Historical and Contemporary periods. A Pleistocene chronology can be attributed to nearly half of the known rock art panels (Zilhão 1995). This will be the period on which the present analysis will focus. More on the discovery, battle for preservation, dating, management and conservation issues as well as the characteristics of the Côa Valley rock art and its archaeological context can be found in Aubry *et al.* (2002), Aubry and Sampaio (2008), Baptista and Fernandes (2007) or Baptista (2009).

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**Fig. 1.** Elevation in the study area, the Côa Valley Archaeological Park and its immediate vicinities.

In this paper it will be argued that orientation may have played an important role in the fashion UP artists and society understood the monumentalized landscape they created. The Pleistocene Côa Valley rock art has a clearly defined internal logic and structure. Some have drawn attention to the fact the whole valley may be understood as an open-air “sanctuary”, possessing well marked distinct “pilgrimage” paths (specifically established by engraved images) leading to different “shrines” (Baptista & García Díez 2002, Baptista *et al.* 2006, Baptista *et al.* 2008). Hence, rock art would have functioned as mean of creating (or “humanizing”) the landscape. Orientation, for reasons discussed below, is a key feature in the spatial distribution and internal functioning of the Côa Valley rock art complex and its coeval “usage”.

A previous spatial distribution analysis carried out by Baptista and García Díez included data gathered until 1999 which relates to a total of 22 rock art sites and 154 panels attributable to the UP (2002: 195-196). These figures have considerably changed in the last decade with the discovery of new sites and engraved outcrops. Therefore, the present lines also intend to update figures regarding several variables connected with spatial organization in the Côa Valley, such as number of sites, panels and their elevation, but mainly the orientation of rock art slopes and outcrops. This update will complement the information contained in the Baptista and García

Díaz paper, besides offering a tentative explanation for an intriguing discrepancy in rock art orientation.

Before proceeding, it will be important to describe how the research being presently carried out on the conservation of the Côa Valley rock art (Fernandes 2009) generated the data on which the present analysis will be based. Given that there are almost a thousand engraved outcrops it was deemed as indispensable to create an intervention work urgency scale. Since it is impossible to intervene upon all outcrops at the same time, it will be necessary to assess which are in worst condition and therefore badly require consolidation work<sup>1</sup>. To achieve this characterization of weathering risk, different parameters will be used to establish the condition of each outcrop. One of the parameters has to do with the orientation of the slopes where the rock art outcrops are located and of the outcrops themselves. Research on geomorphology issues has shown that aspect<sup>2</sup> plays an important role in the weathering and erosion dynamics affecting geomorphologic structures as it affects the way different weather variables, of great importance in such processes, act upon differently facing slopes (see, for instance, Bennie *et al.* 2008, Egli *et al.* 2006, Williams & Robinson 2000 or Yalcin & Bulut 2007). Therefore, aspect in the area of study, the Côa Valley Archaeological Park (PAVC) (see Fig. 1), was determined with the intent of aiding in the condition ranking of engraved outcrops. This was done resorting to a 10m resolution Digital Elevation Model (DEM) for the entire area of the PAVC supplied by Instituto Geográfico Português<sup>3</sup>.

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<sup>1</sup> Suitable methods to consolidate the Côa outcrops were already tested on non-engraved outcrops affected by similar weathering dynamics as the engraved ones (Fernandes and Rodrigues 2008).

<sup>2</sup> In geomorphology the term aspect is used to signify the orientation of a slope or any other element in the landscape such as outcrops or boulders faces. For instance, if a slope is said to have an easterly aspect this means that it predominately faces East. Henceforth, "aspect" will be used concomitantly with "orientation".

<sup>3</sup> Basically, a DEM is a table containing multiple x, y and z values of the same geographic points for an entire given area of study and, in this case, taken every 10 meters. This table can be manipulated in GIS software packages (in the present case, ArcGis 9.2 was used) in such a way the desired information can be retrieved and displayed.

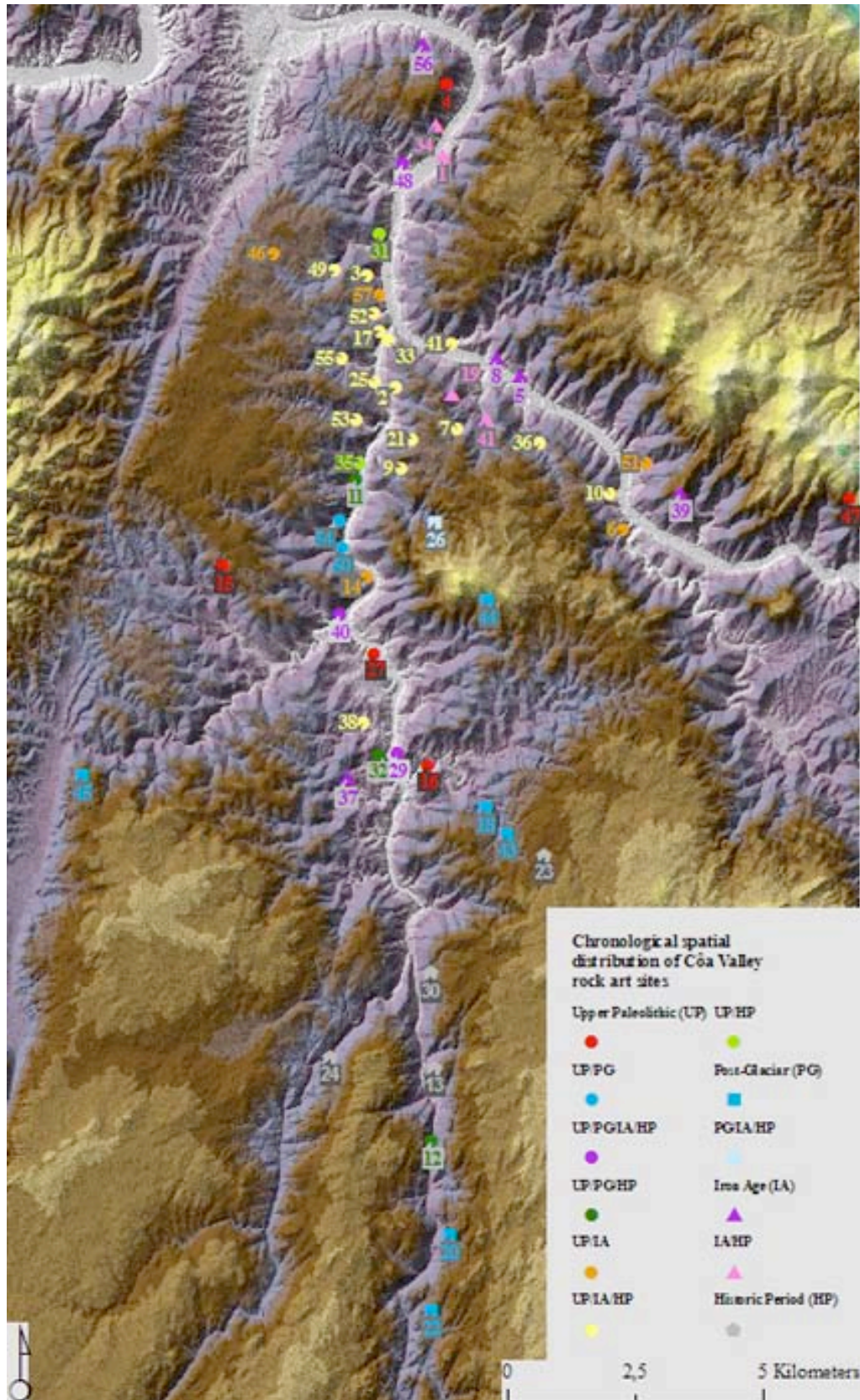
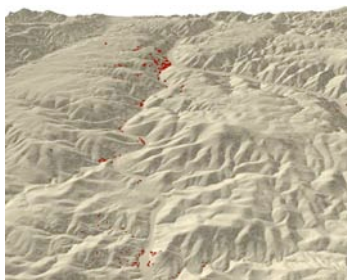


Fig. 2. Location and chronology of the Côa Valley rock art sites.

## The data

As of January 2010, a total of 954 engraved outcrops had been identified in the Côa Valley grouped in 57 different sites<sup>4</sup>. Imagery from the Pleistocene is to be found in 450 outcrops, corresponding to 42% of the total identified outcrops, and scattered along 36 different sites<sup>5</sup> (see Fig. 2 and Table 1). At this point, it is difficult to accurately determine the total number of UP motifs but these are estimated to be around two thousand (Baptista 2009: 130).

As one can see in Figure 2, the Pleistocene rock art sites<sup>6</sup> are located on both banks of the Côa, with predominance for the left margin, and on some of its (mostly left bank) tributaries. In the later case, the majority of these sites are very close to the main valley. There are also a few sites located in both banks of the Douro, again with predominance for the left bank. Due to local geomorphology, after the mouth of the Côa, the Douro follows a northbound course which makes it, in way, a sort of continuation of the Côa, for the short length where rock art is still to be found. In this stretch of the Douro, sites are only located on the left bank. Before the Côa's mouth, sites in the Douro are to be found in both banks. It should be noted that of all the Côa UP sites only a quarter (9 sites) are located on the right banks of the Côa (6 sites) and of the Douro (3 sites).



**Fig. 3.** Bird's-eye view of UP rock art outcrops in the main valley from South (the Penascosa/Quinta da Barca/Ribeirinha sites) to North (beyond the Côa's mouth). Only the very few UP outcrops that fall outside the area represented in the image are not shown. No scale.

As for the distribution of UP outcrops themselves (see Fig. 3) most are located in or near the mouth of the Côa albeit two sites (Vale da Casa and Cachão, totalling 3 outcrops) can be found to the north on the left margin of the Douro. Sites around and in the area of the mouth of the Côa (Broeira, Bulha, Canada do Amendoal, Canada do Inferno, Foz do Côa, Meijapão, Moinhos de Cima, Porto Velho, Quinta das Tulhas, Rêgo da Vide, Ribeira de Urros, Vale de Cabrões, Vale de José Esteves, Vale de Moinhos, Vale do Forno and Vermelhosa) contain more than half (282 outcrops) of known Pleistocene panels. Continuing our analysis towards the

<sup>4</sup> Figures supplied by Mário Reis, the PAVC's archaeologist in charge of surveying the area to find new rock art.

<sup>5</sup> There are 5 more engraved outcrops with motifs from the UP located in two distinct sites relatively nearby to the Park. However, since their location fell outside the area covered by the DEM (that only corresponds to the area of the PAVC and its immediate vicinities), these were not included.

<sup>6</sup> It will be out of the scope of this paper to discuss how can a rock art site be defined. In the case of the Côa, sites are usually defined as a cluster of rock art panels on outcrops located on the slopes of a tributary valley or on just one slope in the case of the main valley (Mário Reis, personal communication). While this definition it is not without its problems (for instance, where does one slope ends and another begins?), a practical and simple approach was needed for inventory purposes.

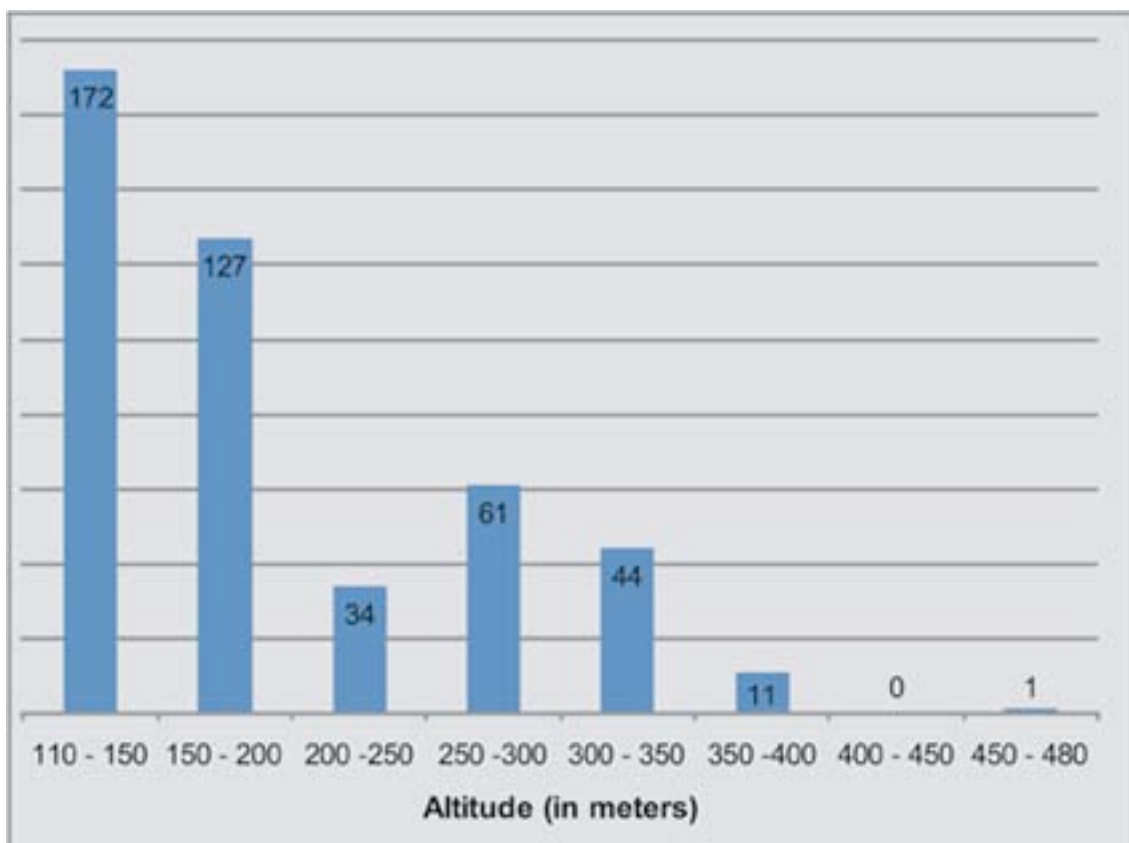
south, a site with only one outcrop can be found (Vale de Videiro). The next large concentration of rock art is constituted by the Vale de Figueira, Fariseu and Ribeira de Piscos sites which, according to Baptista *et al.* (2008), must be regarded as being interconnected as they are spatially organized around Mount Fariseu. Together, these sites possess 47 outcrops.

ID NO	Site name (and number of engraved outcrops)	ID NO	Site name (and number of engraved outcrops)	ID NO	Site name (and number of engraved outcrops)
2	Broeira – 5	17	Foz do Côa – 95	41	Ribeira de Urros – 2
3	Bulha – 15	21	Meijapão – 3	46	Tudão – 2
4	Cachão – 1	25	Moinhos de Cima – 6	47	Vale d'Arcos – 1
6	Canada da Meca – 2	27	Olgas da Ervamoira – 4	48	Vale da Casa – 2
7	Canada da Moreira – 4	29	Penascosa – 26	49	Vale de Cabrões – 27
9	Canada do Amendoal – 5	31	Porto Velho – 1	50	Vale de Figueira – 6
10	Canada do Arrobão – 2	32	Quinta da Barca – 45	51	Vale de João Esquerdo – 5
11	Canada do Inferno – 37	33	Quinta das Tulhas – 3	52	Vale de José Esteves – 31
12	Faia – 2	35	Rêgo da Vide – 4	53	Vale de Moinhos – 17
14	Fariseu – 16	36	Ribeira da Cabreira – 1	54	Vale de Videiro – 1
15	Fonte d'Água Alta – 1	38	Ribeira das Cortes – 14	55	Vale do Forno – 25
16	Foz da Ribeirinha – 8	40	Ribeira de Piscos – 25	57	Vermelhosa – 6

**Table 1.** List of UP Côa Valley rock art sites. The ID number colours refer to Figure 2.

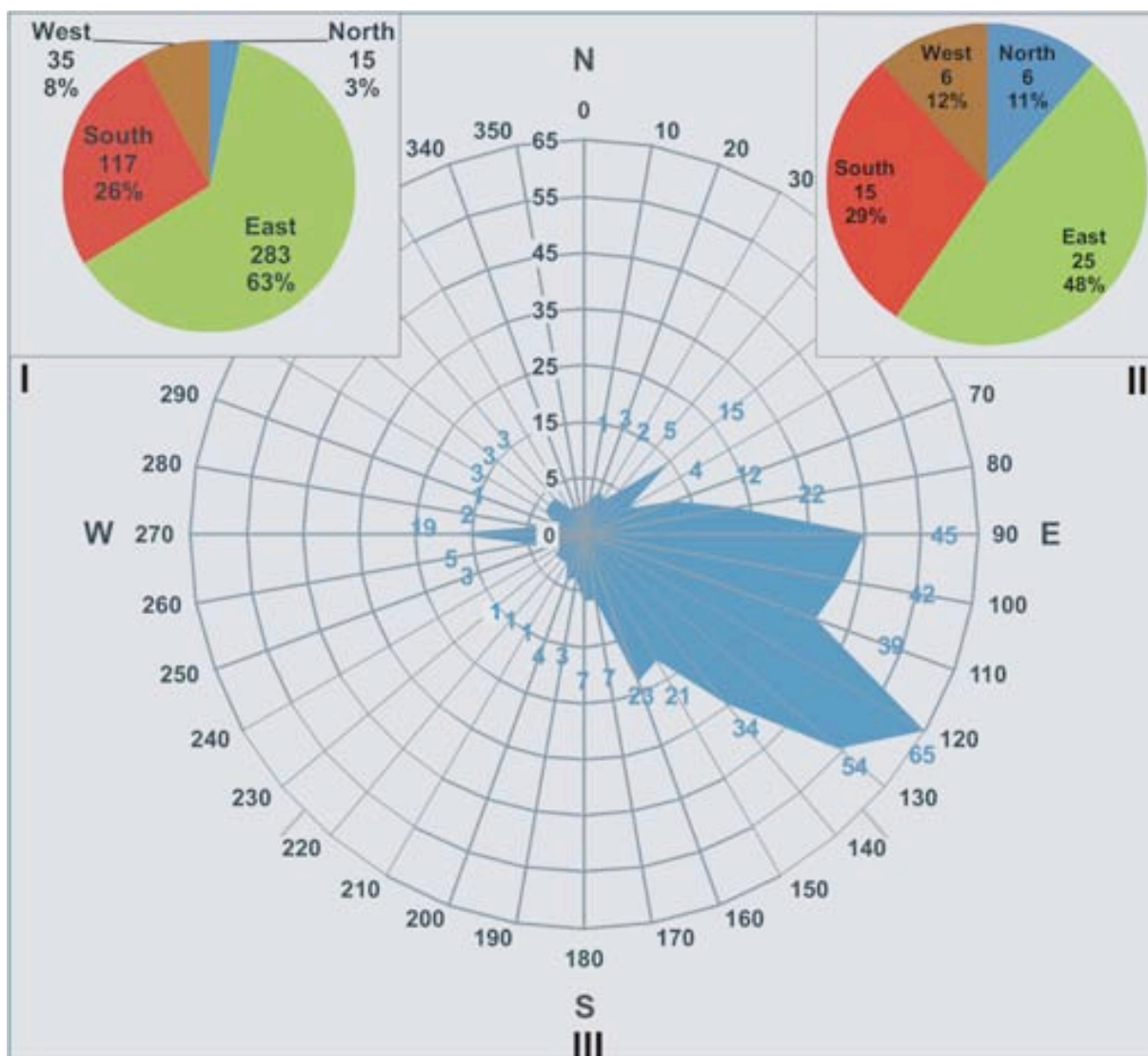
After the Olgas da Ervamoira site (with only 4 outcrops), the next large cluster of rock art is constituted by the Ribeira das Cortes, Quinta da Barca, Penascosa and Foz da Ribeirinha sites where 93 engraved outcrops are located. This cluster marks the southern end of the sanctuary, as further south UP rock art is merely residual (2 outcrops). A few more sites are located on the periphery of this central core comprising the final stretch of the Côa. Some are located on both banks of the Douro prior to the Côa's mouth (Canada do Arrobão or Ribeira de Urros, for instance) while others on higher plateau terrains (Tudão & Fonte d'Água Alta). Together these only account for 18 outcrops.

Regarding altitude, more than half (299) of the Pleistocene outcrops are located on, or very close to, the feet of slopes (therefore, near or on the waterways margins'), having an elevation between 110 and 200m (see Fig. 4). Average altitude of the outcrops is 188m. A more suitable characterization of the spatial distribution reality of UP outcrops concerning elevation is perhaps given by median altitude (160m).

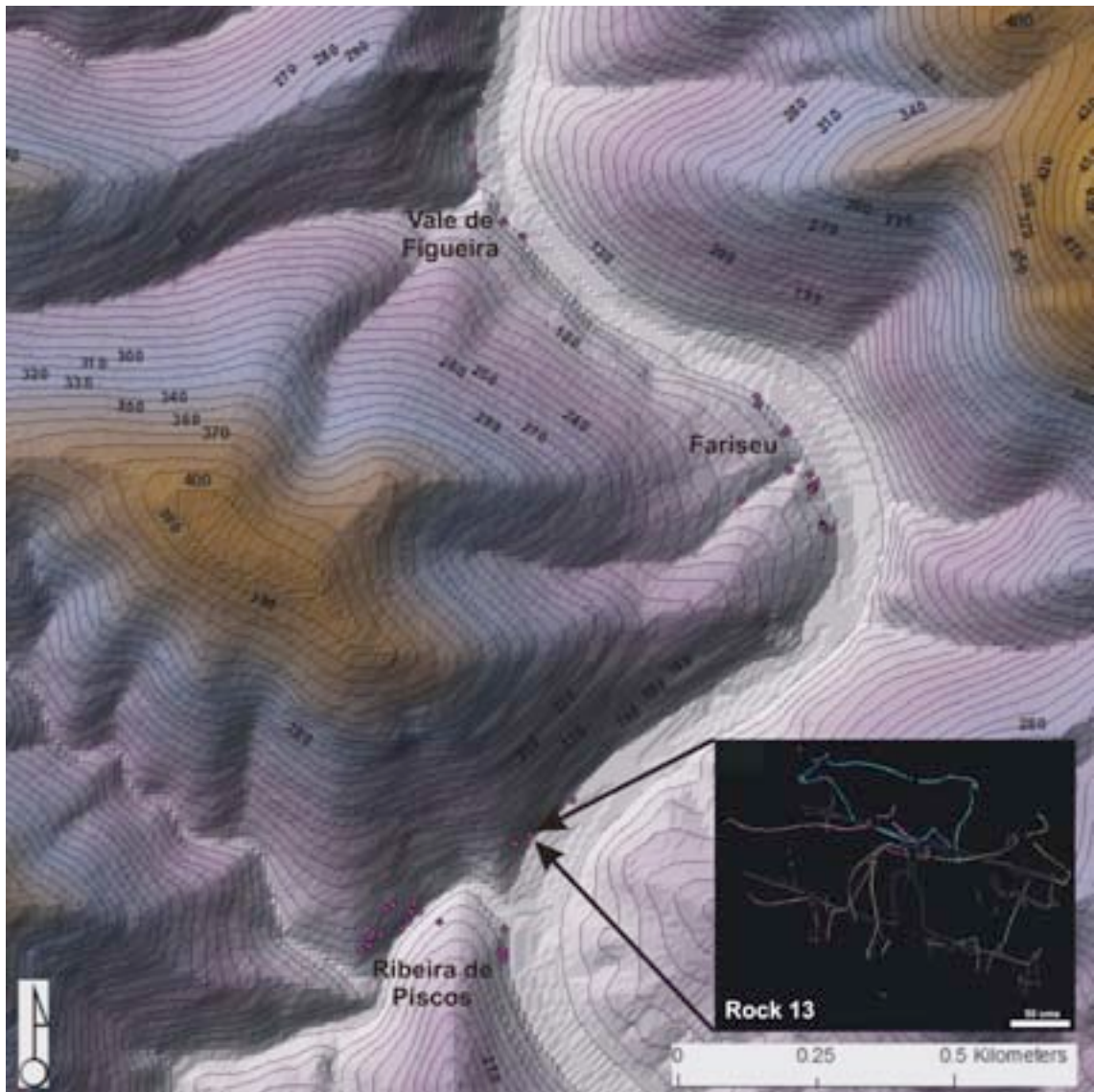


**Fig. 4.** Altitude of UP rock art outcrops.

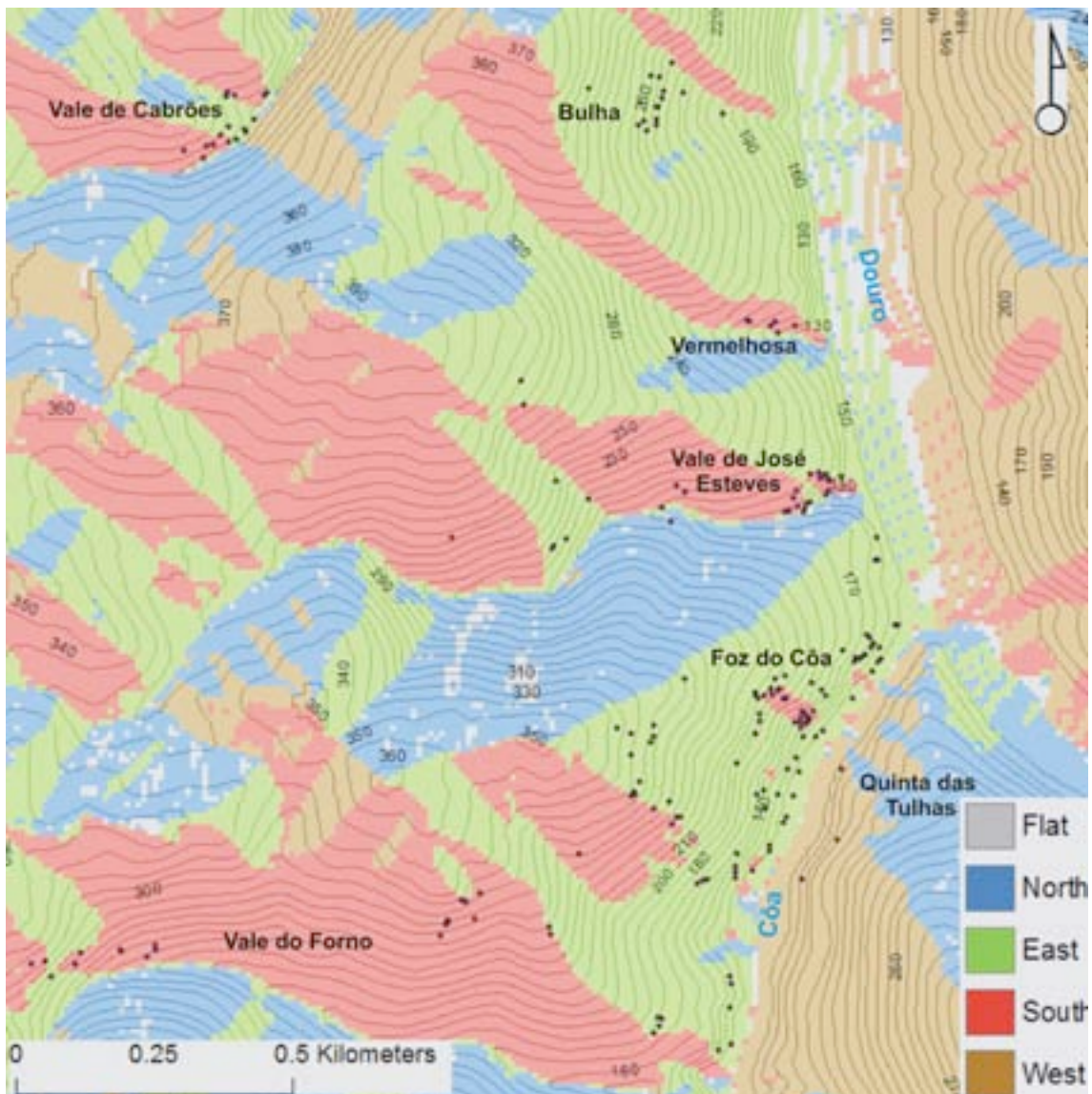
Aspect, the main variable to be considered in the present paper, presents a rather distinguishing characteristic. Since UP rock art sites are mostly located in the left banks of the Côa and, to lesser degree, of the Douro, they overwhelmingly face East and South (Fig. 5). If aspect of the outcrops themselves is to be considered, figures speak louder than words: 63% of outcrops have an easterly orientation being average and median aspect values  $134^{\circ}$  and  $125^{\circ}$ , respectively (see Fig. 5). Some examples of aspect distribution in precise sites are given in Figures 6 & 7. It might be worth mentioning that the nearby Siega Verde rock art site, belonging to the same UP artistic tradition, follows the same trend in the orientation of panels. Of the 91 known panels, only one is located in the right bank (and thus facing Northwest) of the Águeda river (Alcolea González & Balbín Behrmann 2007: 507-511).



**Fig. 5.** I. Aspect of UP rock art outcrops. II. Aspect of all UP rock art sites. III. Orientation of rock art outcrops in a 'wind rose' graphic. Following Yalcin and Bulut (2007), aspect was divided in 5 categories: Flat (-1°/0°), North (315°/45°), East (45°/135°), South (135°/225°) and West (225°/315°).



**Fig. 6.** Ribeira de Piscos, Fariseu and Vale de Figueira rock art sites located at the foot of Mount Fariseu. Note that there is no rock art on the right margin of the Côa. Rock 13 stands out as its three aurochs are the largest figures identified so far in the Côa. Furthermore, the motifs were inscribed in a quite large wall-like outcrop (more than ten meters high). The engravings would be clearly seen from a considerable distance. Drawing of the aurochs taken from Baptista (2009, 74-5).



**Fig. 7.** Aspect in the area of the Vale do Forno, Quinta das Tulhas, Foz do Côa, Vale de José Esteves, Vermelhosa, Bulha and Vale de Cabrões sites. Note that amongst so many engraved outcrops, only one (in Vale de José Esteves) faces North. Also note that the West facing Quinta das Tulhas site only has three engraved outcrops against the 95 located in the opposing Foz do Côa East facing site.

The final spatial organization pattern worthy of consideration is chronology. Within the UP, the Côa Valley rock art has two distinct periods: the Gravettian-Solutrean and the Magdalenian. According to Baptista, the more ancient period generally corresponds to pecked and abraded motifs located in the most ample fluvial beaches available in the Côa (Canada do Inferno, Rêgo da Vide, Fariseu, Ribeira de Piscos, Quinta da Barca and Penascosa). This group of sites constitutes what he calls the archaic sanctuary. As for the fine line incised Magdalenian motifs, most are concentrated in the mouth of the Côa area, although these can be found, in small amounts, in the above mentioned sites containing older representations (Baptista 2009: 166-171).



**Fig. 8.** Distribution of aspect in the area of study, the PAVC and its immediate vicinities.

Finally, the geomorphologic characteristics of the area are crucial in the consideration of rock art aspect. The Côa is a river that runs from South to North, and, in its final stretch, slightly from Southeast to Northwest. The whole river system down-cutting process took advantage of two preexisting joint families of, roughly, North-South and East-West orientations. Hence, the main river valley has slopes of Easterly (right bank) and Westerly aspect (left bank) while tributaries have slopes with North and South orientation (see Fig. 1). Therefore, generally speaking<sup>7</sup>, all outcrops in the area possess a smooth vertical schist surface that parallels the orientation of the slopes, given that these faces result from the exposition of the joint families previously mentioned. It was the river down-cutting process that exposed these vertical panels where, in a few, human beings from distinct eras engraved artistic motifs (Fernandes 2006). Given these geomorphologic patterns, it would be expectable that aspect in the area of the Park and its immediate vicinities would be

<sup>7</sup> There are a few exceptions where outcrops' faces are not parallel to "their" slopes. However, these few cases are oddities that confirm the general rule.

equally distributed, having each aspect class a value of around one quarter. Figure 8 confirms such belief.

## **Discussion**

Considering the above presented data regarding aspect, an immediate question arises: is it possible to explain the high concentration of rock art in Easterly and Southerly oriented slopes in detriment of West and North slopes? To provide an answer it will be necessary to consider two different set of variables, i.e. geomorphologic and environment constraints and cultural motivations. While the two are interconnected, the analysis of the later is dependent on previous consideration of the former.

### ***Geomorphologic and environment constraints***

While it was possible to ascertain that aspect is equally distributed in the area of the PAVC, this alone does not establish if, in each slope and in each aspect class, roughly the same quantity of outcrops exists. That is, if the total available number of outcrops in slopes of North and West aspect (that have lower amounts of rock art) is inferior to the total available number of outcrops in East and South facing slopes (where most of the rock art concentrates). An absolute answer would require counting the entire number of outcrops in the area in order to generate statistical figures on the distribution of outcrops by aspect. Such task has not yet been achieved since it is difficult and extremely time-consuming to count all the thousands (if not millions) of existing outcrops.

Even so, preliminary research suggests that in some rock art sites with East or South facing slopes, opposing slopes (facing North or West) have much lesser quantity of outcrops (and no rock art). However, in other sites the contrary occurs; slopes of East and South orientation possess reasonable concentration of rock art outcrops while opposing North and West slopes with a relative abundance of outcrops have very low numbers of rock art outcrops or none at all (see again Fig. 3). For instance, we have the Fariseu, Vale de Cabrões or Canada do Inferno cases, all with engraved outcrops on East and South facing slopes. In all these sites, opposing slopes do have a fairly high amount of outcrops (Fig. 9-10). However, these slopes do not possess a single engraved motif. Another piece of information worth considering is that, after the Côa's mouth, the Douro only has UP rock art on its left bank while in the opposing margin outcrops do exist in fair number (and even rock art of Iron Age chronology). Therefore, it will be argued that somewhat random disparities in the distribution of the total number of available outcrops in the area are not sufficient to explain the high concentration of motifs in easterly and southerly oriented slopes and outcrops.



**Fig. 9.** Opposing bank of the Canada do Inferno site. All of the 37 engraved outcrops of this site are located on slopes facing East and South located in the Côa's left margin (from where the photo was taken). The opposing slope, while having a fairly high and noticeable amount of outcrops, does not hold a single engraved outcrop.



**Fig. 10.** As in the case of the previous Figure, the Vale de Cabrões site only has engraved outcrops (27) on East and South facing slopes (left area of the photo) while North and West facing hills are void of rock albeit many outcrops are present (see Fig. 7).

Differential conservation of outcrops is another factor that might help to explain aspect discrepancy. Research on natural causes of weathering and erosion of rock in its environment suggests that outcrops on north facing slopes degrade at a faster pace than the ones located in the other aspect classes<sup>8</sup>. This could explain why there are, on one hand, less outcrops and, in the other, fewer engraved outcrops on Northerly slopes. Nonetheless, this would not account for the underrepresentation of

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<sup>8</sup> See last paragraph in the introductory section.

engraved outcrops in Westerly slopes. It is likely that natural causes have made disappear some (engraved or not) outcrops in the Côa Valley. Even if aspect does play a role in weathering and erosion, its relative weight in all weathering and erosion processes will not be enough to make it the determinant factor in all dynamics that affect the stability of outcrops in the Côa (Fernandes 2006, 2007).

Human agency is also a factor that might explain differential conservation of outcrops. From an historic perspective, economic activities in the area of the PAVC mainly comprise agriculture (wine, olives and almonds), occasional quarrying and the construction of infrastructures such as roads, electrical lines and so forth. Farming, due to the sizeable dimension of total cultivated areas, is the most disruptive activity for the survival of outcrops. It is very reasonable to suppose many (again, engraved or not) have been lost over the last two millennia<sup>9</sup>. However, due to the higher amounts of solar radiation received, generally speaking, South (and, to less degree, East) facing slopes have been traditionally more exploited by farmers than slopes belonging with other orientations (Bennie *et al.* 2008). This appears to be the case in the Côa (see Fig. 11). Therefore, the chances of outcrops in South facing slopes having "survived" farming activities would have been lesser than of those located in North slopes.



**Fig. 11.** The South facing slope of Vale de José Esteves rock art site. Notice the existence of terraces where olive and almond groves were planted. Albeit historical land use for farming purposes, this site still holds 31 outcrops of which only one is located in the North facing slope from where the photo was taken (see Fig. 7).

### ***Cultural motivations***

It is believed, due to the reasons enunciated above, that geomorphologic and environment constraints alone are not enough to explain the discrepancy in aspect. Therefore, the cultural motivations that might have been behind the choice of outcrops to engrave by UP artists are the second available option to try to explain such divergence. There are not many studies on open-air rock art that mention the relationship between aspect and location of motifs. In the case of the Côa, Baptista and García Díez (2002) carried out a discussion of the spatial organization of the Côa Valley rock art complex. However, albeit considering the orientation of the slopes and rock outcrops as a factor in spatial organization, the authors focused more on the relationship between site distribution, local geomorphology (location of sites regarding main or secondary waterways, river banks and altitude) and execution, stylistic and chronologic (within the UP) similarities and unconformities.

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<sup>9</sup> See Fernandes (2006) for a description of rock art protective measures currently enforced by the PAVC.

Considering aspect, they noted the Côa slopes and outcrops possessing UP imagery overwhelmingly face southeast. However, this piece of information could not be related to any graphical and landscape feature (Baptista & García Díez 2002: 201). Fairén-Jimenez (2009), working on Northumberland rock art, arrived to same conclusion whilst Loubser *et al.* (2000) related the scarcity of North facing panels in Miller Island (Oregon, USA) to the action of weathering processes. On the other hand, Coles, referring to southern Scandinavia Bronze Age rock art states "The living rock was chosen (...) presenting shallowly-sloping surfaces that often faced to the west, to be illuminated by the rising sun as the viewer stood at the base of the slope, gazing to the east up the rock surface"<sup>10</sup> (2005, 195; author's emphasis). In spite of significant formal and contextual differences between Scandinavian Bronze Age carvings and the Côa Valley UP rock art, it is believed that the sun's motion will be part of an explanation of aspect discrepancy in the case at hands. However, this might prove a slippery interpretative avenue to follow if it is suggested that there is a connection between UP religious or spiritual beliefs, the rising or setting sun and the aspect discrepancy. That is, it will not be suggested that the Côa engravers worshiped the sun moreover when there are no motifs attributable to the UP representing our star<sup>11</sup>.

The argument of why engravers overwhelmingly preferred the slopes that receive higher amounts of sunshine will revolve around two ideas. Firstly, if we consider the UP human habitat sites already identified in the area, we notice that all three located in the bottom of the valley (Fariseu, Quinta da Barca Sul and Cardina) are on the left margin of the Côa (Aubry *et al.* 2002). In Cardina, the site with more ancient levels, dating back to the early Gravettian, no engraved outcrops have been found nearby. The Fariseu and Quinta da Barca Sul sites have more recent levels of Solutrean and Magdalenian chronology. While in Quinta da Barca Sul UP rock art has been identified in its immediate vicinities (namely the Quinta da Barca rock art site), excavations in Fariseu unearthed Magdalenian and Solutrean layers that were covering up the motif packed (more than 80) Fariseu's rock 1 (Aubry & Sampaio 2008). Aubry *et al.* state that the "principal ensembles of engravings are found on (...) blocks (that) face south and accumulate heat during the day" (2002, 75). Giving the connection between identified habitat sites and rock art it is suggested that UP groups engraved outcrops in the immediate vicinities of the areas they inhabited. South and East facing slopes, being considerably warmer than North and West facing ones, were preferred to establish habitat sites and thus to "create" what today is classified as "rock art sites". If this line of analysis is taken further, it might equally be suggested that the preferred time to engrave outcrops and to look at motifs would be during the morning when the sunlight fully illuminated the panels<sup>12</sup>.

The second hypothesis that might help to explain the aspect discrepancy has to do with the way UP groups perceived their wider territory. Considering that the closest

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<sup>10</sup> Coles is suggesting that "the sun rises in the East and as it shines down the sloping rock face, the images are illuminated" (personal communication). What is of most interest to the Côa case is not the orientation of the panels themselves, but the fact that the sun's motion may have determined, in Southern Scandinavia, the choice of panels to carve.

<sup>11</sup> Curiously, there is at least one Historic period representation of the sun. It is located on rock 9 of Canada do Inferno (Baptista 1999, 186), a left bank East facing site.

<sup>12</sup> It should of course be mentioned the engravings might have been done and/or viewed at night with the help of torches or lamps, similar to the ones used in caves (Beaune 1987). However, it is suggested that motifs would be simpler to do and/or more fully visible in the sunlight.

potential sources of Gravettian lithic tools found in the UP habitat sites identified in the Côa lay one or two hundred kilometers to the South, the Southeast or the Southwest, two hypotheses for their procurement are put forward (Aubry *et al.* 2002, Aubry and Mangado 2006). The first proposes that the same group exploited the vast territory encompassing the Côa Valley and stone sources. The second suggests that different groups present in this region exchanged commodities between them. This second proposition might hint that the Côa Valley could have been a meeting place for different groups where goods were traded and intergroup ties were strengthened (Luís and García Díez 2008). One of the ways these ties could be reinforced was by carving, in a structured fashion, meaningful motifs in the outcrops thus constructing a landscape, which the creation act itself might have turned into a "sanctuary".

The foot of river valleys would be the best path to travel along such an uneven territory such as this area of the Iberian Peninsula<sup>13</sup>. Figure 11 reveals that the Côa Valley is at the intersection of an East-West route provided by the Douro Valley with a South-North route made available by the Côa and the Sabor Valleys. The group or groups<sup>14</sup> that travelled regularly to the Côa did so from the South located areas where stone resources were present. Therefore, individuals reached the Valley from the South and, it is suggested, they saw and experienced it from South to North, hence the overwhelming majority of South facing engraved outcrops. The mental map of the Valley was structured in a South to North fashion. Engravings facing northbound travelers could have been a way of signaling the arrival to "sanctuary" grounds but also to advise on the precise direction(s) to follow, once inside the precinct, in order to reach "shrines" on the main waterway or in small perpendicular tributaries. Individuals could then visit the different "shrines" hiking along "pilgrimage" paths, probably idealized to be used in an iterative fashion. The most prominent or rich in motifs engraved outcrops (such as Ribeira de Piscos 13 –see Fig. 6) would also mark the visitor's arrival at some of the "inner shrines" in the sanctuary.

One of the suggested routes to enter the Côa would be via the Massueime stream. The Massueime's mouth is only 3km. from the Penascosa/Quinta da Barca Gravettian ensemble of engraved rocks (Baptista *et al.* 2006), which would symbolically and de facto mark the entrance in the "consecrated" territory. Since it was necessary to effectively signal entrance, this grouping extended throughout two opposing East (Quinta da Barca) and West (Penascosa) slopes being, in fact, the later the only site, of archaic chronology, located on the right bank of the Côa. This entrance route would also help to explain why the rock art complex develops towards the North after the Massueime's mouth. Although from the Massueime's mouth southwards there exists harder to engrave granite formations whilst northwards the smooth schist outcrops can be found, towards the south there is at least one archaic phase UP motif<sup>15</sup>. So, it was not (only) the hardness of the granite that prevented UP artists of engraving motifs southwards from the Massueime's mouth. For Pleistocene

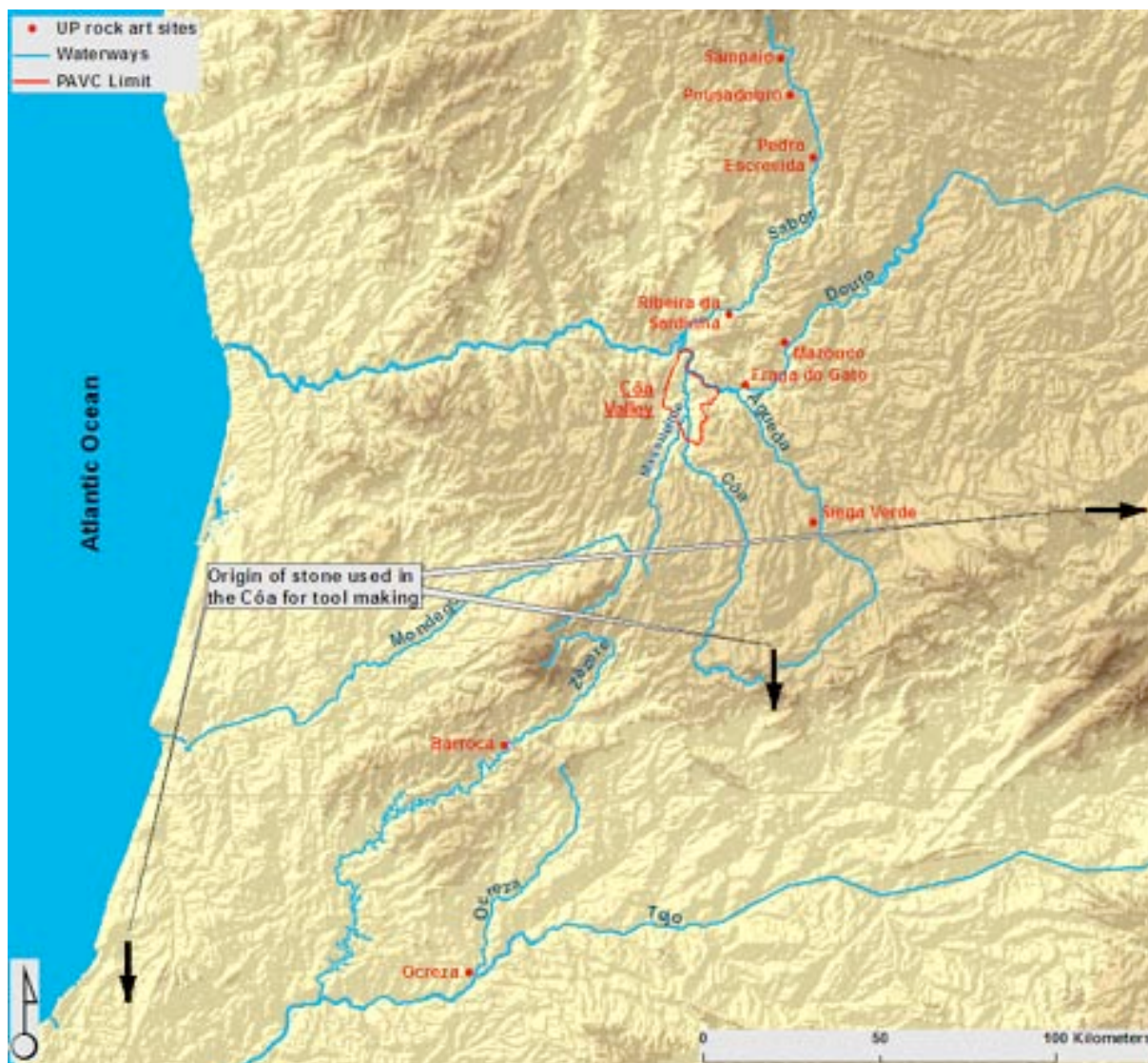
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<sup>13</sup> A notion reinforced by the vast majority of open-air rock art (and not only in the Côa) to be found on river banks at low altitude.

<sup>14</sup> For our argument regarding UP perception of the landscape, it is of no great importance if the Valley was seasonally occupied by a single group or by several. Therefore, hereafter singular and plural will be used indistinctly.

<sup>15</sup> Located in Faia rock 6. UP rock art to the south of the Massueime's mouth can also be found in Quinta da Moreirola and Alto da Cotovia. These two sites, that were not included in our analysis (see note 5), have 5 outcrops with UP motifs.

groups, regardless of precise UP chronologies, it is proposed that the final stretch of the Côa from the Massueime's mouth until its confluence with the Douro was considered the most important part of the "consecrated" territory. All other regional sites (see Fig. 12), possessing altogether less than 10 engraved outcrops<sup>16</sup>, were peripheral serving as outer markers of a wide area of which the Côa was the heart.



**Fig. 12.** The PAVC in its regional setting. Coming from the south and southwest, the Massueime is pointed out as one of the possible entry routes in the Côa. Obviously, there are more possibilities as many waterways in the area have a South to North orientation, including the Côa itself. Regarding all indicated rock art sites outside the Côa, note that they are all located in East or South facing margins with the exception of Ribeira da Sardinha. DEM source: A. Jarvis, H.I. Reuter, A. Nelson, E. Guevara, 2008, Hole-filled seamless SRTM data V4, International Centre for Tropical Agriculture (CIAT), available from <http://srtm.csi.cgiar.org>.

<sup>16</sup> With the exception of Siega Verde that, as noted above, possesses 91 outcrops. This site may have transitorily functioned as a sort of substitute to the Côa "sanctuary" (due, for instance, to momentaneous inaccessibility of the Côa, caused by severe weather changes), in a complementary fashion to the Côa, or even, at a given time, as its "competitor".

In the course of this paper, it has been frequently mentioned the sanctuary hypothesis to interpret how the great concentration of motifs of the Côa could have had functioned socially (and economically)<sup>17</sup>. Nevertheless, it is supposed that the Côa was an area richer in food resources than other locations in the region, especially during the summer or in extremely dry years, due to a nearly constant flow of water (Aubry *et al.* 2002). Therefore, the Côa, besides its hypothetical role as a sanctuary, could also have been an area where groups would almost constantly find sustenance sources. Indeed, as that affluence extremely impressed individuals they felt "obliged" to "consecrate" this particular part of the physical world by impregnating it with their symbols. This dedication would also be part of the landscape creation process<sup>18</sup>. Aspect of slopes, as it has been attempted to demonstrate, played a vital role, during UP times in the Côa, in such a process.

A fact that must be mentioned regarding aspect discrepancy and cultural motivations is the "quality" of outcrops<sup>19</sup>. Apparently, due to a geomorphologic caprice, panels in outcrops located in East and South facing slopes are smoother and with less fractured and wider areas to engrave. Therefore, those "better" quality surfaces where chosen to be engraved (Mário Reis, personal communication). There are two major objections to this argument. Firstly, as the West facing important Penascosa site shows, if it was deemed important to engrave inferior "quality" panels, UP artists did it. Penascosa, possesses 26 different engraved outcrops, many of them of "inferior" quality. As it has been suggested (Fernandes 2008), most were already in poor condition as of UP times. The second objection as to do with present day judgments perceived on "inferior" or "superior" quality outcrops. We have no way of knowing what UP artists thought on this matter. While it is entirely reasonable, in this day and age, to suppose and construct interpretation models for rock art, it must be stressed that this kind of aesthetic judgment on the geological "quality" of panels can prove to be quite subjective.

## Conclusion

Although this study did not attempt to ascertain if there are any chronological variations, within the UP, of aspect distribution of the rock art outcrops, available data suggests that the only major spatial organization shift between the Gravettian-Solutrean archaic phase and the Magdalenian has to do with a northwards dislocation, towards the Côa's mouth, of the central nucleus of the "sanctuary". Regarding aspect, the preference for East and South facing slopes remained. On the other hand, rock art of more recent chronologies still keeps up with this tradition of preferentially engraving in East and South facing slopes. It may be noted that, if there was a kind of "reinforcement of might", with their own coeval symbols, of the rock art motifs and sites<sup>20</sup>, regarding aspect engravers from more recent times significantly followed the pattern established in the most archaic period of the UP.

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<sup>17</sup> See Coimbra (2009) for a discussion on the criteria that can serve as a basis to consider open-air rock art sites as sanctuaries.

<sup>18</sup> Ingold (2000) notes that the "landscape" is a human invention aimed at assisting human beings understanding (and placing ourselves in) nature and (on) its motion.

<sup>19</sup> To completely ascertain the role of "quality" of outcrops in choice of outcrops, it would be required to add a "ranking of quality" to the above mentioned unfulfilled count of the total number of outcrops available in the area.

<sup>20</sup> Most sites (see Fig. 2), especially in the main valley, have motifs, sometimes in the same outcrops, of different chronologies.

As Leroi-Gourhan (1992, for instance) suggests, rock art is not the mere piling up of motifs in haphazardly chosen locations. In the case of the Côa, the present author has elsewhere tried to demonstrate that shapes, tones or prominent location as well as the existence of fractures might have determined the selection, in the UP, of outcrops to engrave. It is not a case for the properties of outcrops themselves but of the culturally driven fashion in which these were perceived. In any case, culturally driven motivations are a strong premise to explain the fact that in the Côa, out of many thousands of outcrops, only a few were chosen to be engraved (Fernandes 2008). In these lines it has been argued that aspect is another feature of outcrops that decisively influenced the choice of panels to engrave. Even if the present paper is a speculative exercise, it is tied to the existent data on the overall Côa Valley Pleistocene art context.

Concluding, it has been attempted to demonstrate that the connection between aspect and Côa rock art is a significant one. The current analysis may also shed some light on what would have been UP landscape creation processes. While human beings try to carve their own niche in the physical world (also) by creating landscapes imbued of significant symbols (such as rock art) that physical world still restrains, determines yet inspires such a construction.

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