

# **Radiometric dates from open-air archaeological contexts: El Mazo de la Castañera (Cantabria, Spain)**

Eduardo Carmona Ballestero (1), Cristina Vega Maeso (2)  
Servicio Territorial de Cultura de Valladolid. Junta de Castilla y León  
(1) educarmonabal@gmail.com, (2) cvegamaeso@gmail.com

**Abstract.** This work is focused on a project developed on El Mazo de la Castañera (Cantabria, Spain). The site is located in a temperate and humid region, with permanent vegetal coverage that limits observation of superficial evidence. In consequence there is a lack of open-air habitats: a problem linked to the low visibility of archaeological remains. For this reason, different methods should be used. Geophysical survey allows detecting non-visible archaeological evidence. After that, in order to check the accuracy of method a trial excavation was conducted in 2014 and 2015. Results were positive: open-air structures with organic fillings (charcoal and several planks in vertical position) have been discovered. Radiocarbon dating (AMS) provides a set of dates from Late Antiquity to Middle Age.

## **Fechas radiométricas de contextos arqueológicos al aire libre: El Mazo de la Castañera (Cantabria, España)**

**Resumen.** Este trabajo se centra en un proyecto desarrollado en El Mazo de la Castañera (Cantabria, España). El sitio está ubicado en una región templada y húmeda, con cobertura vegetal permanente que limita la observación de evidencias superficiales. En consecuencia, existe una falta de hábitats al aire libre: un problema vinculado a la escasa visibilidad de los restos arqueológicos. Por esta razón, deben utilizarse diferentes métodos. La prospección geofísica permite detectar evidencias arqueológicas no visibles. Posteriormente, para comprobar la exactitud del método, se realizó una excavación de prueba en 2014 y 2015. Los resultados fueron positivos: se han descubierto estructuras al aire libre con rellenos orgánicos (carbón vegetal y varias tablas en posición vertical). Radiocarbon dating (AMS) provee un conjunto de fechas desde la Antigüedad Tardía hasta la Edad Media.

## **1 Introducción**

El Mazo de La Castañera is located in Obregón (Fig. 1), municipality of Villaescusa (Cantabria, Spain). It is a small hill where alternates layers of clay and limestone cliffs in which are located caves and rock shelters. In some cases have archaeological remains from Paleolithic to Late Antiquity [Gom72, Rin82, Rui90, Ser01]. On one of them, El Abrigo de la Castañera, it has been conducted a research project directed by one of us (CVM). In fact, the results of the project have reinforced the known information, providing well contextualized data which have proved an intensive occupation from Neolithic to Bronze Age. To solve some specific issues related to this project have been carried out 4 fieldwork campaigns in the outer space near El Abrigo de la Castañera. Some of the results of this work are presented here.

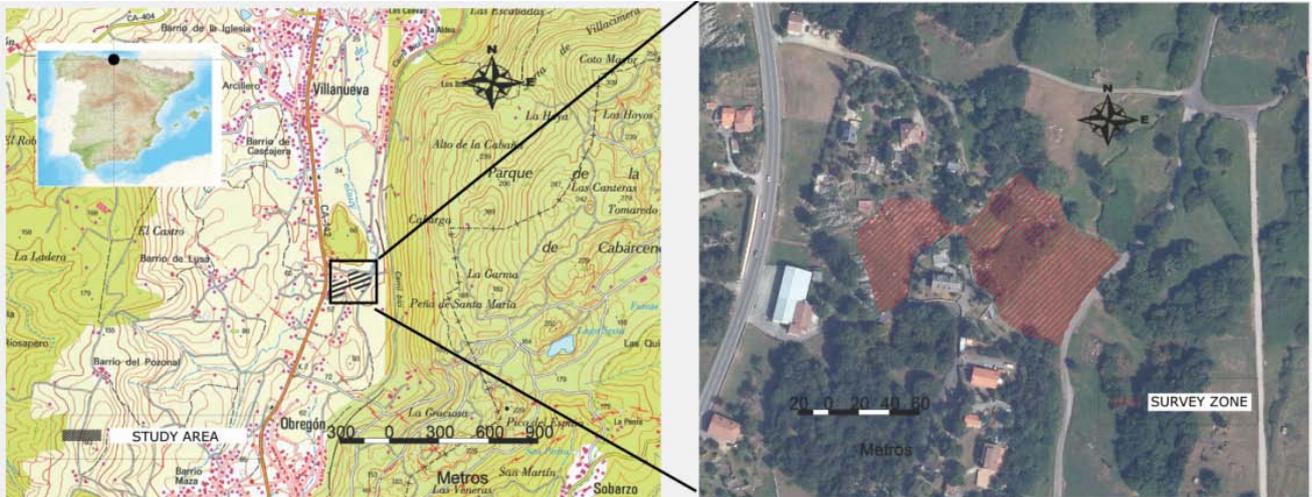


Figure 1 - Location of El Mazo de La Castañera

## 2 Objectives

The mentioned research project aimed to explore the potential archaeological record located on the nearby of the Abrigo de la Castañera. Especially data about open-air habitat were necessary because there is a notorious absence of this kind of sites in the Cantabrian region. The lack of habitats is linked to the low visibility of archaeological remains related to peasant communities from recent Prehistory (post holes, pits, thin deposits, etc.). These kinds of remains are difficult to detect with traditional survey because the environment has permanent vegetation coverage. In consequence, a different method should be employed.

## 3 Methods

### 3.1 Geophysical survey: Zone M1

In order to detect non-visible evidence a geophysical survey was conducted in El Mazo de la Castañera [Car16]. To get data the procedure employed was an electromagnetic induction survey. We worked on a 9 ha area divided into 6 different zones (M1 to 6) (Fig. 2). The data and its interpretation are presented by georeferenced surface maps. These maps provided images of some anomalies after we have analyzed and have processed the data. The aim of this method is to distinguish evidences of abnormal accumulations embedded into non-anthropogenic sedimentary soils. To cover the whole area with optimum quality and data density, we needed hike through the study area doing perpendicular tracks (1 meter between them). In consequence, we have obtained a mesh of each zone. Regarding available data about archaeology and geology, we have worked with a frequency that allowed collect data to 2.5 meters of depth. The purpose was to explore only the superficial layer where archaeological evidences should be found. The selected frequency was 47.175Hz, both electric and magnetic.



Figure 2 - Surveyed zones on El Mazo de la Castañera



Results were represented in two types of georeferenced surface maps: Electric conductivity (EC) and magnetic susceptibility (MS). These maps show surface anomalies which were detected after data analyzing and processing. The results show several potential evidences. More precisely, there are traces of anomalies which have some kind of geometrical design or sedimentary filling with archaeological potential. The detection of non-angular structures, with low intensity, is pretty difficult. Therefore, we had to present the results with high contrast in order to observe these traces. The results were different between zones. The most interesting were located in M1, M4 and M6. They show circular anomalies, with several sizes, that are gathered in some specific areas. It was also documented huge sedimentary packages with a high archaeological potential in several cave mouths. M1 shows several anomalies with geometrical shape (Fig 3), besides big sedimentary accumulations nearby rock shelter of Abrigo de la Castañera were detected. The most significative anomaly is a sedimentary rounded zone with a dark perimeter, and with a small anomaly in its centre.

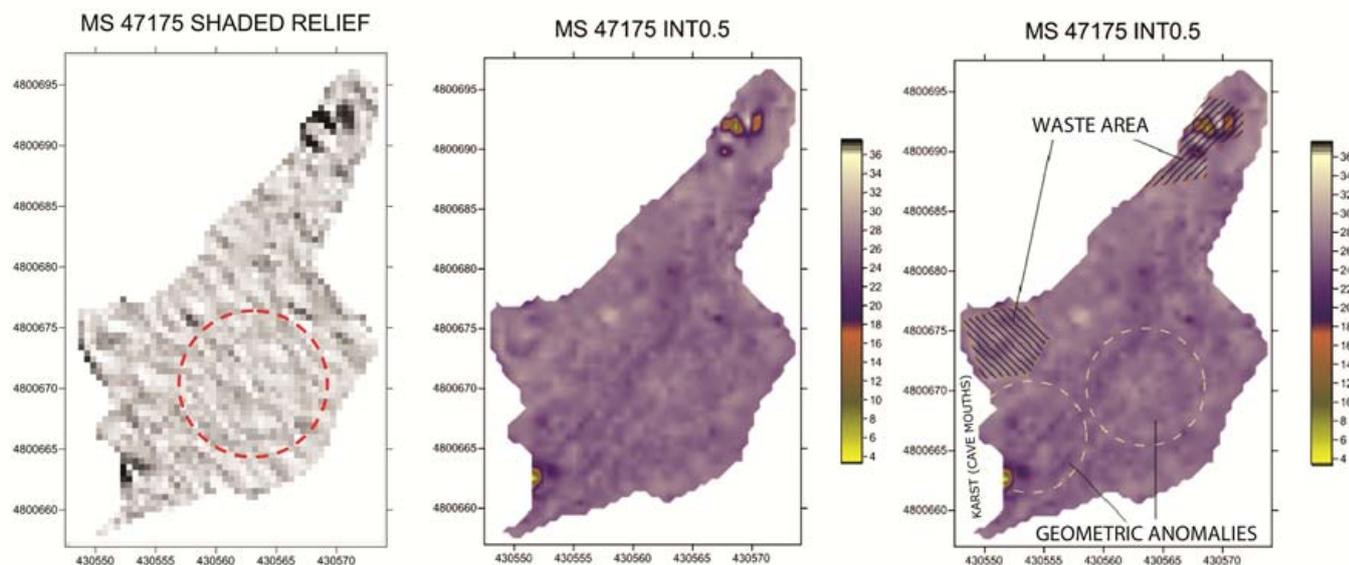


Figure 3 - Surface maps from M1 Zone: Magnetic Susceptibility (MS)

### 3.2 Exploring and checking anomalies

The anomalies detected suggest that it is possible to find archaeological structures related to open-air domestic zones. The research has documented several "hot spots" where we have focused the next step of research. In 2014 and 2015 we have conducted an archaeological excavation in zone M1 in order to check readings (Fig. 4). To do that, a 50m<sup>2</sup> trial excavation was opened. Underneath of 90 cm of quaternary fillings (SU 1) there were SU 2 and SU 10, reddish deposits with abundance of charcoal and a sporadic presence of small and rounded sherds of pottery. Also a few lithic artefacts were recovered. Covered by SU 2, several features have been discovered: a pit, postholes and a ditch with several planks in vertical position, filling by the same stratigraphic unit (SU 4). SU 10 (partially excavated) covered a couple of postholes.

It cannot determinate yet if archaeological evidence discovered is related to a dwelling or another kind of feature like a fence, a corral, etc. Nowadays the study of archaeological record from zone M1 is ongoing. For instance, we are waiting for results of several analytics (micromorphology, anthracology ...). All of them will provide interesting data in a near future.



Sondage 2014



Fieldwork 2014



Trial excavation 2015

Figure 4 - Archaeological excavation in zone M1

### 3.3 Radiocarbon dating

Since short-lived samples were not available, several samples of charcoal and sediment were dated by AMS radiocarbon dating. Samples were sent to the International Chemical Analysis form the University of Miami. Dates were calibrated with Oxcal 4.2.3 using ItnCal13 calibration curve [Rei13].

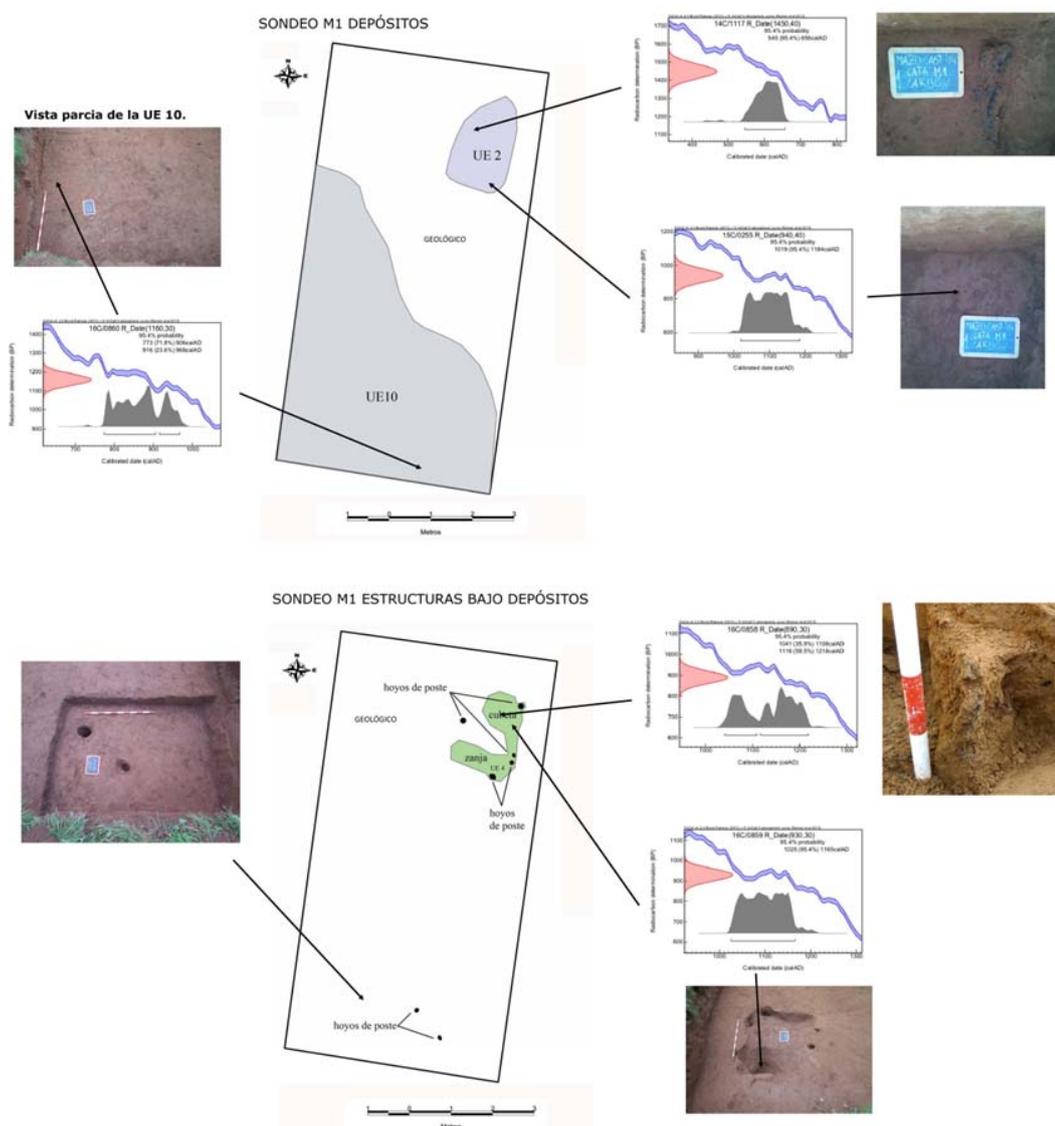
Samples were from different archaeological contexts (Table 1, fig.5). Results provided a set of dates from Late Antiquity and Middle Ages, which are unusual in Cantabria because dating from “modern contexts” is quite uncommon.



Table 1 - Radiometric dates from El Mazo de La Castañera

ICA ID	Date B.P.	Date Cal AD (2σ)	Material	Context	Age
14C/1117	1450,40	545 (95,4%) 656 AD	Charcoal	SU 2, sample 6	Late Antiquity
15C/0255	940,40	1019 (95,4%) 1184 AD	Charcoal	SU 2, sample 8	High Middle Age
16C/0858	890,30	1041 (35,9%) 1108 AD 1116 (59,5%) 1218 AD	Charcoal	SU 4, sample 1, bottom of pit	High Middle Age
16C/0859	930,30	1025 (95,4%) 1165 AD	Charcoal	SU 4, sample 2, plank	High Middle Age
16C/0860	1160,40	773 (71,8%) 906 AD 916 (23,6%) 968 AD	Sediment	SU 10	Early Middle Age

Figure 5 – Sampled contexts





## 4. Discussion

If we analyze the determinations according to their archaeological context, we observe that, on the one hand, deposits seem to correspond to two different phases linked to the Early Middle Ages (SU 10) and the High Middle Ages (SU 2 and features that covers) (Fig. 5). On the other hand, the northern area of activity (configured by SU2 and features) picks up the most modern and the oldest dates. Given the type of sample, it is highly likely that the explanation is related to the "old wood effect" linked to the sample 6. On this subject, the ongoing anthracologic analysis may provide relevant information. Consequently, this date should not be taken into account for the purpose of determining the date of the stratigraphic event where it is located. In order to fine-tune the dating of this area of activity, the SU 2 and SU 4 (158C/205; 16C/858 y 16C/859) have been combined in Oxcal. The result (Fig. 6) is a coherent date: 1039 (95.4%) 1163 cal AD. That is, the formation of these events is circumscribed in this case to the High Middle Ages.

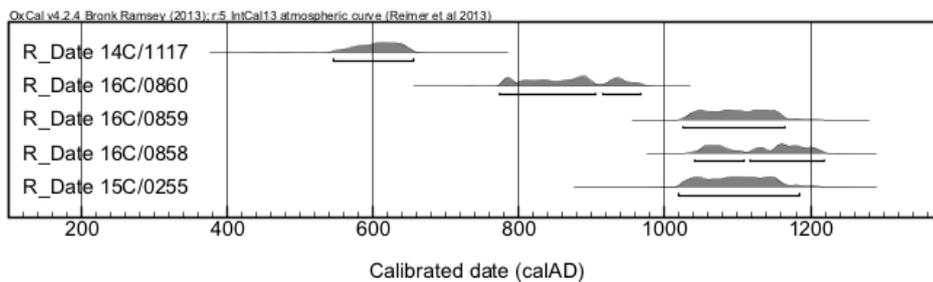


Figure 6

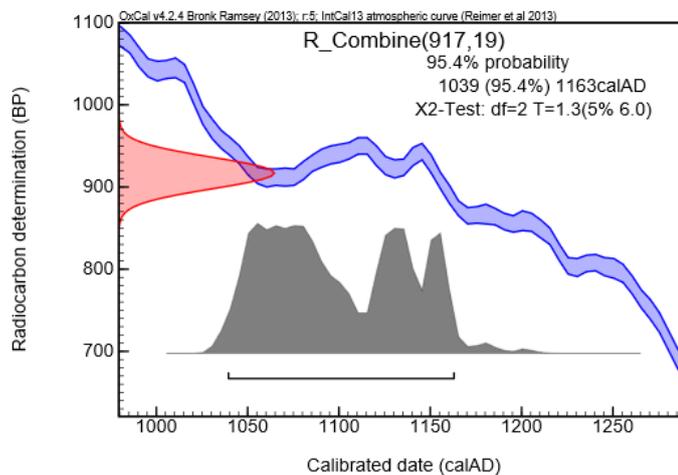


Figure 7

## 5 Conclusions and perspectives

The research has demonstrated that the anomalies detected may correspond to truly archaeological open-air structures. The function of the structures is still unknown, although they seem to be linked to a domestic use, highly probably agricultural use. It has been necessary to excavate 90 cm of fillings to reach the contexts, which shows even more the difficulty of detecting this type of evidence in Cantabria.

In sum, the results of the project can be considered positive and promising. Beyond the lack of monumentality of evidence, the importance of the results lies in the unusual of them within an archaeological framework in which these kind of contexts are scarce, specially to the period to which they belong.



## Acknowledgements

This research has been funded by Government of Cantabria, which has been supported the project Electromagnetic Survey for the Location of Archaeological Structures in El Mazo de La Castañera (Obregon, Villaescusa) in 2013 and the project Locating open-air habitats from recent Prehistory in El Mazo de la Castañera (Obregon, Villaescusa) from 2014 to 2016.

## References

- [Car16] Carmona Ballester E., Vega Maeso C. López Jiménez O., Martínez Calvo V. (2016) Geophysical survey on “El Mazo de la Castañera” (Cantabria, Spain): looking for open-air domestic remains. In: Kamermans, H., de Neef, W., Piccoli Ch. (eds) *The Three Dimensions of Archaeology: Proceedings of the XVII UISPP World Congress (1–7 September, Burgos, Spain)*. Volume 7/Sessions A4b and A12, Archaeopress. Pp. 133-139.
- [Gom72] Gomarín Guirado F. (1972-73) Dos nuevos yacimientos de la Edad del Bronce en la provincia de Santander, *Zephyrus*, XXIII-XXIV, pp. 193-95.
- [Rei13] Reimer P. J., Bard E., Bayliss A., Beck J. W., Blackwell P. G., Bronk Ramsey C., Grootes P. M., Guilderson T. P., Haflidason H., Hajdas I., Hatté C., Heaton T. J., Hoffmann D. L., Hogg A. G., Hughen K. A., Kaiser K. F., Kromer B., Manning S. W., Niu M., Reimer R. W., Richards D. A., Scott E. M., Southon J. R., Staff R. A., Turney C. S. M., van der Plicht J. (2013). IntCal13 and Marine13 Radiocarbon Age Calibration Curves 0-50,000 Years cal BP. *Radiocarbon*, 55(4).
- [Rin85] Rincón Vila R. (1985) Las Culturas del Metal. In: García Guinea M. A. (ed.) *Historia de Cantabria. Prehistoria, Edades Antigua y Media*, Estudio, Santander. Pp. 113-209.
- [Rui96] Ruiz Cobo J. (1996) El Abrigo de La Castañera (Obregon, Villanueva de Villaescusa): materiales arqueológicos, *Boletín Cántabro de Espeleología*, 12, pp. 123-28.
- [Ser01] Serna Gancedo M. L., Valle Gómez Á. y Obregon Goyarrola F. (2001) *Las cuevas del valle de Villaescusa*. Asociación para la Defensa del Patrimonio de Villaescusa, Santander.