

25 kya – 15 kya A Shaky Start

We enter the Last Glacial Maximum with modern hunter-gatherers having established a tentative hold on the Iberian Peninsula, at least the outer coastal areas and favoured areas a little further inland.

The modern hunter-gatherers had built a network that allowed ideas, materials and people to move around. It had taken them about 20,000 years to get this far-and they were now to face a severe test of their endurance.

Hunter-gatherers tended to merge into the landscape, they moved through it rather than over it. They did not try to modify the land in which they lived so the primary reasons for them to change their way of life, the tools they used or the area they inhabited are the fluctuations of temperature and humidity during the extremely long *longue durée* wave of climate.

The climate and the geography, upland areas, sheltered valleys, coastal plains etc., together with any peripheral influences, such as large bodies of water, in this case the Mediterranean and Atlantic Oceans, determine the vegetation which in turn determines the fauna.

Since climate and vegetation are the key factors during this period, it will be helpful to look at the weather from 26 kya to 15 kya, the Last Glacial Maximum.

The Iberian Peninsula can be divided north south at roughly latitude 40° North. The north tended to be more humid with greater precipitation and was comparatively densely populated whilst the south was dryer and less densely populated. Throughout the period the climate was unstable with dry and cold conditions interspersed with comparatively warm phases.

The last Glacial Maximum was the coldest period so far experienced by modern man. Combined with extreme aridity, plant, animal and human life became impossible. Despite his ability to adapt in situ, large areas of Europe became uninhabitable and were abandoned.

Within Europe vast areas became de-populated; southern Britain, northern France, the Low Countries, Switzerland, Germany, Poland, the Czech Republic and Slovakia. Surviving human populations were in the southwest and the partially merged Italian and Balkan peninsulas.

The period from 18 kya until about 15.6 kya, included the driest and coldest conditions experienced in the Iberian Peninsula during the Last Glacial Maximum with reduced annual rainfall and temperature, increased seasonality of rainfall and increased aridity. Local geographical features combined with local peripheral influences produced small-scale regional patterns.

In contrast to northern Europe, while cold, southern Europe, with greater insolation (the amount of sunlight over a set period of time) many areas of montane relief and water courses that also permitted the growth of at least dense non-arboreal vegetation (grazing land), rich and diverse ungulate (all hooved animals) faunas, the marine resources of coastlines, karstic bedrock in many regions with abundant caves and rock shelters in sheltered valleys, was viable and even quite favourable for the survival of highly competent hunting-based societies.

Separated by the Pyrenees there were two favoured areas, southern France with abundant reindeer and horse and a landscape of steppe-tundra, and the Iberian Peninsula with red deer and

ibex. Both had a sprinkling of bison and chamois and, in highly selective areas, wild boar and roe deer.

During the Last Glacial Maximum, most of the Iberian Peninsula was covered by largely treeless landscapes ranging from grassland or heathland to steppe, dotted with small stands of pine, juniper and sometime birch trees. Warm-loving deciduous trees were limited to very sheltered valleys mainly in the southernmost habitats of the Peninsula – Andalusia and also locally in regions such as Catalunya and even Galicia.

There will have been many bare, rocky upper and north-facing slopes. Trees in the majority of the Iberian Peninsula were probably clustered in sheltered areas, such as south-facing lower slopes, adjacent to reliable watercourses.

Areas with karstic bedrock and hence a good selection of caves would have been favoured. While the northern Atlantic region was still relatively humid, the Ebro Valley, SE Spain and southern Portugal were largely arid. Like the trees, humans must have sought out the most sheltered spots for residential habitation, ones with caves facing south or west, available water, wood for fuel, etc. Favoured areas would also have to have reliable game and other food resources. Not surprisingly, many of the caves preferred by humans in the coastal regions of the Peninsula continued to be used during this period, but many more sites appear on record, especially in Vasco-Cantabria and in Andalusia, which during the Last Glacial Maximum, was a particularly favourable region within the greater SW European refugium.

Elsewhere on the Iberian Peninsula, in Cantabria, the southern belt down the foothills of the Pyrenees, Galicia, Asturias and northern Portugal, populations remained but reduced in number and, from the quantity of artefacts recovered from levels dated to this period, occupations were of short duration and not very repetitive. Fewer bands were having to be more mobile in order to survive and this is reflected in the greater number of sites discovered but with only a scattering of artefacts at each site.

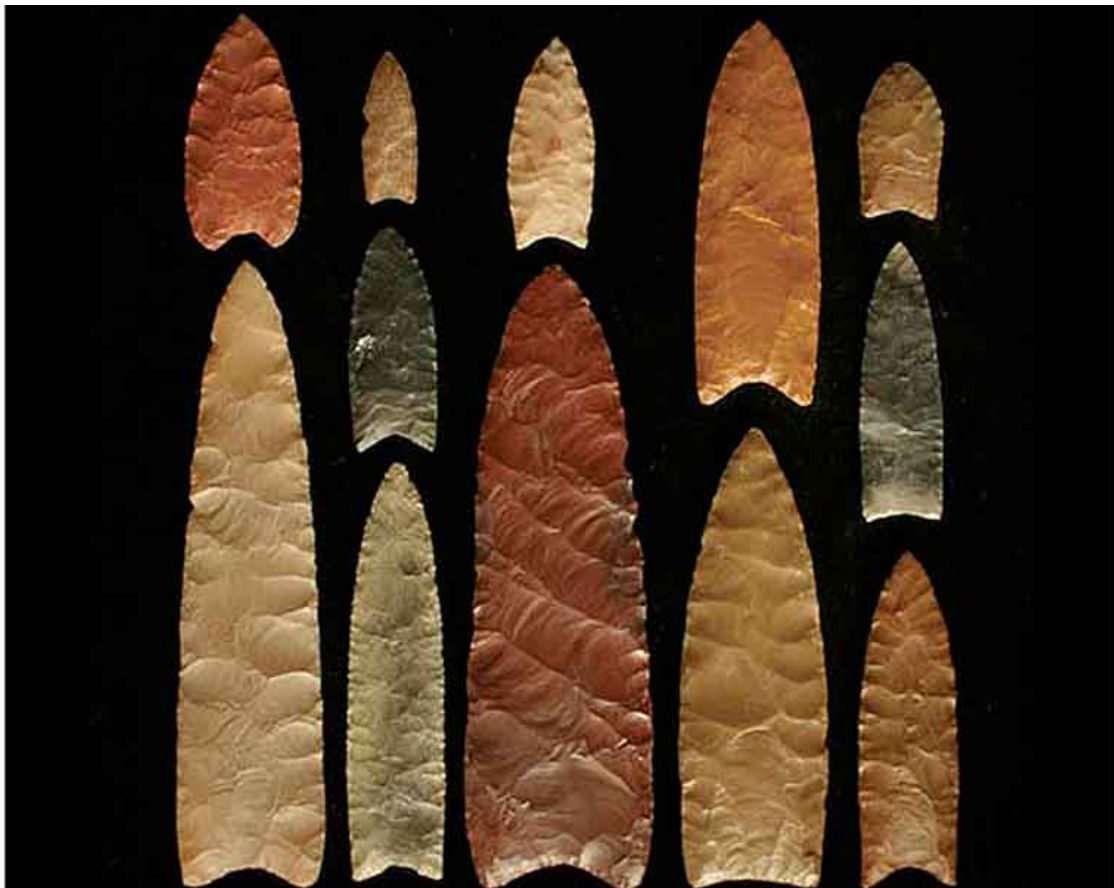
Archaeological evidence indicates that, generally, populations on the Iberian Peninsula were already desperately thin on the ground - they decreased during the cold snaps and recovered during the warming periods. We have already mentioned this in connection with the advance of modern humans into the area. One exception to this trend within Europe, is an area of Andalusia that is sheltered from the cold winds flowing off the Meseta, and under the benign influence of a warming sea, the southern Iberian coast below the Sierra Nevada mountains.

Modern hunter-gatherers temporarily found their nirvana in southern Andalusia within a local restricted area and with a very varied ecological diversity created by the abrupt transition from mountain to sea. The tendency in such places, where all daily, monthly and annual needs are available close at hand, is for populations to increase and coalesce into more permanent settlements and adopt more sedentary lifestyles. Whilst this phenomenon is rare for hunter-gatherers it is not entirely unknown, it occurred at a similar time in the upper reaches of the Nile and the upper Jordan valley. A more sedentary lifestyle allows more time for original thought and innovation, especially if that contemplation can take place in a warm, sunny environment when the rest of the continent is decidedly chilly. We shall return to this towards the end of the chapter.

The communications and support networks established over the previous twenty thousand years, now, in this time of stress, came into their own. The people of southern France remained connected to those of southern Spain and through them to the populations in Portugal and Cantabria. Without the network, that allowed people to maintain social contacts to find mates and to ensure availability of help during times of crisis, the modern human could easily have disappeared from Europe during this period. We can only speculate that re-population under those circumstances would have been purely from the east. The network that had served our first Andalucians so well during their long trek through the Iberian Peninsula was now starting to solidify into a viable means of communication that would pay huge dividends in the future.

The contraction and expansion of the networks is traced through finds of Solutrean tools. They became the tools of choice for the discerning hunter gatherer in southwest Europe.

Solutrean Toolkit

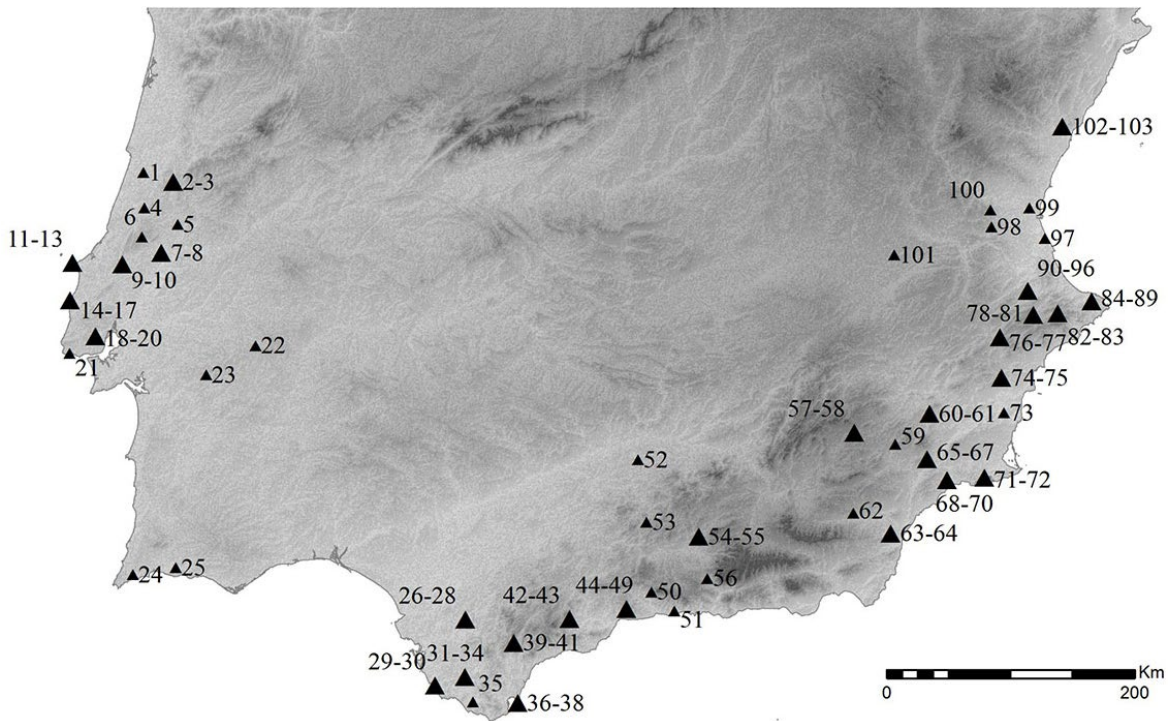


The Solutrean toolkit is a bit of an enigma. Whilst the finished products are clearly 'new models' of Gravettian tools, the manufacturing techniques had never been seen before and, when the techniques disappeared archaeologically about 20 -21 kya, to make way for another method, the Magdalenian, they were not recovered for thousands of years. The toolkit appeared and disappeared during the Last Glacial Maximum, the time of the most severe conditions of cold and aridity for humans in Europe, that may have sparked off an upsurge in the acquisition of more efficient weapons for hunting and finally saw off the last of the Neanderthals in Andalucia.

The Solutrean ensemble consists of a suite of tools, spear heads, arrow points and so on. All have relatively finely worked, bifacial points made with lithic reduction percussion and pressure flaking, rather than cruder methods of flintknapping. Solutrean knapping was done using antler batons, hardwood batons and soft stone hammers. This method permitted the working of delicate slivers of flint to make light projectiles and even elaborate barbed and tanged arrowheads. Large thin spearheads; scrapers with the edge not on the side but on the end; flint knives and saws, but all still chipped, not ground or polished; long spear-points, with tang and shoulder on one side only, are also characteristic implements of this industry. They are unlike any other contemporary tool kit being used elsewhere. Solutrean tools have been found at 121 sites in France and 164 sites in Spain and Portugal. The greatest concentration of sites overall is in the Iberian Peninsula, in the southern areas of Andalucia – strong evidence that the industry originated there. At the merest hint of a warming climate, the bearers of these magnificent Solutrean spearheads would expand into southern France from their heartland in areas such as La Cueva de Ambrosio in Almeria and Nerja cave in Malaga province.

Even though specific local styles of points on Solutrean projectiles emerged, studies of stylistic similarities of the stonework indicate a wide communications network with major sites, where habitation is frequent and artefact numbers indicate a larger than normal population. Associated with these larger sites are wide flung minor sites, where habitation is infrequent and artefact numbers indicate a small population. Sometimes there will be two major sites in the same cluster of minor sites.

Solutrean Sites in the Southern Iberian Peninsula



1. Ourão; 2–3. Buraca Grande, Buraca Escura; 4. Lagar Velho; 5. Caldeirão; 6. Lapa do Anecrial; 7–8. Almonda, Casal do Cepo; 9–10. Olival da Carneira, Passal; 11–13. Furninha, Casa da Moura, Lapa do Suão; 14–17. Lapa da Rainha, Porto Dinheiro, Baío, Vale Almoinha; 18–20. Gruta de Salemas, Gruta do Correio-Mor, Rua de Campolide; 21. Poço Velho; 22. Monte da Fainha; 23. Gruta do Escoural; 24. Vale Boi; 25. Vala; 26–28. C. Higueral S. Valleja, Llanos de Don Pedro, La Escalera 3; 29–30. La Fontanilla, Casa de Postas; 31–34. Choritto, Cubeta de la Paja, Tajo de la Figuras, C. de Levante; 35. C. del Moro; 36–38. Río Palmones, Sewell's Cave, Gorham's Cave; 39–41. C. del Higueral de Motillas, Abrigo del Bombín, C. de la Pileta; 42–43. Trinidad de Ardales, C. Tajo del Jorox; 44–49. El Bajondillo, Toro, Complejo del Humo, C. del Hoyo de la Mina, C. del Higuérón, C. de la Araña; 50. C. Boquete de Zafarraya; 51. C. de Nerja; 52. Peña Grieta; 53. El Pirulejo; 54–55. C. de Malalmuerzo, Pantano de Cubillas; 56. C. de los Hojos; 57–58. C. de Ambrosio, Chiquita de los Treinta; 59. Barranco de la Hoz; 60–61. Finca Doña Martina, La Boja; 62. Almaceta; 63–64. C. de los Morceguillos, C. del Serrón-Palica; 65–67. Hoyo de Pescadores, C. de Cejo del Pantano, C. de la Moneda; 68–70. C. del Palomarico, Los Tollos, C. Horadada; 71–72. C. Hernández Ros, C. Vermeja; 73. Los Mortolitos; 74–75. Ratla del Bubo, C. del Sol; 76–77. Cantos Visera, Viña de Huesca Tacaña; 78–81. Troncal de la Corona, C. Beneito, C. Negra, Pinaret dels Frares; 82–83. C. de Reinós, C. de Sta. Maria; 84–89. C. del Cendres, C. de les Calaveres, C. Ampla del Cap Gros, C. del Montgó, Abrigo del Capurri, Font de Maria Rosa; 90–96. C. dels Porcs, C. del Llop, C. de les Maravelles, C. del Parpalló, Rates Penaes, C. de Barranc Blanc, C. de les Mallaetes; 97. Volcan del Faro; 98. Covalta; 99. Balsa de la Dehesa; 100. C. del Llentiscle; 101. Palomar; 102–103 Pla de la Pitja, Corral Blanc.

Major Solutrean Sites on the Iberian Peninsula

In the north, the most important sites include Las Caldas and La Riera/Cueto de la Mina (Asturias), Altamira, El Pendo and La Pasiega (Cantabria), Antolina, Aitzbitarte, Amalda (Basque Country).

In Catalunya the principal sites are Caude les Goges, Reclau Viver and l'Arbreda.

In Valencia, Parpallo, Les Mallaetes, Les Cendres and Santa Maira.

In Andalucia, Nerja and Ambrosio.

In Portugal, Caldeirao (Estremadura), Olga Grande and Cardina at Coa (ex-Alto Douro), and Vale Boi (Algarve).

Lesser Solutrean Sites on the Iberian Peninsula

Associated with those 'major' sites are the minor sites that together build up a picture of the web of routes that made up the network. It can be seen that this basically builds on the original network set up from 45,000 years ago.

The Atlantic and Mediterranean worlds were connected via the Ebro Basin, where there are several Solutrean sites at Abauntz, Chaves and Fuente del Trucho.

The central Asturian cluster of sites along the Nalon Valley may be linked to the sites of Coa by at least one recently discovered site in Galicia (Valverde) and another in northeast Portugal in the Douro tributary Sabor river valley (Foz do Medal).

The important Portuguese - Estremadura site cluster may be connected to Vale Boi by Solutrean evidence at Escoural in Alentejo.

Lesser Solutrean Sites in Andalucia

Andalucia appears to be cut off, culturally, if not geographically, from direct contact with southern Portugal during this phase. Instead the network starts in the south. The sites are often in clusters and some of the very minor sites are open air sites, the only evidence being Solutrean tools found there and, in some cases Solutrean art. The locations in bold are caves or shelters that also show signs of Solutrean art.

In Cadiz province Cueva Higueral, Valleja, Llanos de Don Pedro and La Escalera form a tight grouping on the south western edge of the Cordillera Beticas, overlooking, but not within, the Guadalquivir valley

On the Atlantic coast of Cadiz, La Fontanilla and Casa de Postas form a group possible linked to another coastal site 30 kms south, **Cueva del Moro**, north and south of Barbate.

Moving a few kilometres inland, Choritto, Cubeta de la Paja, Tajo de la Figuras and Cueva de Levante are in the southern foothills of the Cordillera Beticas.

Gorhams Cave, Rio Palmones and Sewell's Cave are three coastal sites at the southern tip of Andalucia.

On either side of the Malaga/Cadiz province border, **Cueva del Higueral de Motillas**, Abrigo del Bombín and **Cueva de la Pileta** form a tight grouping on the southeast facing slopes of the Cordillera Beticas.

Trinidad de Ardales and Cueva Tajo del Jorox are between the Cordillera Beticas and at the western edge of the Cordillera Penibeticas in Malaga province

On the southern flank of the Cordillera Penibeticas, on the coast, is a group of six sites, El Bajondillo, **Toro**, Complejo del Humo, Cueva del Hoyo de la Mina, **Cueva del Higuero** and Cueva de la Araña. The next two sites were only a few kilometres away and may have formed part of the latter group.

On the southern flanks of the Cordillera Penibeticas you find Cueva Boquete de Zafarraya and, 20 kms southeast on the coast, **Cueva de Nerja**.

Peña Grieta is an isolated site near Porcuna in Jaen province. It is on the northern flank of the Cordillera Subbeticas and the only site actually in the Guadalquivir valley although towards its eastern extremity.

El Pirulejo is about 50 kilometres south of Peña Grieta in the Cordillera Subbeticas itself, near Priego de Cordoba, in Cordoba province.

Cueva de Malalmuerzo and Pantano de Cubillas are high, mountain sites north of Granada, again in the Cordillera Subbeticas

Cueva de los Hojos is on the southern side of the Sierra Nevada, part of the Cordillera Penibetica in Granada province.

Cueva de Ambrosio and Chiquita de los Treinta are in the easternmost part of Almeria, high in the Cordillera Subbeticas

Almaceta is in the Cordillera Penibetica in Almeria.

Cueva de los Morceguillos and Cueva del Serrón-Palica, are coastal sites in Eastern Almeria

The Andalucian and Valencian sites are now linked by the rock shelter sites of La Boja and La Finca de Dona Martina in Murcia. (You will remember Murcia had little to show for the Aurignacian and Gravettian periods). Finds include stemmed or winged (Parpallo) points, but also large numbers of backed bladelets, especially in Dona Martina dated to about 23 kya.

The whole southern arc of Solutrean sites is characterized by stemmed or winged (corner-notched) points, from Casa da Moura north of Lisbon to Vale Boi to Ambrosio (with many extraordinarily elegant, delicate examples, presumably representing a significant interaction sphere, just as do the concave base points of the Cantabrian region. There are traces of Solutrean occupation in the lowest level of El Pirulejo Cave in Cordoba.

For the first time there is evidence of penetration of the deep interior of Spain, presumably during a warming period, as indicated by the sites of Las Delicias and El Sotillo in Madrid and Pena Capon

in Guadalajara. These interior sites were only inhabited infrequently over a short stretch of time and then abandoned.

It is not only the ideas and finished products that moved around the networks. Raw materials also circulated. The presence of non-local flints from Old Castile at the Coa sites is indicative of short range Solutrean movements in the area and possibly beyond. A C14 date squarely within the Solutrean range associated with a small set of artefacts (that included two perforated marine shells) in the site of Maltravieso (Caceres), also known for its cave art, might also point to contacts between the southern Portuguese sites and the Spanish interior.

Whilst short range movement may have been a frequent occurrence, longer range movement, of raw materials was likely to have been less frequent. Evidence for such long-distance interactions include the distinctive flints of Chalusse (Les Landes, SW France) and the trans-Cordilleran areas of Alava, Trevino and Navarra that are present in Solutrean sites from central Asturias (Las Caldas) to central Cantabria (Altamira) to Vizcaya (Antolina).

As mentioned, Solutrean sites occur in clusters and these are separated by empty areas or areas with only a few finds. The impression is that some locales were favoured for settlement, while other areas were less hospitable, although they had to be crossed for contact with other human bands. It is tempting to imagine that some of the 'major' sites, were places at which the various bands congregated at certain times of the year.

The distinctive Solutrean weapons technology of invasively retouched (uni- and bifacial) points and either invasively and/or backed points, as well as tanged points, began to appear in both France and the Iberian Peninsula around 25 kya. In general, it is clear that the Solutrean used a common manufacturing technique to develop local manifestations of the Gravettian toolkit and that the social networks already in place among bands in southern France and around the peripheries of the Iberian Peninsula spread the new weapon tips and the ideas for them and their manufacture.

Soon after the appearance of the Solutrean tool making tradition, cave art took on a different, or at least a more advanced, form; engraved pictographs and stone friezes, in particular relief sculptures carved on blocks representing fat-bellied, short-legged animals. Stone working skills transferred from tool making to art.

The distribution of Solutrean artefact sites in Andalucia, suggests that there were 15 groups in total. They were concentrated on the coast and the parallel Cordilleras behind the coast with an emphasis on the western end of the Cordilleras Beticas and the Cordillera Penibetica, i.e. the Cordilleras closest to the coast. Only towards the eastern part of the region do we find sites further inland in the eastern parts of the Cordillera Subbetica. Apart from the one stray open-air site of Peña Grieta, the valley of the Guadalquivir and the Sierra Morena north of the Guadalquivir valley, remain deserted. Of those groups, eight had within the group, at least one cave with paintings. The remainder had decorated caves (with no artefacts found) within 10 kilometres.

The coastal sites are interesting due to the paintings found in some caves, that could indicate a pubescent seafaring ability, if only inshore fishing. Nearly 150 fish images are known in cave art in 30 caves from this period. They concentrate in France and the Iberian Peninsula with the latter

focusing on Nerja and La Pileta caves, indirect evidence that these early Andalucians had a sea going ability.

Cave Art at Pileta Cave



Creator: Tom Raftery

The oldest paintings at La Pileta date back to 18,000 BC and the most recent in the 1st millennium BC. The images from the earlier period consists of about 60 animal figures (horses, goats, bulls and ibex) painted in yellow, orange, red, white and black (some painted with fingers), as well as some hunting scenes containing human figures armed with raised spears. In addition, the cave has about 50 abstract signs (serpentiforms, spirals, zig-zag, criss-cross lines, meanders). One figure of an auroch has been dated to 18,130 BC, during the Solutrean period. Another is of a 1.5 metre diameter flatfish, thought to be a halibut, with what looks like a seal inside it.

At Nerja cave there are an incredible thirty species of fish represented in drawings, mainly small fish found close inshore, but including sturgeon, Atlantic cod, haddock and pollock that came through the Gibraltar Strait from the Atlantic in order to feed. The marine profile for the Alboran Sea at this time, is as strange to modern eyes as the flora onshore, both caused by the climatic conditions.

Apart from illustrating the skill of the artist, the drawings do indicate that during the last glacial maximum, coastal residents of Andalucia were using marine resources to vary their diet.

There are two groups within the coastal sites that had the potential to become something more than just places to survive.

The Gorham's Cave group and the El Bajondillo group met all the requirements for a more sedentary existence, as discussed briefly above. Gorhams had a coastal environment at Gibraltar with good hunting on the Rock itself, an estuarine environment at Palmones at the head of Algeciras Bay to the west and decent hunting and gathering in the vicinity of Sewel Cave (also known as Goat's Hair Twin Caves) on Gibraltar.

The El Bajondilla, combined group, is even more blessed with seven coastal sites stretching from Torremolinos to Nerja, backed by a range of mountains and one high level site, and the nearby wide valley and estuary of the Rio Velez. The Nerja decorated cave may have acted as a central meeting point. The high concentration of sites would indicate that a notion of society, beyond that of family, is emerging. As yet, there is no archaeological evidence to suggest that this was manifested in elite burials.

However, all the groups had skilled artists. Some of the art was created deep within caves that had not been occupied, indicating a purely spiritual purpose, the drawings and engravings perhaps created by a shaman. It is believed that even early hunter-gatherer tribes had shamans, people who could induce upon themselves a trance like state as part of a ritual and communicate with good and evil spirits. The depictions of animals and humans in cave art reveal a world full of constant movement, symbolism and ritual. The consistent nature of the images and carvings indicates a school of artists or even a school of shamans rather than independent eruptions of creativity across the Iberian Peninsula. A first indicator of a proto-religion?

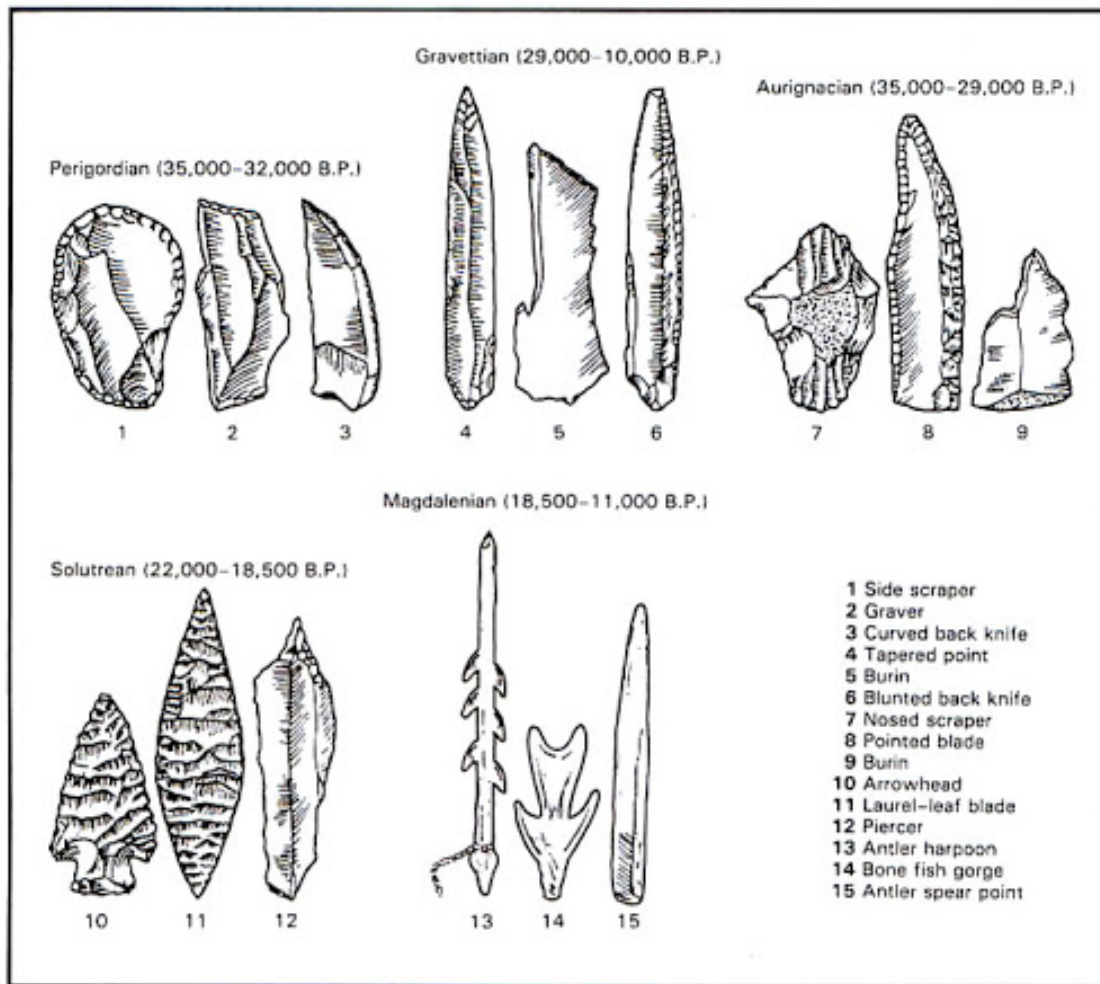
Table of the Solutrean cave art sites in Andalucia

| Site | Province | Type | Habitat | Phases |
|--------------------------|----------|-------------|--------------|---------------------------------------|
| Ambrosio | Almería | Rockshelter | At the site | Solutrean |
| Almaceta | Almería | Cave | Within 10 km | Solutrean |
| Piedras Blancas | Almería | Open-air | Within 10 km | Solutrean |
| Malalmuerzo | Granada | Cave | At the site | Solutrean |
| Morrón | Jaén | Cave | Within 10 km | Solutrean |
| Nerja | Málaga | Cave | At the site | Solutrean and Magdalenian |
| Higuerón | Málaga | Cave | At the site | Solutrean and Magdalenian |
| Victoria | Málaga | Cave | Within 1 km | Solutrean |
| Navarro | Málaga | Cave | At the site | Solutrean |
| Toro | Málaga | Cave | Within 1 km | Solutrean |
| Doña Trinidad de Ardales | Málaga | Cave | At the site | Gravettian and Solutrean |
| La Pileta | Málaga | Cave | Within 10 km | Gravettian, Solutrean and Magdalenian |
| Moro | Cádiz | Rockshelter | Within 1 km | Solutrean |
| Motillas | Cádiz | Cave | At the site | Solutrean |
| Atlanterra | Cádiz | Rockshelter | Within 10 km | Solutrean |
| Ciervo | Cádiz | Rockshelter | Within 10 km | Solutrean |
| La Jara | Cádiz | Rockshelter | Within 10 km | Solutrean |
| El Realillo | Cádiz | Rockshelter | Within 10 km | Solutrean |

In addition to cave art, the people of this time produced portable art. Over 2,300 engraved stone slabs have been collected from just one location, El Parpallo, in Valencia. The slabs, decorated with engravings of animals, also occur at Les Mallaetes in Valencia, and Nerja and Gorham's Caves in Andalucia. Shells are common in many sites, as are perforated red deer teeth. An interesting find was several mammoth ivory plaques from Cantabrian sites, from an ever-depleting group of mammoths, they disappeared from the Iberian Peninsula about 10 kya, victims of increasing warmth and loss of habitat rather than hunting. Perforated and decorated antlers from the canny deer that managed to survive climate change and the predations of man are common.

Somewhere between 20 and 21 kya, the Solutrean toolkit started to disappear in Iberia to be replaced with the Magdalenian. As with the transition from Gravettian to Solutrean, the replacement did not occur overnight, or all in one place. Individual improvements were made to existing Solutrean tools and, if they proved efficient, those improvements permeated through the networks. New tools appeared and likewise filtered through the networks.

Comparison of Toolkits



Magdalenian stone tools include small geometrically shaped stone implements (e.g., triangles, semilunar blades) probably set into bone or antler handles to enable efficient use, burins (a sort of chisel), scrapers, borers, backed bladelets, and shouldered and leaf-shaped projectile points. The Magdalenian tool industry is also known for its increased use of bone and ivory implements, a direct progression from the Solutrean. Bone spear points, harpoon-heads, borers, hooks and needles become more prevalent. The Magdalenian flourished in northern parts of the Iberian Peninsula and even penetrated into the central Meseta. Catalunya and Valencia have numerous sites and the two areas were connected via the Ebro river. Portugal too has a sprinkling of Magdalenian sites. From the archaeology it looks as though site numbers increased throughout the Iberian Peninsula, including the cold interior, for the next 4,000 years. In Cantabria and Valencia, the creation of engraved objects, portable art and cave paintings blossomed during this period. However, in Andalucia, the situation is bleak between about 20 and 18 kya.

There is a lone site in Andalucía that has been shown to pertain to this period: El Pirulejo (Córdoba), where an archaeological level dates to 17.4 kya and contains a decorated antler wand reminiscent of ones from the Magdalenian of the north, with a dominance of burins and small

flake tools. It is noteworthy that the whole early Magdalenian is missing from the long sequence in Nerja Cave (Málaga) and the impressive Solutrean sequence in Ambrosio (Almería) represents the end of human occupation of the rockshelter.

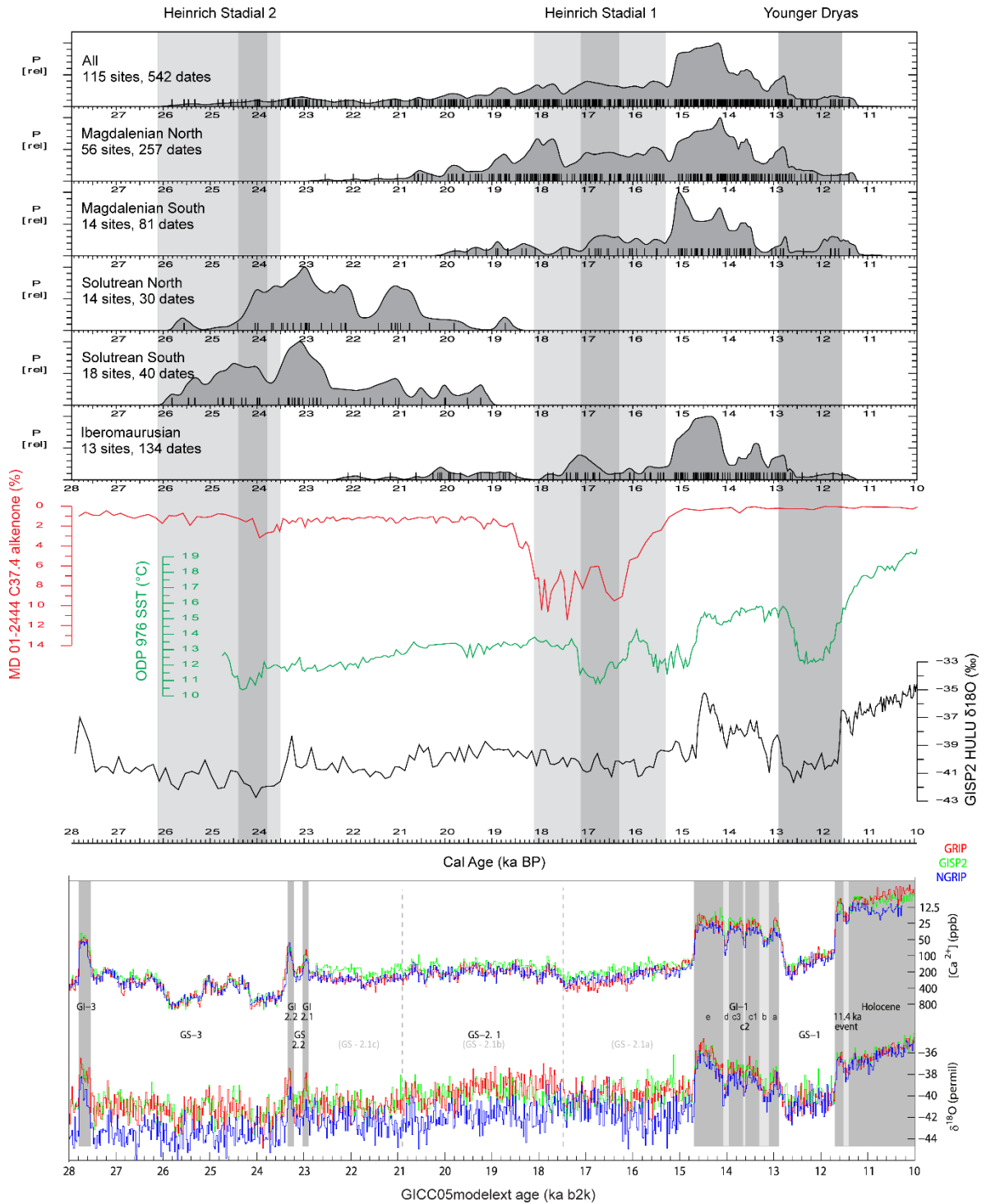
Map-with-the-main-Magdalenian-and-Epimagdalenian-sites



Andalucía, (at least at the present time) seems largely devoid of evidence for human occupation between 20 and 18 kya, indicating a significant decline in human population, or even abandonment. Small highly mobile bands require more territory to survive. They leave meagre amounts of evidence in many places but cannot consolidate into larger groups.

As we leave the Iberian Peninsula about 16 kya we see how fragile that initial hold on the Iberian Peninsula really was. Populations had waxed and waned, depending on the variations of climate and vegetation. Humans were continuously improving their skills and tools in order to combat the weather. Small bands, highly mobile, requiring more territory to survive, leave evidence in many places but cannot consolidate into larger groups. Locally, at the beginning of the period, Andalucia is a sought-after area, by the end, Andalucia appears to have been abandoned, or at least so thinly populated that there is no trace.

The following charts show the comparative populations over this period. The Iberomaurusian data refers to population levels in North Africa over the same period.



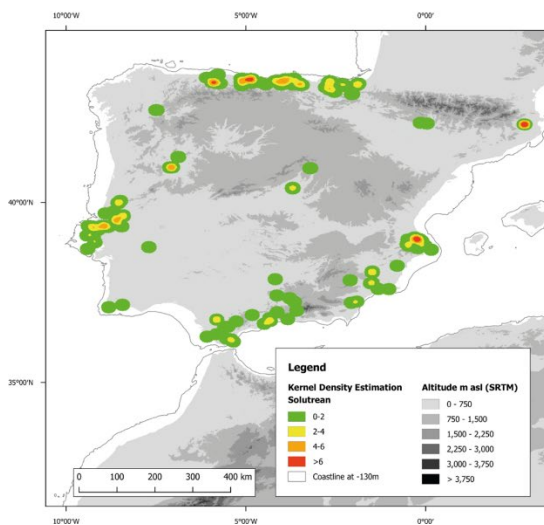
Recent research has tried to pin down just how many sites and people there were in the Iberian Peninsula during the Solutrean and Magdalenian tool industry periods. It uses a method called Kernel Density Estimation (KDE), a tool often used in archaeological studies to visualize and interpret site clusters and Wobst's Mating Network Model.

Wobst divides hunter-gatherer populations into minimum bands forming a network with other minimum bands. The purpose of these networks is communication, trade, and ensuring mating partners. Each minimum band is composed of about 25 individuals (cited the "magical number" for group size of hunter-gatherers) and is ideally arranged in a hexagonal honeycomb structure with 6 neighbouring minimum bands. Following his simulations, a mating network must comprise of at least 175 individuals, given no mating restrictions, and up to at least 475, with various restrictions.

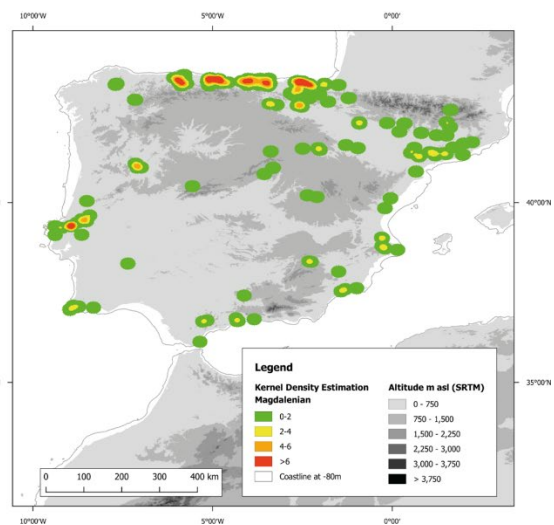
A maximum viable travelling distance to neighbouring bands has to be assumed. Fortunately, a paleoecologist by the name of Stein Mandryk has already arrived at a number that seems to work – 214.8 kilometres.

Hexagons are placed on known sites and circles, 214.8 kilometres in radius are drawn around the centre point of each of the ranges. If the number of neighbours exceeds 6, the range is deemed sustainable.

Kernel Density Estimation Solutrean

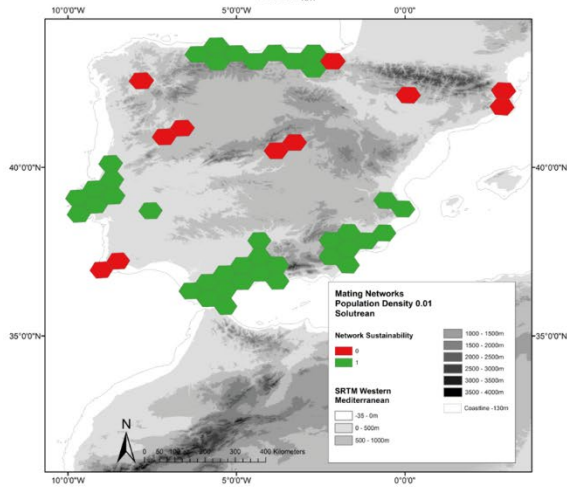


Kernel Density Estimation Magdalenian



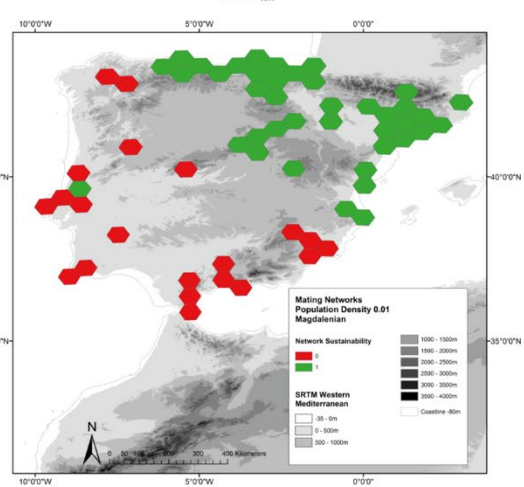
Solutrean

$0.01 \frac{P}{km^2}$

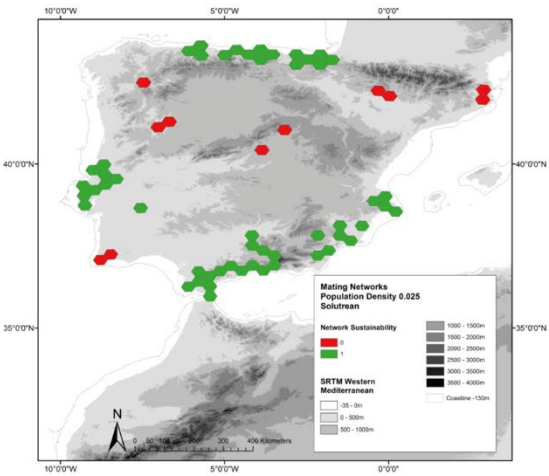


Magdalenian

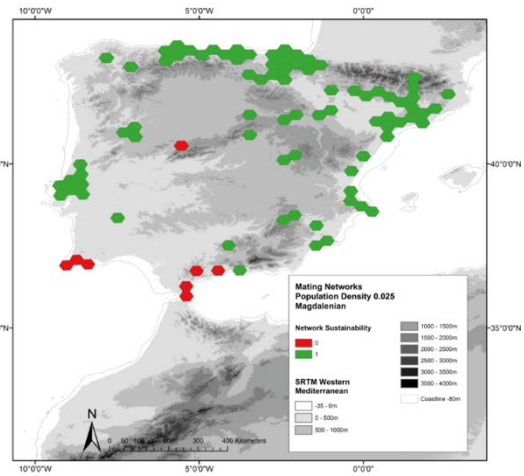
$0.01 \frac{P}{km^2}$



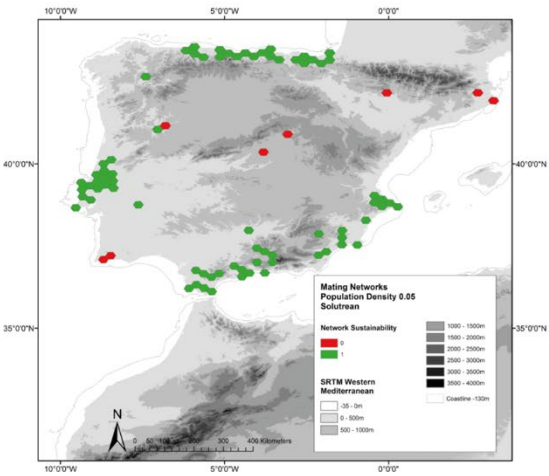
$0.025 \frac{P}{km^2}$



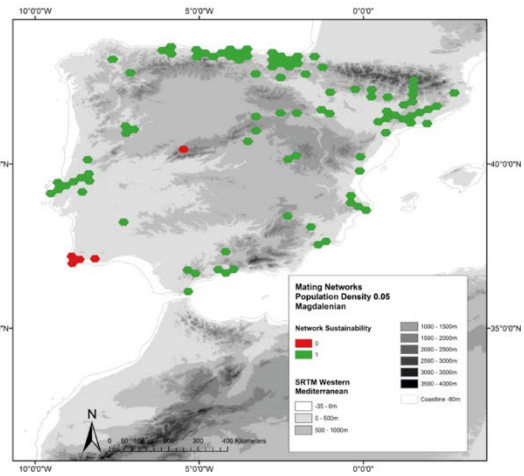
$0.025 \frac{P}{km^2}$



$0.05 \frac{P}{km^2}$



$0.05 \frac{P}{km^2}$



You can play with the size of range, increasing or decreasing the range size to still accommodate 25 people at varying densities until you reach a point where the land just cannot sustain any more people.

The model under the worst conditions with the highest range and smallest population density of 0.01 people per km² shows large stable networks during the Solutrean in all settlement areas except for the Interior.

This changes dramatically in the Magdalenian era. Southern Iberia including Portugal disintegrates into patchy isolated settlement areas and small, unstable networks. However, in contrast to the preceding Solutrean, the Magdalenian networks in the north now expand into Central Iberia. A clear division roughly around Latitude 40° North from the west to east through the Iberian Peninsula can be seen.

Only one band below this line could theoretically form a stable network; however, as this network is comprised of unsustainable minimum bands, its lifespan would be limited to that of the surrounding bands. Clearly, under the worst conditions, the Magdalenian in the south would not have been sustainable in the long-term.

With a simulated increase in population density to 0.025 people per km², the pattern on the Iberian Peninsula during the Solutrean remains unchanged. The Magdalenian fares much better, although bands in the far south would still not be stable in the long term. Only at a population density of 0.05 people per km² does the Magdalenian settlement become stable over most regions of the Iberian Peninsula, with only the far southwest and a part of the interior as an exception. The relatively high threshold of 0.025 to 0.05 people per km² indicates that the Southern Iberian Peninsula was probably unstable for human settlement during the Magdalenian.

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