

Location of hillfort culture settlements by means of aerial archaeology in the municipality of Carral, Galicia

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Abstract

The use of aerial photography as an archaeological tool allows the identification of archaeological remains and human settlements, and may also provide knowledge about their evolution within their surroundings. However, this identification must be accompanied by the support of documentary or oral sources as, in some cases, aerial photography by itself does not allow their identification, due to the changes and the evolution of the countryside.

Using the potential of aerial photography to identify the archaeological heritage, various Iron Age settlements were analysed in an area of the northwest of the Iberian Peninsula, specifically in an area in the municipality of Carral. These settlements are termed “castros”, and are characteristic of the Hillfort or Castro (Castrexa Culture) in Galicia,

1. Introduction

From the 19th century, changes have occurred in the way the land is occupied, whether through the needs of agricultural use, the increase of infrastructure, or the manner in which new ways to inhabit it have been developed. These changes, generated by human pressure, have hidden or, in numerous cases, erased archaeological settlements which, once abandoned, have been concealed by the topography, with their archaeological heritage and location having been blurred with the passage of the centuries.

New free and open access to digital tools and the digitalization of existing documentary collections, are essential in identifying these archaeological elements in the land. These tools have great potential and offer the researcher the possibility of complementing traditionally used resources. Utilities, such as those developed in the international sphere by Google Maps and the Europeana European initiative, are complemented with local research applications, such as those of the region of the Autonomous Community of Galicia. Among the latter maybe highlighted those of the “Instituto de Estudos do Territorio de Galicia (CMATI)”, the services of digitisation of historical cartographies and documents of “Galiciana, Biblioteca Dixital de Galicia”, and the “Infraestrutura de Datos Espaciais de Galicia (IDEG)”, essential tools in cartographic research in this region.

Technological development is generating new tools, such as the use of drones for obtaining high-resolution aerial photographs of specific areas in real time, which complement research studies.

With respect to the digitisation of collections of aerial photographs, the series of photographs “American Flight, Series A” was taken in Spain by the government of the United States between 1945 and 1946. They were taken at the end of World War II for strategic

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reasons in the face of possible conflicts with the Soviet Union. This resource consists of 435 reels of film at a scale of 1:50,000.

As Fernández García (Fernandez and Linares 1997) indicated, “... *the flight series A... offers us a snapshot of the Country in the first stage of its long post-war period, during which the dominion of the traditional agrarian activities was reinforced, without the processes having yet begun that were to have a major economic and spatial importance*”.

These aerial photographs are considered unique of their type from the past that are available to us today, hence their enormous importance. The “American Flight” can be considered as the unique photography of the past preserved.

2. Objective

The objective of the present study is to use aerial archaeology to identify and to catalogue Iron Age settlements, called castros, in the municipality of Carral. These settlements are characteristic of the Castrexa Culture in Galicia. Some are perfectly locatable at the present time whilst others have left no trace.

The present study has sourced written references, cartography and aerial photogrammetry from 1945, called “American Flight, Series A”, comparing them with aerial photographs taken during 2015. This has allowed verification of the evolution of the land and the present state of conservation. The study area, Carral, in the Autonomous Community of Galicia, is indicated in Figure 1; Figure 2 shows its location in the historical map of 1696 of the *Regno di Galicia*, by the geographer Cantelli da Vignola.



Figure 1. Spain, Galicia region and general location of the study area



Figure 2. Area of study in the historical map by Cantelli da Vignola, 1696

3. The influence of demographic pressure on the land

The settlements and human infrastructure have not made a uniform impact on the land during the different stages of history, and that impact has been mainly due to population growth and agricultural activity.

Galicia has almost as many toponym variants as the rest of Spain. The changes in the fabric of the Galician landscape during the last 50 years have been made even more complex, due to abandonment of the countryside, urbanization of the rural environment, changes in the agrarian systems and to the creation of roads that modify the fabric of the habitat (Sánchez Pardo 2013:84). The same author (*ibid*:446) indicates: “*Most geographers and historians share the idea that the general structure of the settlement, in traditional rural Galicia, has remained relatively stable since at least the Later Middle Ages until the 60’s of the last century. This means that we can learn about the origins and evolution of rural settlement from its present, by means of regressive analysis*”.

Data from the Spanish National Statistics Institute (INE), from 1842 to 2011, the years for which data exist, were consulted to investigate the demographic evolution of the number of inhabitants and homes, in order to study the evolution of the municipality of Carral. These data are shown in Figure 3, which also shows the date of the American Flight in the years 1945–1946. The graph shows a population growth during the decade of the 1930s, while the number of homes remained stable. It was at the start of the 21st century when both the population and the homes increased, generating urban pressure, reaching 2,300 homes in 2011; this number is double that of the 1940s, the time of the American Flight, when there were 1,100 homes.

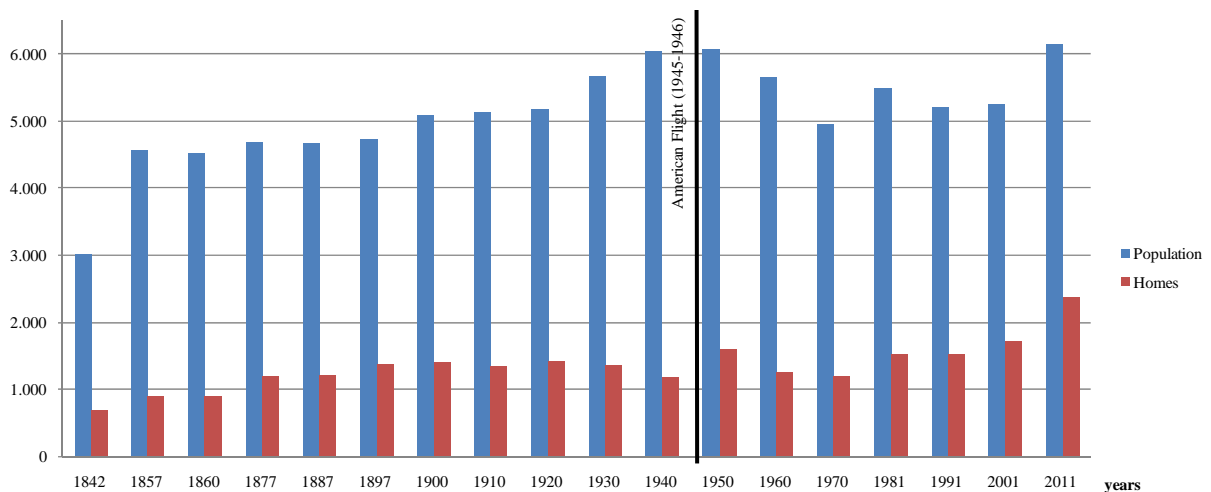


Figure 3. Carral Municipality: historical evolution of inhabitants and homes, 1842 to 2011 (Source: author’s production from INE data 2015)

4. The organisation of the population in Castros

The current total number of castros that exist in Galicia is unknown. In addition, the different zones offer very different densities, which is why their quantification is difficult. There are a high number of toponym variants in Galicia, 570 according to the source <http://toponimia.xunta.es/Buscador>, and of those, 421 include the name of “castro”. However, regarding the different numbers of castros, authors quantify them from 1,300 to 5,000. Specifically, the geographer Abel Bohuier (Villares 1984) establishes a margin between 2,000 and 2,500. The same numbers are indicated by the archaeologist Felipe Arias Vilas “it is

calculated that there are between 2,500 and 3,000 castros, reaching 5,000 for some authors, such as Ángel del Castillo” (Arias1984:17).

The updated query of databases gives approximately 2,080 inventoried castros in the official Xunta de Galicia web page (<http://inventariopatrimoniocultural.xunta.es/>) and 624 castros in the “Patrimonio Galego” initiative, both still in the updating phase. This large number of castros and their distribution, is due to the idiosyncrasy of the dispersion of population in the Autonomous Community of Galicia and the north of Portugal, with a high density of occupation of the space and a wide network of roads and communication routes.

Regarding their distribution, the historian Manuel Murguía indicated “*that they form a circle around themselves does not seem strange if, as the locals assure us, the castros can be seen one from another and the valleys or zones that they dominate form a circle*”, (Murguía 1865:526). This proliferation and dispersion of castros, generates a highly humanised landscape, accumulating a legacy that remained inhabited from the Iron Age to mediaeval times and maintains a strong rural character at the present time.

5. Methodology

To locate settlements by means of aerial archaeology it is necessary to complement the geographic analysis with an historical analysis, establishing a method of analysis that Orella Unzué terms “geo-historical analysis” (Orella 2010:266), which combines field work, plans and maps of the land and an ethnographic study through interviewing the inhabitants, all of which are basic for approaching the study of documents and aerial photography.

The area of research was limited to the municipality of Carral, which has varied historical remains and which has been an area of confluence of various routes (Freire Priegue 1998); the most important being the Camino Inglés de Santiago, or the English Way to Santiago, the backbone of the region, which links the axes of commercial development between A Coruña, Betanzos and Santiago de Compostela.

The methodology was established in two phases:

- Firstly, the references on historical settlements were identified geographically, consulting documentary references (Vilar Hermidas 1996, 1999), urban plans of the Council of Carral, and topographic maps at a scale of 1:25,000 of the Spanish National Geographic Institute (IGN).
- Secondly, the different archaeological environments were located in the present cartography, to collate them with the oldest available aerial photogrammetry, the so-called “American Flight, Series A” (1945-1946) and “Series B” (1956-1957).

5.1. Identification of castros

Ten archaeological elements were identified according to documents from various sources in the municipality of Carral, and are indicated in Table 1.

Table 1. Elements identified in the study and their present state.

Historical element	Municipality	Current situation
Church & Castro de Paleo complex	Paleo, Carral	existing (forest road)damaged (agricultural works)
Castro de Ans	Carral	damaged (house construction)
Castro de Ameás	Ameás, Carral	damaged (agricultural works)
Castro-Fortress Castelo ⁴	Ans de Tellado, Carral	hidden

⁴“Another example might be O Castelo, in the south east of Paleo parish (Carral). In the American Flight photographs, it is possible to distinguish an oval feature of about 83 by 58 m in diameter, which is still visible in recent aerial photographs.

Castro de A Torre/Detorre	Quembre, Carral	damaged (agricultural works)
Castro de Gosende	Tabeaio, Carral	damaged (house construction)
Castro de Tabeaio	Tabeaio, Carral	hidden
Castro de Herves/Fortello	Herves, Carral	hidden
Castro Lourido	Cañás, Carral	hidden
Castro As Travesas	Herves, Carral	archaeological excavation

According to previous research, remains of ceramics and querns have been found in some settlements, as in the case of the church of Paleo (Erias 1990) and the Castro de Ameás (Fernández 2013). Others have been the object of archaeological excavations, as with the Castro de As Travesas (Fernández and Castro 2011). In addition to the ten castros identified in Carral, which are included in an area of 48 km², there are also another twenty-one castros nearby, pertaining to the neighbouring municipality of Abegondo, in an area of 84 km². Thus, we can define the density of castros in these areas which, in the case of Carral is one castro per 5 km², and in Abegondo, a greater density is found of one castro per 4 km².

These results were compared with those estimated for Galicia (total surface area of 29,574.4km²), and high, medium and low ratios which corresponded to an estimation of 5000, 3000 and 2000 castros respectively; this gave densities for high (one castro per 6 km²), medium (per 10 km²) and low ratios (per 15 km²). They were also compared with the densities suggested by the historian Sánchez Pardo for the historical land of Nendos or Nemitos (Sánchez Pardo 2006)⁵, with a density of one castro per 8km² (558 km², 72 castros). The results show that the density of castros in the municipality of Abegondo is very high, greater than the estimated high ratio for Galicia (Figure 4).

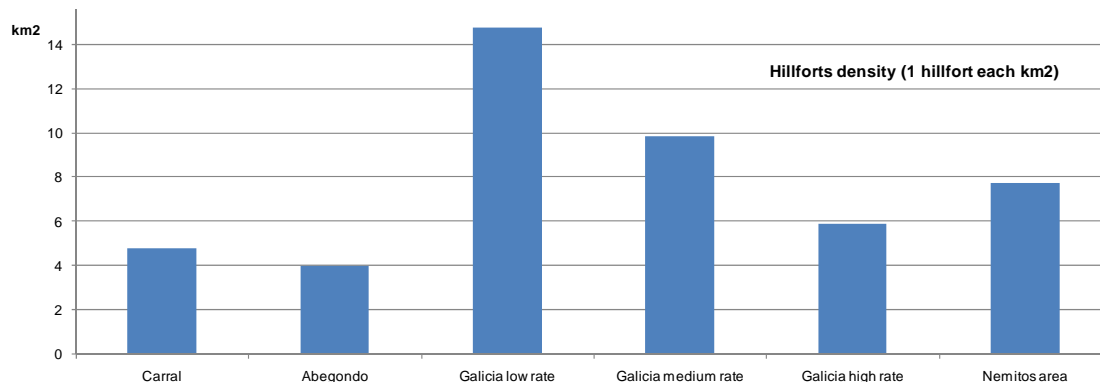


Figure 4. Density of castros in Galicia (high, medium and low), Carral and Abegondo. One castro per 5 km² is estimated for Carral.

5.2. Photo-interpretation of documented castros and the land in the aerial photographs of the American Flight

In this phase, all the settlements in the aerial photographs taken in the American Flight from 1945 were identified, and were in turn compared with the documentary sources.

Representative examples of those identified castros are shown below, to demonstrate the different models of occupying the land. The photo-interpretation appears according to the scale of analysis, whether at a detailed small scale, or at a large scale of the land. For each

This feature, partly defined by a row of trees, could possibly represent the remains of a medieval or modern fortification". (Sánchez and Fumadó 2013:188)

⁵Nendos or Nemitos, an area of land of about 558 km², which now includes the municipalities of Carral and Abegondo.

case, parameters were studied at the large and small scale, referring to the evolution of the land.

Those parameters at the large scale are:

- Uses of the adjacent land in the period of study, 1945 and 2015
- Whether their relationship with the land remains: Yes or No
- Whether the main communication routes remain: Yes or No

At the small scale:

- Arrangement of the land in 1945 and 2015
- Number of homes and buildings in 1945 and 2015

Figure 5 shows the case of the castro of Ans. The aerial photographs taken in the American Flight (left) and present aerial photography from 2015 are compared (right). Their GPS coordinates of latitude (north) and longitude (west), are indicated for their geographic location, in addition to the elevation (metres) of the land, as well as the approximate dimensions.



Figure 5. Castro of Ans, dimensions 150 x105 m, in 1945 (left), and in 2015 (right)
Latitude = 43.224819653; Longitude = -8.353978268; elevation=147.1m

The castro of Ans is characteristic of those located next to communication routes and populated areas. In this case it has been absorbed by the urban growth of the town of Carral (point 1 in Figure 5). The aerial photographs show the evolution in the uses of the land, changing from a cultivated zone to residential areas and a countryside without cultivation, with the main communication routes remaining (routes A and B in Figure 5).

Study of the parameters in the Castro of Ans:

At the large scale:

- Uses of adjacent land 1945/2015: agrarian/urban, educational and agrarian
- Relationship with the land remains?: No
- The main communication routes remain?: Yes

At the small scale:

- Arrangement of the land 1945/2015: 4 plots/7 plots, the geometry of the plots has varied
- Number of homes and buildings 1945/2015: 0/8

The castro of Ameás developed on a hill side next to a communication route (Figure 6, point A), without large population areas nearby, which is why the site has been completely conserved. The aerial photographs shows continuity in the uses of the land, with the “croa”

(central zone) of the castro (Figure 6, point 1) remaining in agrarian use, although a reservoir has been constructed within it.



Figure 6. Castro of Ameás, dimensions 190 x 200m, in 1945 (left) and in 2015 (right)
Latitude = 43.241003079; longitude = -8.322291796; elevation = 211.6m

Study of parameters in the Castro de Ameás:

At the large scale:

- Uses of adjacent land 1945/2015: agrarian, forestry/agrarian, forestry and residential
- Its relationship with the land remains?: Yes
- The main communication routes remain?: Yes

At the small scale:

- Arrangement of the land 1945/2015: 5 plots /7 plots, the geometry of the plots has varied
- Number of homes and buildings 1945/2015: 0/2

The Castro-Fortress Castelo, is located next to a small water course (1 in Figure 7), elevated on a small promontory, next to main secondary communication routes (A and B in Figure 7). There are no populated areas nearby, which is why the site has been completely conserved. The aerial photographs shows continuity in the uses of the land, although with more extensive wooded areas at the present time.



Figure 7. Castro-Fortress Castelo, dimensions 90 x 80 m, in 1945 (left), and in 2015 (right)
Latitude = 43.215644068; longitude = -8.361546551; elevation = 97.8m

Study of parameters in the Castro-Fortress Castelo:

At the large scale:

- Uses of adjacent land 1945/2015: agrarian, forestry/agrarian, forestry, residential
- Its relationship with the land remains?: Yes
- The main communication routes remain?: Yes

At the small scale:

- Arrangement of the land 1945/2015: 2 plots /2 plots, the geometry of the plots, has not varied
- Number of homes and buildings 1945/2015: 0/0

The castro A Torre / Detorre is situated on a hillside, next to a river on its North side (1 in Figure 8), where there is a considerable incline; it developed between two communication routes (A and B in Figure 8), without nearby population areas. The aerial photographs show the line of vegetation of the river course and a continuity in the uses of the land, due to its steep topography (delineated by the dotted line between 2-3 in Figure 8), with large wooded areas.



Figure 8. Castro A Torres / Detorre, dimensions 60 x 80m, in 1945 (left) and in 2015 (right)
Latitude = ; longitude = -8.372587112; elevation = 164.5m

Study of parameters in the castro A Torre / Detorre:

At the large scale:

- Uses of adjacent land 1945/2015: agrarian, forestry/agrarian, forestry
- Its relationship with the land remains?: Yes
- The main communication routes remain?: Yes

At the small scale:

- Arrangement of the land 1945/2015: 1 plot /1 plot, the geometry of the plots has not varied
- Number of homes and buildings 1945/2015: 1/2

The castro of Herves/Forteillo is situated next to a communication route (A in Figure 9), and is limited on its North face by a pronounced hillside and by a river (Figure 9). It is in a rural area, with zones of dispersed dwellings to the North (1 in Figure 9). The aerial photographs show the line of vegetation of the river course (2 in Figure 9) and a concealment of the castro due to the change from agricultural use to forestry, with the main wooded areas remaining.



Figure 9. Castro of Herves/Forteillo, dimensions 150 x140 m, in 1945 (left), and in 2015 (right)
 Latitude = 43.193351022; longitude = -8.362025145; elevation = 201.2m

Study of parameters in the castro of Herves/Forteillo:

At the large scale:

- Uses of adjacent land 1945/2015: agrarian/forestry
- Its relationship with the land remains?: Yes
- The main communication routes remain?: Yes

At the small scale:

- Arrangement of the land 1945/2015: 1 plot /1 plot, the geometry of the plots has not varied
- Number of homes and buildings 1945/2015: 0/0

The castro As Travesas is located next to main and secondary communication routes (A and B in Figure 10), without nearby population areas. The aerial photographs (Figure 10) show the different lines of walls of the castro, currently visible with the archaeological works undertaken; the presence of an electricity station next to its eastern part (1), and industrial uses (2), as well as the variation of the secondary route (B).



Figure 10. Castro As Travesas "Quenllo dos Mouros", dimensions 170 x 170 m, in 1945 (left), and in 2015 (right).
 Latitude = 43.165566391; longitude = -8.358738405; elevation = 436.0m

Study of parameters in the castro As Travesas:

At the large scale:

- Uses of adjacent land 1945/2015: agrarian/agrarian, industrial
- Its relationship with the land remains?: No
- The main communication routes remain?: Yes

At the small scale:

- Arrangement of the land 1945/2015: 1 plot /1 plot, the geometry of the plots has varied
- Number of homes and buildings 1945/2015: 0/0

In each case, it has been possible to study the evolution of the land by means of aerial photographs, analysing changes inland use, urban pressure and the existence of communication routes.

6. Conclusions

The use of aerial photographs as an archaeological tool has allowed identification of archaeological remains and human settlements, and knowledge to be gained about their evolution within their surroundings. However, this identification must be supported by documentary or oral sources, as in some cases aerial photographs alone do not allow their identification, due to the changes and the evolution of the land.

In the present study, the aerial photographs of the municipality of Carral was corroborated with documentary information, and field inspections during which ceramic and stone remains were found at surface level at some locations. This methodology allows non-destructive archaeological analyses for historical recovery and cataloguing to be made.

Thanks to the use of aerial photographs, some castros were located in the municipality of Carral which had not been previously identified. This has fulfilled the study objective of geographically locating and cataloguing the castros, which widened the geo-historical knowledge of the land. This identification is the first step to including these castros in the list of protected elements of historical heritage and in the municipal urban plans, enabling them to be the objects of future protection and other archaeological research.

The results obtained in this article demonstrate the possibilities offered by aerial photography for historical and archaeological research, not only on population settlements, but also for the study of communication routes.

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