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Explorer la côte, sonder le passé : méthodes et pratiques de la préhistoire maritime
Actes de la séance de la Société préhistorique française de Brest (décembre 2020)
Textes publiés sous la direction de Grégor Marchand (†), Yvan Pailler et Pierre Stéphan
Paris, Société préhistorique française, 2023
(Séances de la Société préhistorique française, 19), p. 91-106
www.prehistoire.org
ISSN : 2263-3847 – ISBN : 978-2-913745-92-6

The Potential of Analysing Prehistoric Human Occupation in the Western Rias of Galicia (Northwest Iberia): Methods and Prospects

Le potentiel de l'analyse des occupations humaines préhistoriques dans les rias occidentales de la Galice : méthodes et perspectives

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Abstract: Located in the north-west of the Iberian Peninsula, Galicia is the region with the longest coastline in Spain. This coast is characterized by the presence of several estuaries (rias), the largest of which are located in the west. A number of islands and islets can be found within or at the mouth of such rias, as is the case in Ría de Vigo, Ría de Pontevedra and Ría de Arousa. Unlike other European Atlantic regions, the occurrence of prehistoric remains in topographically low coastal locations has traditionally been considered rare in the area. However, prehistoric human subsistence strategies in the region largely benefited from the extremely rich coastal and maritime resources, and there is increasing material evidence of sites dating from these periods, as well as of long-distance exchange of materials and ideas between these and other European Atlantic communities. In this paper we will focus on the different survey, fieldwork and dating methods and approaches recently used in these Western rias and will discuss the future prospects for prehistoric coastal research and heritage in the area.
Keywords: Prehistory, coastal archaeology, coastal erosion, Galicia, Iberian Peninsula.

Résumé : Située au nord-ouest de la péninsule Ibérique, la Galice est la région qui, en Espagne, possède le plus long littoral. Cette côte est caractérisée par la présence de plusieurs estuaires (*rías*), dont les plus grands sont situés à l'ouest. Un certain nombre d'îles et d'îlots se trouvent à l'intérieur ou à l'embouchure de ces rias, c'est le cas de la Ría de Vigo, de la Ría de Pontevedra et de la Ría de Arousa. En Galice, contrairement à d'autres régions atlantiques européennes, la présence de vestiges préhistoriques dans des zones côtières topographiquement basses a traditionnellement été considérée comme rare. Cependant, les stratégies de subsistance développées au cours de la Préhistoire ont largement tiré parti des ressources côtières et maritimes, et il existe de plus en plus d'indices de sites de ces périodes ainsi que d'échanges d'idées et d'objets entre ces communautés et d'autres communautés atlantiques européennes. Dans cet article, nous parlerons des différentes méthodes et approches relatives à la prospection, à l'enregistrement, à la fouille et à la datation des sites de la Préhistoire dans ces rias occidentales et nous discuterons à la fois des perspectives de la recherche et du patrimoine côtier préhistorique dans la région.
Mots-clés : Préhistoire, archéologie littorale, érosion côtière, Galice, péninsule Ibérique.

INTRODUCTION

The archaeological study of prehistory in coastal areas and their associated ecosystems (e.g. estuaries, marshes) has undergone fundamental changes at the international level in recent decades. Driven in part by Anglo-Saxon and Scandinavian research in the 1990s and 2000s, regional programs of an interdisciplinary nature have multiplied (e.g. Ashmore, 1994; Bell and Neumann, 1997; Bailey et al., 2020) and journals specialising in this type of environment have emerged. (e.g. *Journal of Island and Coastal Archaeology*, *Journal of Maritime Archaeology*, *Journal of Wetland Archaeology*). Advances in the field include, on the one hand, aspects of epistemological, theoretical and methodological positioning and, on the other, legal and administrative issues, which have had a notable impact on the data corpus at both qualitative and quantitative levels.

Unlike other Western European regions, specific research on and management of coastal archaeological heritage has not been fully addressed in the Iberian Peninsula until recent years. This is despite the known potential of the coastal areas for providing fresh quantitative and qualitative data on prehistoric societies and despite the fact that, like in neighbouring regions, there are severe threats to coastal cultural heritage from both natural and human factors. In Spain, specialists working in virtually all coastal regions have warned of the effects that climate change and coastal erosion are having on their cultural heritage. The situation is similar in Portugal, but with less regional variability as all the coastal regions face the Atlantic, none being open to the Mediterranean. It is noteworthy, however, that while Portugal is rich in prehistoric coastal sites (e.g. Sousa et al., 2016), only a few of them correspond to submerged or intertidal sites (Bicho et al., 2020).

Located in the north-west of the Iberian Peninsula, Galicia is the region with the longest coastline in Spain. This coast is characterized by the presence of several estuaries (*rías*), the biggest of which are located in the west. A number of islands and islets are found within or at the mouths of such rias (Rías Baixas; fig. 1). Despite growing interest in the archaeology of coastal areas in the region, the development of research programs and dedicated lines of research is relatively scarce. The 1980s and 1990s saw an increase in research and publications on coastal prehistory, with, for instance, the discussion of Mesolithic macrolithic industries, Neolithic and Bronze Age remains, rock art, the analysis of Iron Age shell middens and the reconstruction of sea-level fluctuations. (e.g. Aira Rodríguez et al., 1992; Martínez Cortizas and Costa Casáis, 1997). Despite these advances, researchers in the early 2000s drew attention to the fact that the development of studies on the use of the sea in the prehistory and antiquity of Galicia were not fully developed (Vázquez Varela and Rodríguez López, 1999-2000). Today, we know that prehistoric human subsistence strategies in Galicia largely benefited from the rich coastal and maritime resources, and there is increasing material evidence of coastal and island occupations from these periods, as well as of long-distance exchanges of materials and ideas between these and other European Atlantic communities.

In this paper, mainly focusing on our own work, we will discuss some of the methods and practices being implemented in current prehistoric coastal research in the western rias and the future prospects this research and management may address in the region.

1. THE PREHISTORIC ARCHAEOLOGICAL CONTEXT OF THE WESTERN RIAS OF GALICIA

Of all Galician coastal areas, the western rias are probably those that have attracted the most attention. A distinctive aspect of these rias is that they have a number of islands and islets located within them or at their mouths.

These rias are fluvial valleys partially flooded by the sea during the Quaternary interglacials, on a coastline undergoing lithospheric uplift (Viveen et al., 2013). Such river valleys were emerged during the last glacial period, being a coastal forest-like continental environment (Vidal-Romaní and Grandal-d'Anglade, 2018) with high archaeological potential, as expected for the Portuguese coast (Bicho et al., 2020). After this cold stage ended 20 ky ago (Vidal-Romaní et al., 2015), the post-glacial marine transgression started. As the sedimentary record shows, the sea level was then at -100 m below present sea level (bpsl) (Arce-Chamorro et al., 2021), reaching -73 m bpsl around 9 ky ago (Nombela et al., 2005). During this transgression, dune sands were transported from the emerged continental shelf to the present-day coastline (Arce-Chamorro et al., 2021). This is demonstrated by sand layers overlying wood remains from 4.5 ky (cal. BP) in the present intertidal area along the coast of Galicia (Nombela et al., 2005; Vidal-Romaní and Grandal-d'Anglade, 2018). Evidence of this can be observed in Galician sites such as Guidoiro Areoso (see below), where dune sand covered several archaeological sites *c.* 2.5 ky ago. Organic levels 4.5 ky (cal. BP) old were found below the dunes (Blanco-Chao et al., 2017) and in the intertidal area, most likely corresponding to buried wood remains. According to the aeolian accretion model (Arce-Chamorro et al., 2021), the age of the dune overlying the archaeological structures suggests a sea level well below the present one. This would indicate that the sea level raised to present-day levels after 2.5 ky ago[(1)], and progressively flooded the fluvial valley to form the present ria.

The chronocultural framework of Galician Prehistory has been the object of a wide debate, no less because the bad preservation of organic remains due to the predominance of acidic soils usually hinders the use of radiocarbon dating (see below, 3.2. Numerical dating of sites and sediments). The main available evidence comes from

the Neolithic (*c.* 5000 to *c.* 2500 BC), the Bronze Age (*c.* 2500 to *c.* 800 BC) and the Iron Age (*c.* 800 BC to *c.* 1st century AD). The evidence from earlier periods is scarcer, and the identification of several lithic assemblages and remains dating from the Palaeolithic and – especially – the Mesolithic have proved to be controversial (see e.g. Vázquez Varela, 1984). This has resulted in the development of complementary approaches for understanding the human occupation of the region, such as the paleoenvironmental and chemical analysis of soils (Kaal et al., 2011) or the technological and archaeometric analysis of pottery (Prieto Martínez and Lantes Suárez, 2017).

The immediate area of the western rias shows an early Neolithic occupation, as the evidence from A Cunchosa suggests (Suárez Otero, 1997; here: fig. 1, nº5). From the middle of the 5th millennium cal. BC, and up to the beginning of the 2nd millennium, the landscape is dominated by the presence of megalithic monuments, some of which are organised in clusters in the higher areas of the sierras overlooking the sea (Criado Boado and Villoch Vázquez, 1998). Settlements are also abundant, especially compared with what is known for the rest of Galicia, although not many of them have been excavated in detail. Some of them, such as Monte dos Remedios (Fábregas Valcarce et al. 2007; here: fig. 1, nº6), seem to have been occupied intermittently throughout the aforementioned period, while others had more limited occupation (e.g. O Regueiriño and Montenegro: fig. 1, nº8 and nº7; Criado Boado and Cabrejas Domínguez, 2005). All of these settlements were open-air sites with huts made of perishable materials, without clear delimitation of the inhabited space or, at most, with possible palisades.

As the Bell-beaker pottery horizon disappeared, well into the Bronze Age (2nd millennium BC), the number of known settlements decreased. Settlements with elongated huts (e.g. Setepías; Acuña Piñeiro et al., 2011) and large storage pits (e.g. Monte Buxel; Lima Oliveira and Pri-

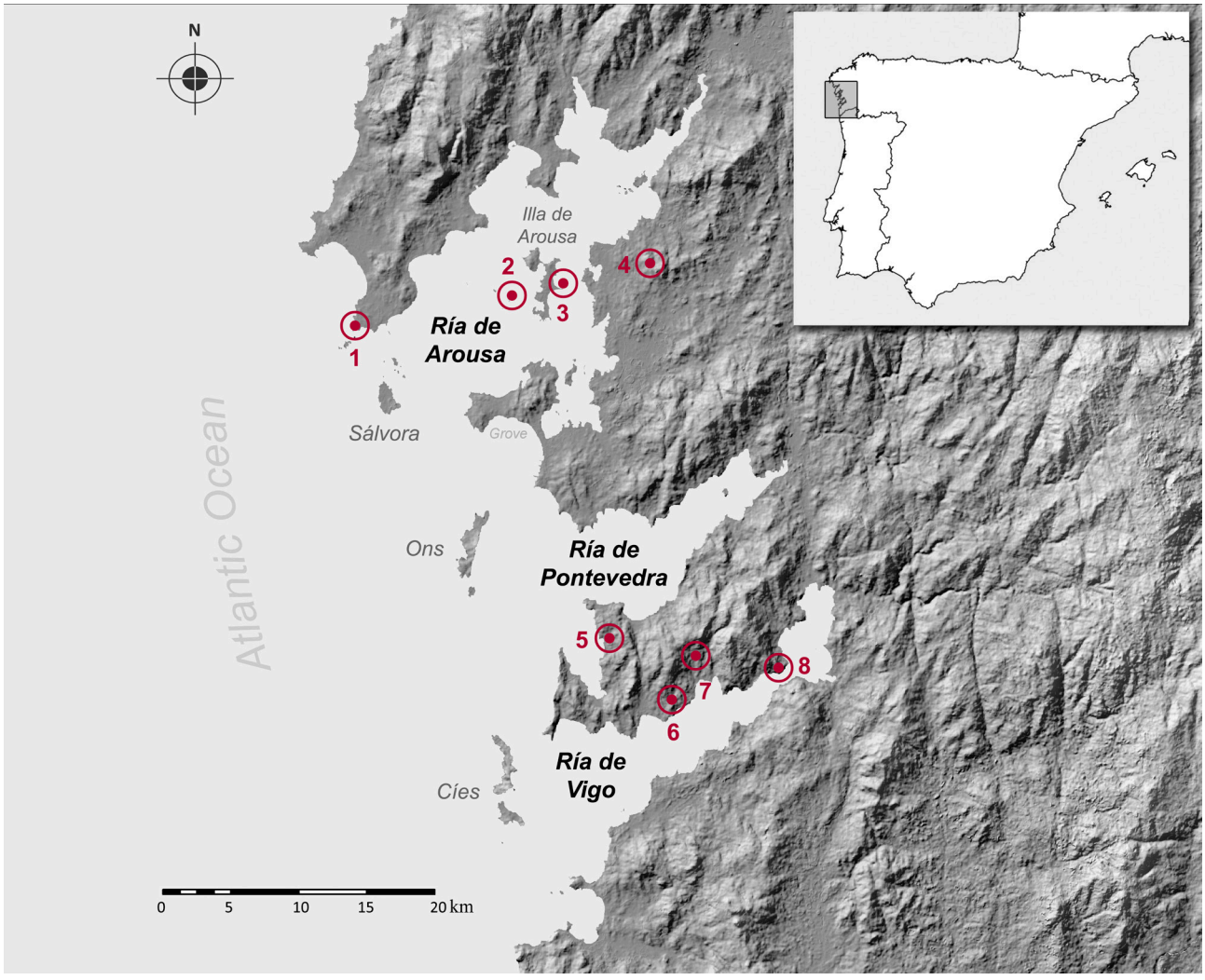

Fig. 1 – Map of the western rias of Galicia (Rías Baixas) indicating the main sites cited in the text: 1. Os Pericos; 2. Guidoiro Areoso; 3. Punta de Riasón; 4. Monte Lobeira; 5. A Cunchosa; 6. Monte dos Remedios; 7. Montenegro; 8. O Regueiriño.

***Fig. 1** – Carte de localisation des rias occidentales de Galice (Rías Baixas), avec les principaux sites mentionnés dans le texte : 1. Os Pericos ; 2. Guidoiro Areoso ; 3. Punta de Riasón ; 4. Monte Lobeira ; 5. A Cunchosa ; 6. Monte dos Remedios ; 7. Montenegro ; 8. O Regueiriño.*

eto Martínez, 2002) have nonetheless been found for the final phases of the period. At the same time, as megalithic monuments became less and less frequent, new forms of burial appeared, among which cist cemeteries stand out (Peña Santos, 1985). However, the main novelty of the Bronze Age is doubtless the open-air art of the so-called Galician group. These are carvings made on rocky outcrops, with geometric motifs (mainly circular combinations, spirals and labyrinths), quadrupeds – especially deer –, weapons and, to a lesser extent, human figures (Fábregas Valcarce and Rodríguez Rellán, 2015). It is precisely in the surroundings of the Western rias and the valleys that converge towards them that there is a greater concentration and variety of this type of manifestation. Their chronology is still debated. Although for some motifs and panels a late chronology has recently been suggested (Late Bronze Age or even the Iron Age; Santos Estévez, 2008), there seems to be a certain consensus that some of them belong to the transition between the 3rd and 2nd millennium BC. Finally, at the beginning of the 1st millennium BC, the archaeological record is reduced to the presence of fortified settlements (*castros*), since we still do not know where the dead were buried during the local Iron Age (Vilaseco Vázquez, 2000).

All things considered, the presence of sites from recent prehistory at low altitudes in the western rias is scarce, probably as a consequence of the palaeogeographic history mentioned above. (i.e. sea-level rise). In connexion with this, buried fossil forests with chronologies dating back to recent prehistoric times have been found at some locations along the coast. The most spectacular and recent example is the one at Rosalía de Castro Street in Vigo, where tree trunks dating back 8,000 years were found at a depth of 13 m below the current street level(2). Others are known to be located directly in intertidal areas, such as at Patos Beach (Nigrán) or Ladeira do Chazo (Boiro), dating from the Neolithic and the transition between the 3rd and 2nd millennium BC, respectively (Fábregas Valcarce and Rodríguez Rellán, 2012).

2. ANALYSING PREHISTORIC HUMAN OCCUPATION: METHODS AND APPROACHES

Since the beginning of the 21st century, we have witnessed the consolidation of a coastal and island archaeology (see Introduction). The reasons for this are multiple. Firstly, the generalization of archaeometry and of interdisciplinary approaches to archaeology has made the coast a privileged field of study for the analysis of human societies and their interaction with the environment. The often exceptional preservation of organic remains and the access to certain sedimentary archives (dunes, paleosoils) are key to understanding the interest in these areas (e.g. Verdin et al. 2019; López-Romero et al., 2023). Secondly, the reorientation of international research in the study of mobility, exchange, evolution and collapse of human societies (Kintigh et al., 2014) has enabled the coastline and wetlands to occupy a renewed place in the agendas of various projects. Finally, the vulnerability of these areas to the effects of climate change has recently placed them at the forefront of the discussion about the causes, consequences and solutions to this global issue. (i.e. numerous articles on this subject in the international archaeological journals).

Based on our own experiences and activities, we will discuss three essential aspects that relate to the recent methods and practices of prehistoric coastal archaeology in the western rias of Galicia: the survey of and excavation in coastal areas, the numerical dating of prehistoric sites and sediments, and the heritage dimension of prehistoric coastal sites.

2.1. Archaeological survey and excavation

Archaeological survey of coastal areas requires an understanding of natural and maritime cycles that makes it different from fully continental survey on dry land. Firstly, like in most European Atlantic regions, tidal regimes (two high and two low tides per tidal day) dictate the times and seasons that are more suitable for archaeological surveys. Secondly, differential erosion affects the visibility of the archaeological record; in this sense, several decades can elapse before a site that originally stood just a few meters apart from another is revealed (e.g. Guidoiro Areoso 'Monument 3'; Rey García and Vilaseco Vázquez, 2012). Thirdly, the rich biodiversity of most coastal areas in Galicia implies that specific planning is necessary, the presence of natural reserves and protected species necessitating additional permits.

Taking into account these factors, pedestrian surveys focus on dune horizons, the intertidal zone and the high water mark. While the survey of locations on continental dry land is obviously also necessary, the former contexts are those with the highest potential, having paradoxically received less attention. In the western rias, a dedicated survey of such targeted areas proved to be essential for the understanding of human occupation of small islands and islets (Ballesteros Arias et al., 2013).

Due to edaphological conditions – shallow granitic soils – and rapid erosion, deposits containing substantial archaeological sequences are rare. This situation implies that repeated surveys of a same area are necessary through the year, something that is not always possible in the absence of long-term funded programmes. Added to this, seasonal deposition of sediments and organic remains such as algae limit both pedestrian and geophysical surveys (fig. 2). On the basis of these facts – erosion, research limitations and visibility of the archaeological record –, make the original density and spatial distribution of prehistoric remains difficult to judge.

In the western rias, gradiometer surveys were performed on the islet of Guidoiro Areoso (fig. 1, nº2) and on Monte Lobeira, (fig. 1, nº4), a hill near the coast. These surveys (fig. 3) show that, despite the shallow granitic

Fig. 2 – Algal deposition in the intertidal zone of Guidoiro Areoso (22/09/2014).
***Fig. 2** – Concentration d'algues sur l'estran de Guidoiro Areoso (22/09/2014).*

soils, relevant information can still be obtained through this technique (e.g. site extension). 3D recording of the visible structures also proved to be a cost-effective solution for the survey of areas that are difficult to access with heavy equipment (López-Romero and Mañana-Borrazás, 2013; López-Romero et al., 2015).

In recent years, interventions on coastal sites in the rias included the realization of test pits and open area excavations. For all of these, the collaboration with geomorphologists and geologists, from the Universities of Santiago de Compostela and A Coruña, was essential.

Test-pit excavation at Os Pericos (Ribeira, A Coruña; Vilaseco Vázquez, 2012; here: fig. 1, nº1), together with the geomorphological study of the surroundings (Costa-Casais et al., 2012), made it possible to document that the promontory had a long occupation history. In addition to a Bell-beaker phase, apparently restricted to the lowest sector of the peninsula, a small, fortified settlement from the Late Bronze Age (13th-10th centuries BC) was found in the northern sector and another, from the Second Iron Age, in the eastern sector. The latter was probably a hillfort settled on a dune formed at the beginning of the 1st millennium BC. Today coastal erosion has demolished most of this settlement and the dune where it stood.

Intense coastal erosion also led to the excavation of the Bronze Age cemetery of Punta de Riasón (Illa de Arousa, Pontevedra; Bóveda Fernández, 2017; here: fig. 1, nº3, and fig. 4). Here, three cists were located in the intertidal zone and test pits were opened in the surroundings to study the geomorphological stratigraphy of the area. The cists, rectangular in shape, were in varying degrees of preservation depending on their position in relation to the tides. In the case of one of them, only a slab was preserved in situ. The structure of the second was almost intact, lacking its cover, but having been subjected to the prolonged action of the tide it was empty. The third, also without a cover, was partially buried; the lower archaeological levels of this tomb were apparently intact and two small silver spirals were documented, allowing us to date it to the Bronze Age.

The coastal site that has received the greatest attention is Guidorio Areoso, (fig. 1, nº2), a small islet (*c.* 8 ha) in the centre of the Arousa estuary. An important occupation has been documented here from the Neolithic to the Iron Age. To date, five megalithic monuments are known on the islet, including one that was destroyed by coastal erosion in 2013, and abundant archaeological material is found on its beaches and in the intertidal zone (López-Romero et al., 2015). Excavations on the beach and on 'Monument 4', one of the megalithic monuments, took place between 2015 and 2017. Collaboration with geomorphologists was essential to understand and date the stratigraphic sequence, strongly conditioned by the formation of a dune system that ultimately covered the site. The analysis of a Bronze Age shell midden associated with the mound was performed by malacologists

Fig. 3 – Gradiometer survey of the dune and intertidal zone in Guidoiro Areoso (22/09/2014).
***Fig. 3** – Prospection géophysique de la dune et de l'estran de Guidoiro Areoso par gradiométrie (22/09/2014).*

Fig. 4 – Punta de Riasón: Bronze Age cists (Illa de Arousa; 12/10/2017).
***Fig. 4** – Punta Riasón : cistes de l'âge du Bronze (île d'Arousa ; 12/10/2017).*

from the University of León, being the second of this age found on the islet (Rey García and Vilaseco Vázquez, 2012). This discovery is extremely important, as shell middens pre-dating the Iron Age are very rare in Galicia. 3D scanning and photogrammetry were also essential for the excavation processes, 'Monument 4' being a prime example of the integrated use of these techniques (Mañana-Borrazás et al., 2020).

2.2. Numerical dating of sites and sediments

Due to the acidic nature of most soils, ^{14}C dating of prehistoric sites in Galicia is most often dependent on the presence of charred remains and on the organic fraction contained in bulk sediments. Fieldwork in the western rias has shown that significant amounts of organic materials, including bone, were preserved here owing to the nature of sediments (calcareous, waterlogged). A human jaw discovered during the 2016 surveys in Guidoiro Areoso was ^{14}C dated to the Second Iron Age (Olalla Costas, USC, pers. comm.), becoming the first date on human bone for this period in Galicia. A ^{14}C date on oyster shell had previously been obtained from this same islet (GrN-16108, 4020 ± 40 BP; Rey García and Vilaseco Vázquez, 2012). Other recent ^{14}C dates on animal bone (Guidoiro Areoso, Beta-495147, 2820 ± 30 BP), plant remains (Punta Riasón, Beta-483265, 180 ± 30 BP showing a post-depositional alteration of the cists; Bóveda Fernández, 2017) and charred wood (Os Pericos, Ua-32504, 2895 ± 45 BP; Vilaseco Vázquez, 2012) confirm the potential of this area to contribute to the chronology of regional prehistory (table 1).

The use of other numerical dating techniques for archaeological purposes is virtually nil. Optically Luminescence Dating (OSL) of sediments has proven useful in coastal contexts, and its potential for the study of prehistoric monuments has been reviewed elsewhere (López-Romero, 2011). In this context, an eroding profile at 'Monument 4' in Guidoiro Areoso gave us the opportunity, for the first time, to use OSL to date the building sequence of a Neolithic monument in Galicia. Five OSL samples were taken (fig. 5). The two uppermost of these corresponded to dune sand overlying the excavated structure, while the three lowermost corresponded to organic sediments. The cores were dated at the Luminescence Laboratory of the University of A Coruña. Quartz grains were used for dating using procedures described in W. Viveen and colleagues (2013) and the blue-OSL (BL-OSL) single-aliquot regenerative dose (SAR) protocol (Murray and Wintle, 2000). Radiocarbon dating

Site	Sample	Context	Material	14C Age (BP)	d13C (‰)	(2s) cal. BC/AD	Reference
Guidoiro Areoso	GrN-16108	Shell midden	Shell (Ostrea edulis)	4020 ± 40	-	2225-1950 cal. BC (ΔR cal. as cited in the reference)	Rey García and Vilaseco Vázquez, 2012
Guidoiro Areoso Mound 4	Beta-495147	Upper level of the midden that covers the mound	Bone (Bos)	2820 ± 30	-20.9‰	1106-1098 (0.5%) OR 1079-1069 (0.7%) OR 1056-898 (94.2%) cal. BC	This paper (after excavations in 2017 funded by Xunta de Galicia; see Mañana-Borrazás et al., 2020)
Punta de Riasón	Beta-483265	Base of one of the cists' slabs (corresponding to a post-depositional alteration)	Plant remains (unidentified species)	180 ± 30	-10.9‰	1655-1698 (19.3%) OR 1722-1814 (50.1%) OR 1836-1883 (7.5%) OR 1910-(18.6%) cal. AD	Bóveda Fernández, 2017
Os Pericos (N terrace)	Ua-32504	Oldest archaeological level	Charcoal (deciduous Quercus)	2895 ± 45	-28.5‰	1219-969 (91.8%) OR 959-932 (3.7%) cal. BC	Vilaseco Vázquez, 2012

Table 1 – Radiocarbon ages on organic remains (excluding organic matter in bulk sediments) from sites in the western rias cited in the text. With the exception of GrN-16108, calibration data are from OxCal v.4.4.4 and the IntCal20 Northern Hemisphere radiocarbon age calibration curve from P. Reimer and colleagues (2020).

***Tabl. 1** – Dates radiocarbone effectuées à partir de restes organiques (à l'exception de la matière organique issue de sédiments) de sites des rias occidentales mentionnés dans le texte.*

was performed on organic matter obtained from samples MG-1, MG-2 and MG-3, by accelerator mass spectrometry (AMS) Beta Analytic laboratory in Florida. The ages were calibrated using the Oxcal 4.1 software package (Bronk Ramsey and Lee, 2013) based on the calibration curve of Reimer et al. (2020).

Gamma spectrometry provided a similar dose rate for all samples (table 2), as observed in coastal dunes of the area (Trindade et al., 2013). The Central Age Model (Galbraith et al., 1999) was used to estimate the ages. The resulting ages (table 2) are stratigraphically consistent and range from 4528 ± 284 to 421 ± 133 BC from the lowermost to the uppermost sample, respectively. Radiocarbon analyses of samples MG-1, MG-2 and MG-3 show ages younger than the OSL ages (table 3). Such ^{14}C ages are not stratigraphically consistent. The organic matter dated probably corresponds to vegetal remains or litter, as the d13C (‰) indicates. Thus, the discrepancy can be explained as a result of plants growing in the soil surrounding the mound. Interestingly, a ^{14}C age of organic sediment at the base of the head slab of this monument provided an age of 3777-3654 BC (Beta-495146; Mañana-Borrazás et al., 2020), making it slightly younger than the MG-1 OSL age. Organic sediments of two sedimentary studies of the surroundings (Blanco-Chao et al., 2017; Cajade-Pascual et al., 2019) provided a range of ^{14}C ages from 4449-4336 BC for the oldest to 328-204 BC for the newest. Other ^{14}C ages of organic matter provided in such studies fit our ^{14}C ages for MG-2 and MG-3. This means that the surroundings of the mound corresponded to a continental area with vegetation, and the sediments worked as soils, at least from the moment of construction of the mound until the point when the sand of the dune presently overlying it was deposited. This is shown by OSL ages of samples MG-4 and MG-5 (see fig. 5).

Such age results fit the model of coastal evolution in Galicia over the last 15 ky (Arce-Chamorro et al., 2021), from a lower sea level. Around 6 ky ago, the Ría de Arousa was a fluvial valley above the sea level (between -70 m and -50 m bpsl) that was located more than 3 km further to the west. In such valleys, forests spread over the land (Vidal-Romaní and Grandal-d'Anglade, 2018), surrounding the river channels and providing a suitable location for human settling. With the later sea level rise, aeolian sands were transported from coastal areas upstream in the fluvial valleys, causing dramatic changes in the forest ecosystems. Dunes moved through the inner part of the present rias, as evidenced by the dated dune that overlies the tomb and the surrounding continental soils. Local sedimentary records reveal that the sea level reached a height of -20 m bpsl around ≈2,000 BP[(1)]. At this time, the shore was located in front of this promontory covered in sand (i.e. the present-day islet), the surroundings becoming flooded shortly after that period.

2.3. Coastal archaeology and heritage

As has been stated elsewhere (López-Romero et al., 2017), the heritage dimension of Galician prehistoric coastal sites has received little attention. Early research often failed to address questions that are essential to our understanding of past and present uses of the coastal zone

Sample	Depth (m)	^{238}U (Bq/kg)	^{232}Th (Bq/kg)	^{40}K (Bq/kg)	D_r (mGy a-1)	N	D_e (Gy)	Age (a)	Age BC
GUIDM4_MG-1	2.55	94.3±3.8	85±3.6	857±38	5.37±0.11	30	35.17±1.36	6545±284	4528±284
GUIDM4_MG-2	1.10	65.8±4.1	52.8±3.0	1173±52	5.17±0.26	31	16.92±0.91	3273±240	1256±240
GUIDM4_MG-3	1.95	88.1±3.6	73.9±4.5	1018±45	6.10±0.12	28	27.56±0.80	4520±157	2503±157
GUIDM4_MG-4	0.85	52.9±2.2	47.0±3.1	1022±45	5.03±0.10	32	12.51±0.39	2489±92	472±92
GUIDM4_MG-5	1.55	31.4±1.3	26.6±2.3	946±41	3.61±0.11	32	8.77±0.48	2438±133	421±133

Table 2 – OSL age results. Activity concentration of radioisotopes, Dr, De and resulting ages.
***Tabl. 2** – Résultats des datations OSL. Concentration d'activité des radio-isotopes Dr, De et âges obtenus.*

Sample	Uncal ^{14}C Age (y)	Code	δ^{13}C (‰)	(2σ) cal. yr BP	(2σ) cal. yr BC
GUIDM4_MG-1	4260+±30	BETA - 588314	-25.7	4870-4655	2921-2706
GUIDM4_MG-2	2300+±30	BETA - 588315	-25.3	2357-2160	408-211
GUIDM4_MG-3	2900+±30	BETA - 588316	-25.9	3159-2953	1210-1004

Table 3 – Radiocarbon ages from sediments of the OSL samples.
***Tabl. 3** – Dates radiocarbone des échantillons OSL.*

and the sea, such as the way past societies adapted to changes in a highly dynamic environment or what effects these coastal dynamics and the global warming are having on heritage preservation today.

As is the case in neighbouring European regions, there is no specific regulation for coastal or intertidal heritage at risk in Galicia (for a review of the current Heritage Bill regulations see Barreiro and Varela-Pousa, 2017). In spite of this, the management of coastal heritage has benefited from increased collaboration between the regional authority responsible for their safeguard (Dirección Xeral de Patrimonio Cultural), researchers, governmental bodies (e.g. Dirección Xeral de Patrimonio Natural, Parque Nacional Marítimo-Terrestre de las Islas Atlánticas de Galicia) and the wider public. Significantly, citizens and associations have warned of the threats prehistoric coastal sites are being subject to, something that has enabled different actions on specific areas within the rias (Chao Álvarez, 2015; López-Romero et al., 2015; Mañana-Borrazás et al., 2020).

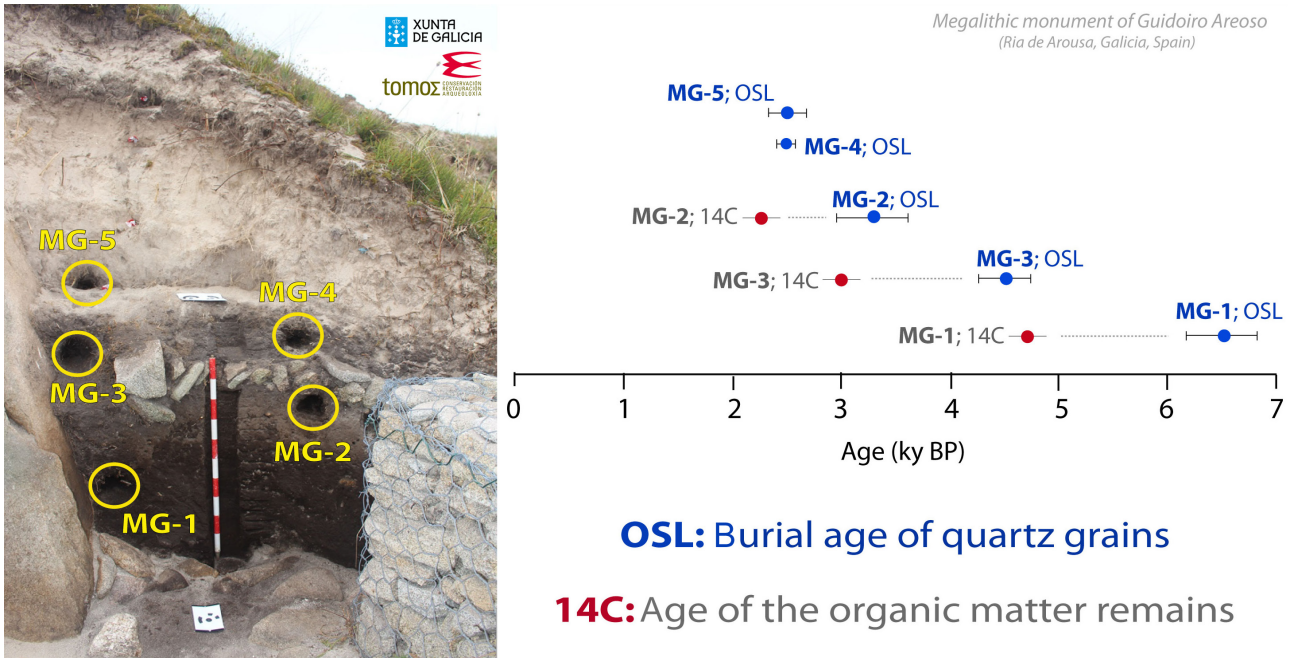

Fig. 5 – Megalithic monument of Guidoiro Areoso (Monument M4). Left: Sample location for OSL dating (image Tomos S.L.; 18/07/2017). Right: Comparison of OSL and 14C – bulk organic sediment fraction – dates from these samples (CAD C. Arce).
***Fig. 5** – Monument mégalithique de Guidoiro Areoso (monument M4). À gauche : localisation des échantillons pour la datation OSL (image Tomos S.L. ; 18/07/2017). À droite : comparaison des dates OSL et C14 – fraction organique des sédiments – de ces échantillons (DAO C. Arce).*

Rapid intervention is promoted by the regional authorities when works are planned in coastal areas within the rias (Vázquez Collazo, 2005) or when coastal erosion is threatening the destruction of relevant archaeological sites (fig. 6).

A wider perspective involved the application of the ALeRT methodology from western France (Daire et al., 2012) to the coastal archaeological record of the rias. This consisted in the analysis of sites at risk through a dedicated Vulnerability Evaluation Form and a public-science dimension, along with photogrammetry and 3D laser scanning monitoring of some of the most vulnerable sites (López-Romero et al., 2015). While many of the sites analysed through these actions were prehistoric, other archaeological and ethnographic heritage was also considered. Recently, a proposal for the prioritisation of action on a specific type of site – shell middens – has been published (González-Gómez de Agüero et al., 2019), but as far as we know it has not been implemented. We believe, however, that it is on the holistic approach to coastal heritage that research efforts need to be focused.

A no less important aspect of this heritage dimension is the fact that many sites at risk are located in areas protected from an environmental point of view, making it necessary to combine archaeological interventions with preservation of natural spaces. A large portion of the western rias coastline is protected either as part of the Islas Atlánticas de Galicia National Park or within the Natura 2000 Network. As mentioned earlier, one of the consequences of this is that fieldwork is sometimes dependent on wildlife cycles. A paramount example occurred at Guidoiro Areoso 'Monument 4', where the archaeological intervention required the dismantling of a dune more than 3 m high that buried the monument. The work was delayed and authorised only under special conditions, including the delay of the fieldwork due to the nesting of the Eurasian oystercatcher (*Haematopus ostralegus*), a species classified as vulnerable in Galicia.

3. DISCUSSION AND FUTURE PROSPECTS

Dedicated approaches to coastal prehistory in Galicia have emerged in recent decades. Understanding the nature, constraints and opportunities of coastal areas is not always straightforward. Adaptation of the planning and methods to marine ecosystems, to geomorphological conditionings and to natural cycles are a fundamental part of the research process.

The integration of Galician coastal prehistory into the current international debates on coastal societies, social complexity and exchange networks, as well as on coastal erosion and heritage management (Kintigh et al., 2014), is becoming increasingly evident. However, a coastal prehistory research agenda should integrate a number of

Fig. 6 – Dry-wall protection for monument M4 in Guidoiro Areoso (built in 2011; 17/06/2014).
***Fig. 6** – Muret en pierre sèche construit pour protéger le monument M4 de Guidoiro Areoso (bâti en 2011 ; cliché du 17/06/2014).*

aspects that still require implementation or further development. While it is not our intention to formalise such an agenda here, we would nonetheless like to highlight some future prospects that could contribute to the qualitative and quantitative improvement of our knowledge on coastal prehistory in the region. These future prospects can be seen as challenges that regional research has to address.

Firstly, administrative and financial issues should be addressed. Today, the most common types of intervention in the coastal areas of Galicia are punctual surveys or excavations, almost always in the form of rescue actions, without real continuity. There is a need to consolidate medium- to long-term actions and projects, which is something that partly relies on the regional and national R&D strategies. This does not only relate to funding but, more critically, to the need to consolidate research teams in the region. The 2008 economic crisis strongly impacted the commercial archaeology and research sectors in Spain (Parga Dans, 2010), resulting in a reduction in the number of companies, the reconversion of some archaeologists to other professional activities or their migration to other countries. Added to this, the recent impact of the global pandemic (and, ultimately, of the economic impact in Europe of the conflict in Ukraine) still needs to be evaluated.

Secondly, theoretical and methodological discussion should widen the approaches and techniques available for coastal and intertidal research. Acknowledging the importance of the preservation of organic materials and sedimentary archives in these settings is crucial for filling the gaps remaining in regional research. As we have shown, questions of chronology that cannot be addressed in other areas of Galicia can be approached here. The combined use of ^{14}C and OSL may help unravel some of the traditional issues of regional prehistory, such as the problems posed by bulk sediment dating (e.g. uncertainty about the origin of the organic matter, taphonomic processes resulting in stratigraphic chronological inversion), or the discussion of architectural sequences. Added to this, the preservation of organic remains can foster the analysis of the rich resources available in these coastal areas, as has recently been the case with the excavation of the Bronze Age shell midden associated with the excavation of 'Monument 4' in Guidoiro Areoso (Fernández-Rodríguez et al., 2017; Mañana-Borrazás et al, 2017). This will improve our knowledge on their availability to and exploitation by prehistoric societies, contributing to understanding questions of seasonality, biodiversity and ecosystems in the past, as has been the case in recent years in other European Atlantic regions like Brittany (Dupont and Marchand, 2021). Similarly, specific surveys of coastal areas still need to be further developed in Galicia, something to which intensive pedestrian survey, geophysics and airborne sensors (e.g. LiDAR) may largely contribute in the near future.

Thirdly, the heritage dimension of prehistoric coastal sites should be an immediate priority. While coastal erosion and heritage loss are particularly acknowledged at the local and regional scales, we must not forget that this is a global issue (i.e. effects of climate change and of human pressure on coastal areas) and that it therefore requires a global response. It is urgent to combine local and regional actions with wider national and international perspectives. For this, the integration of all layers of society in the diagnosis, research, decision-making and restitution processes should be a priority. Another important aspect concerns the relationship between cultural and natural heritage. While, as we have seen, nature conservation issues may condition archaeological research, the joint consideration of the cultural and natural heritage in coastal areas can result in a win-win situation. Many of the threats are similar to both types of heritage and adapted responses to their vulnerable situation can hence be jointly considered. This is the case for the integration of the public in the survey and monitoring phases, the sustainable exploitation of cultural and natural resources in natural parks, or the study of heritagisation processes (Barbeito, 2013; Sánchez Carretero, 2013).

Finally, all these challenges and gaps should not only be seen as negative. They can also be considered as opportunities to boost the visibility and the future of coastal research and management in the area. There is a real opportunity to situate the region in the international debate of the prehistoric uses of wetlands, estuarine and coastal environments. This can be achieved not only by addressing the aforementioned challenges, but also by proactively integrating the discussion of Galician case studies in European programmes and international working groups. Owing to their characteristics, the western rias and other Galician coasts are also well placed to become a reference for the discussion of the aforementioned natural-cultural heritage dimension. To succeed with this, it is again the multi-scalar perspective from the very local to the global that needs to be emphasised.

Acknowledgements: Excavation and ^{14}C dates from Guidoiro Areoso were funded by Xunta de Galicia. OSL and ^{14}C dating of the eroding profile of M4 was funded through a LabEx LaScArBx Chair (E. López-Romero, LaScArBx ANR-10-LABX-52, France). The authors would like to thank all the individuals, municipalities and bodies that have collaborated in the different actions since 2010 in the area. Special thanks are due to Olalla López (Universidade de Santiago de Compostela - USC) for the information on the human jaw from Guidoiro Areoso. Thanks are also due to the two anonymous reviewers for their suggestions and comments.

NOTES

(1) ARCE CHAMORRO C., VIDAL ROMANÍ J.R., SANJURJO-SÁNCHEZ J. (2022) New Model of Coastal Evolution in the Ria de Vigo (NW Spain) from MIS2 to Present Day Based on the Aeolian Sedimentary Record, J. Mar. Sci. Eng. 2022, 10(10), 1350; https://doi.org/10.3390/jmse10101350.

(2) https://www.vigoalminuto.com/2019/04/09/hace-8-000-anos-vigo-y-parte-de-su-ria-eran-un-bosque/ [accessed 08.05.2021]

REFERENCES

Acuña Piñeiro A., Barbeito V., Prieto Martínez M. P. (2011) – Setepías (Cambados, Pontevedra). Un ejemplo de arquitectura doméstica de la Edad del Bronce, in P. Prieto and L. Salanova (eds.), *Las Comunidades campaniformes en Galicia: cambios sociales en el III y II milenios BC en el NW de la Península Ibérica*, Pontevedra, Deputación de Pontevedra, p. 13-24.

Aira Rodriguez M. J., Criado Boado F., Diaz-Fierros F. (1992) – Human Effect on Galician Vegetation (NW Spain) from the Bronze Age. Paleobotanical and Archaeological Evidences, in J.-P. Métailié (ed.), *Protoindustries et histoire des forêts*, Toulouse, GDR ISARD 881-CNRS (Les Cahiers de l'histoire, 3), p. 185-192.

Arce Chamorro C., Vidal Romaní J. R., Sanjurjo-Sánchez J. (2021) – Islas Cíes: una trampa eólica en la Ría de Vigo (Galicia, España) al final del último glaciar, *Geogaceta*, 70, p. 3-6.

Ashmore P. (1994) – *Archaeology and the Coastal Zone. Toward a Historic Scotland Policy*, Edinburgh, Historic Scotland, 35 p.

Bailey G., Galanidou N., Peeters H., Joens H., Mennenga M., eds. (2020) – *The Archaeology of Europe's Drowned Landscapes*, Cham, Springer Open (Coastal Research Library, 35), 561 p., https://doi.org/10.1007/978-3-030-37367-2

Ballesteros-Arias P., Güimil-Fariña A., López-Romero E. (2013) – *Estudo arqueolóxico do Parque Nacional Marítimo-Terrestre das Illas Atlánticas de Galicia. Prospección superficial e vulnerabilidade*, Santiago de Compostela, Incipit-CSIC (CAPA, 33), 99 p.

Barbeito V. (2013) – Diagnose do estado actual do patrimonio arqueolóxico na mancomunidade de municipios Arousa Norte dende o ámbito municipal, *Barbantia*, 9, p. 129-165.

Barreiro D., Varela-Pousa R. (2017) – La nueva Ley de Patrimonio Cultural de Galicia: una lectura crítica, *Nailos*, 4, p. 163-191.

Bell M., Neumann H. (1997) – Prehistoric Intertidal Archaeology and Environments in the Severn Estuary, Wales, *World Archaeology*, 29, 1, p. 95-113.

Bicho N., Infantini L., Marreiros J. (2020) – Portugal: Intertidal Archaeology and Submerged Coastal Landscapes, in G. Bailey, N. Galanidou, H. Peeters, H. Joens and M. Mennenga (eds.), *The Archaeology of Europe's Drowned Landscapes*, Cham, Springer Open (Coastal Research Library, 35), p. 295-305, https://doi.org/10.1007/978-3-030-37367-2

Blanco-Chao R., Costa-Casais M., Taboada-Rodríguez T., Tallón-Armada R. (2017) – Sedimentología y cambios del nivel del mar en el islote Guidoiro Areoso, Ría de Arousa, NO de la Península Ibérica, *Geotemas*, 17, p. 103-106.

Bóveda Fernández M. J. (2017) – *Escavación arqueolóxica das cistas de Punta Riasón (A Illa de Arousa, Pontevedra)*, excavation report, Xunta de Galicia, Santiago de Compostela, 78 p.

Bronk Ramsey C., Lee S. (2013) – Recent and Planned Developments of the Program OxCal, *Radiocarbon*, 55, 2-3, p. 720-730.

Chao Álvarez J. (2015) – *Sondaxes arqueolóxicas valorativa e labores de conservación no Illote de Guidoiro Areoso (Illa de Arousa, Pontevedra)*, excavation report, Xunta de Galicia, Santiago de Compostela, 123 p.

Cajade-Pascual D., Costa-Casais M., Blanco-Chao R. (2019) – Ascenso del nivel del mar y cambios ambientales costeros durante el Holoceno Final. Islote de Areoso, Ría de Arousa, in R. Durán, J. Guillén and G. Simarro (eds.), *X Jornadas de Geomorfología Litoral, Libro de ponencias*, (Castelldefels, 4-6 septiembre 2019), Barcelona, Instituto de Ciencias del Mar, p. 261-264.

Costa-Casais M., Martínez Cortizas A., Pontevedra-Pombal X., Berasategui Vinagre I., Ferro-Vázquez C., Rodríguez Racedo J. (2012) – Evolución holocena do sector costeiro de Punta dos Pericos (Ribeira, a Coruña), in R. Fábregas and C. Rodríguez Rellán (eds.), *A arte rupestre no Norte do Barbanza*, Santiago de Compostela, Andavira, p. 151-172.

Criado Boado F., Cabrejas Domínguez E., eds. (2005) – *Obras públicas e patrimonio. Estudo arqueolóxico do corredor do Morrazo*, Santiago de Compostela, Incipit-CSIC (Tapa, 35), 195 p.

Criado Boado F., Villoch Vázquez V. (1998) – La monumentalización del paisaje: percepción y sentido original en el megalitismo de la Sierra de Barbanza (Galicia), *Trabajos de Prehistoria*, 55, 1, p. 63-80.

Daire M.Y., López-Romero E., Proust J.-N., Régnauld H., Pian S., Shi B. (2012) – Coastal Changes and Cultural Heritage (1): Assessment of the Vulnerability of the Coastal Heritage in Western France, *Journal of Island and Coastal Archaeology*, 7, 2, p. 168-182.

Dupont C., Marchand G. (2021) – New Paradigms in the Exploitation of Mesolithic Shell Middens in Atlantic France: The Example of Beg-er-Vil, Brittany, *Quaternary International*, 584, p. 59-71.

Fábregas Valcarce R., Rodríguez Rellán C. (2015) – Walking on the Stones of Years. Some Remarks on the NW Iberian Rock Art, in P. Skoglund, J. Ling and Bertilsson U. (eds.), *Picturing the Bronze Age,* Oxford, Oxbow Books, p. 47-63.

Fábregas Valcarce R., Bonilla Rodríguez A., César Vila M. (2007) – *Monte dos Remedios (Moaña, Pontevedra). Un asentamiento de la prehistoria reciente*, Santiago de Compostela, Tórculo Edicións, 116 p.

Fernández-Rodríguez C., Bejega-García V., Fuertes Prieto N., González-Gómez De Agüero E., Rey-García J. M., Vilaseco-Vázquez X. I. (2017) – Shellfishing During the Bronze Age in Northwestern Iberia: First Results from Guidoiro Areoso Shell Midden (Galicia), in M. Valente, C. Costa and C. Detry (eds.), *Encontro de Zooarqueologia Ibérica (EZI2017),* 5ª Reunião Científica de Arqueomalacologia da Península Ibérica (Faro, Portugal, 26-29 April 2017), Book of Abstracts, Faro, Universidade do Algarve, p. 36-37.

Galbraith R. F., Roberts R. G., Laslett G. M., Yoshida H., Olley J. M. (1999) – Optical Dating of Single Grains of Quartz from Jinmium Rock Shelter, Northern Australia.

Part I: Experimental Design and Statistical Models, *Archaeometry*, 41, p. 339-364.

González-Gómez De Agüero E., Fernández-Rodríguez C., Roselló-Izquierdo E., Llorente-Rodriguez L., Bejega-García V., Fuertes-Prieto N., Morales-Muñiz A. (2019) – Fish- and Shellmiddens from Galicia (Northwest Spain): Reflections upon a Neglected Coastal Cultural Heritage from the Iberian Peninsula, *Humanities*, 8, 85, https://doi.org/10.3390/h8020085

Kaal J., Carrión Marco Y., Asouti E., Martín Seijo M., Martínez Cortiza A., Costa Casáis M., Criado Boado F. (2011) – Long-Term Deforestation in NW Spain: Linking the Holocene Fire History to Vegetation Change and Human Activities, *Quaternary Science Reviews*, 30, 1-2, p. 161-175.

Kintigh K. W., Altschul J. H., Beaudry M. C., Drennan R. D., Kinzig A. P., Kohler T. A., Limp W. F., Maschner H. D. G., Michener W. K., Pauketat T. R., Peregrine P., Sabloff J. A., Wilkinson T. J., Wright H. T., Zeder M. A. (2014) – Grand Challenges for Archaeology, *American Antiquity*, 79, 1, p. 5-24.

Lima Oliveira E., Prieto Martínez M. P. (2002) – *La arqueología de la gasificación de Galicia 16: Excavación del yacimiento de Monte Buxel*, Santiago de Compostela, Laboratorio de Patrimonio, Paleoambiente y Paisaje (Tapa, 27), 160 p.

López-Romero E. (2011) – OSL Dating of Megalithic Monuments: Context and Perspectives, in L. García-Sanjuán, C. Scarre and D. Wheatley (eds.), *Exploring Time and Matter in Prehistoric Monuments*, Antequera (Málaga), Junta de Andalucía-Consejería de Cultura (Menga Monográfico, 1), p. 193-214.

López-Romero E., Mañana-Borrazás P., eds. (2013) – *El círculo lítico de Monte Lobeira (Vilanova de Arousa, Pontevedra). Trabajos de 2008 y 2010*, Santiago de Compostela, Incipit-CSIC (CAPA, 34), 183 p.

López-Romero E., Güimil-Fariña A., Mañana-Borrazás P., Otero Vilariño C., Prieto Martínez M. P., Rey García J. M., Vilaseco Vázquez X. I. (2015) – Ocupación humana y monumentalidad durante la Prehistoria Reciente en el islote de Guidoiro Areoso (Ría de Arousa, Pontevedra): investigaciones en el marco de las dinámicas litorales atlánticas actuales, *Trabajos de Prehistoria*, 72, 2, p. 353-371.

López-Romero E., Vilaseco Vazquez X.I., Mañana-Borrazas P., Guimil Fariña A. (2017) – Recovering Information from Eroding and Destroyed Coastal Archaeological Sites: A Crowdsourcing Initiative in NW Iberia, in T. Dawson, C. Nimura, E. López-Romero and MY. Daire (eds.), *Public Archaeology and Climate Change*, Oxford, Oxbow Books, p. 72-80.

López-Romero E., Verdin F., Eynaud F., Culioli C., Hoffman A., Huchet J.-B., Rollin J., Stéphan P. (2023) – Human Settlement and Landscape Dynamics on the Coastline South of the Gironde Estuary (SW France): a Multi-Proxy Approach, *Journal of Island and Coastal Archaeology*.18,1, p. 53-74.

Mañana-Borrazás P., Bóveda Fernández M. J., Vázquez Collazo S. (2017) – *Escavación arqueolóxica da Mámoa 4 de Guidoiro Areoso (A Illa de Arousa, Pontevedra). Ano 2016-2017*, memoria técnica, Consellería de Cultura, Educación e Ordenación Universitaria, Xunta de Galicia, 259 p.

Mañana-Borrazás P., Blanco Chao R., Bóveda Fernández M. J., Cajade Pascual D., Costa-Casais M., Güimil-Fariña A., López-Romero E., Vázquez Collazo S., Vilaseco Vázquez X. I. (2020) – Lo que nos cuenta la marea. Prehistoria en el Illote de Guidoiro Areoso (A Illa de Arousa, Galicia) a la luz de las últimas intervenciones, in A. Carretero and C. Papí (eds.), *Actualidad de la investigación arqueológica en España I (2018-2019)*, Madrid, Museo Arqueológico Nacional, p. 159-176.

Martinez Cortizas A., Costa Casáis M. (1997) – Indicios de variaciones del nivel del mar en la ría de Vigo durante los últimos 3,000 años, *Gallaecia*, 16, p. 23-48.

Murray A. S., Wintle A. G. (2000) – Luminescence Dating of Quartz Using an Improved Single-Aliquot Regenerative-Dose Protocol, *Radiation Measurements*, 32, 1, p. 57-73.

Nombela M. A., Alejo I., Bernárdez F., Clemente F., Costas S., Diz P., Fernández-Bastero S., Francés G., Gago-Duport L., García T., González-Alonso D., González-Álvarez R., González-Villanueva R., Liquete C., Pena L.D., Pérez-Arlucea M., (2005) – Evolución sedimentaria desde el último máximo glacial en la costa y plataforma continental de las Rías Baixas (Galicia, NW de la Península Ibérica), in M. C. Freitas and T. Drago (eds.), *Iberian Coastal Holocene Paleoenvironmental Evolution*, Proceedings of Coastal Hope Conference (Lisboa, 24-29 July), Lisboa, Universidade de Lisboa, p. 99-100.

Parga Dans E. (2010) – Commercial Archaeology in Spain: its Growth, Development and the Impact of the Global Economic Crisis, in N. Schlanger and K. Aitchison (eds.), *Archaeology and the Global Economic Crisis. Multiple Impacts, Possible Solutions*, Tervuren, Culture Lab Editions, p. 45-54, http://e-archaeology.org/archaeology-and-the-global-economic-crisis-multiple-impacts-possible-solutions/

Peña Santos A. (1985) – Las cistas de Gandón (Cangas de Morrazo, Pontevedra), *El museo de Pontevedra*, 39, p. 77-94.

Prieto Martínez M.P., Lantes Suárez O. (2017) – Mobility in Late Prehistory in Galicia: A Preliminary Interpretation from Pottery, *in* M. Besse and J. Guilaine (eds.), *Materials, Productions, Exchange Network and their Impact on the Societies of Neolithic Europe*, Oxford, Archaeopress (Archaeopress Archaeology), p. 51-67.

Reimer P., Austin W., Bard E., Bayliss A., Blackwell P., Bronk Ramsey C., Butzin M., Cheng H., Edwards R., Friedrich M., Grootes P., Guilderson T., Hajdas I., Heaton T., Hogg A., Hughen K., Kromer B., Manning S., Muscheler R., Palmer J., Pearson C., Van Der Plicht J., Reimer R., Richards D., Scott E., Southon J., Turney C., Wacker L., Adolphi F., Büntgen U., Capano M., Fahrni S., Friedrich R., Köhler P., Kudsk S., Miyake F., Olsen J., Reinig F., Sakamoto M., Sookdeo A., Talamo S. (2020) – The IntCal20 Northern Hemisphere Radiocarbon Age Calibration Curve (0-55 cal. kBP), *Radiocarbon*, 62, 4, p. 725-757.

Rey García J. M., Vilaseco Vázquez X. I. (2012) – Guidoiro Areoso. Megalithic Cemetery and Prehistoric Settlement in the Ría de Arousa (Galicia, NW Spain), in A. Campar,

A.M.S. Bettencourt, D. Moura, S. Monteiro and M.I. Caetano (eds.), *Environmental Changes and Human Interaction Along the Western Atlantic Edge*, Coimbra, Associação Portuguesa para o Estudo do Quaternário, p. 243-258, http://repositorium.sdum.uminho.pt/bitstream/1822/22079/1/environmental%20changes%20%26%20human%20interaction%202012.pdf

Sánchez Carretero C. (2013) – Significance and Social Value of Cultural Heritage: Analyzing the Fractures of Heritage, in M. A. Rogerio-Candelera, M. Lazzari and E. Cano (eds.) *Science and Technology for the Conservation of Cul tural Heritage*, London, Taylor and Francis, p. 387-392.

Santos Estévez M. (2008) – A New Proposal for the Chronology of Atlantic Rock Art in Galicia (NW Iberian Peninsula), in G. Nash and G. Children (eds.), *The Archaeology of Semiotics and the Social Order of Things*, Oxford, Archaeopress, p. 141-152.

Sousa A.C., Miranda M., Monge Soares A. (2016) – O Concheiro de São Julião (Carvoeira, Mafra): as intervenções de 2007 e 2014, novos dados e novas leituras, *Revista Portuguesa de Arqueologia*, 19, p. 11-26.

Suárez Otero X. (1997) – Del yacimiento de A Cunchosa al Neolítico en Galicia. Primera aproximación al contexto cultural de la aparición del megalitismo en Galicia, in A. Rodríguez Casal (ed.), *O Neolítico Atlántico e as orixes do Megalitismo*, Actas do Coloquio Internacional (Santiago de Compostela, 1996), Santiago de Compostela, Universidad de Santiago de Compostela, p. 485-506.

Trindade M. J., Prudêncio M. I., Sánchez J. S., Vidal Romaní J. R., Ferraz T., Fernández Mosquera D., Dias M. I. (2013) – Post-Depositional Processes of Elemental Enrichment Inside Dark Nodular Masses of an Ancient Aeolian Dune from A Coruña, Northwest Spain, *Geologica Acta*, 11, 2, p. 231-244.

Vázquez Collazo S. (2005) – *Informe de Valoración dos traballos arqueolóxicos previos á construcción do muro de sostén de Noiro en Illas Cíes*, Pontevedra, Xunta de Galicia, 36 p.

Vázquez Varela J. M. (1984) – Paleolítico y Mesolítico en Galicia: estado actual de la cuestión. Problemas y perspectivas, *Portugalia*, 4, p. 21-25.

Vázquez Varela J. M., Rodríguez López C. (1999-2000) – El aprovechamiento de los recursos marinos en la prehistoria y la antigüedad de Galicia, *Boletín del Museo de Lugo*, 9, p. 335-365.

Verdin F., Eynaud F., Stéphan P., Arnaud-Fassetta G., Bosq M., Bertrand F., Suanez S., Coutelier C., Comte F., Wagner S., Belingard C., Ard V., Manen C., Saint-Sever G., Marchand G. (2019) – Humans and their Environment on the Médoc Coastline from the Mesolithic to the Roman Period, *Quaternaire*, 30, 1, p. 77-95.

Vidal-Romaní J.R., Fernández-Mosquera D., Marti K. (2015) – The Glaciation of Serra de Queixa-Invernadoiro and Serra do Geres-Xurés, NW Iberia. A Critical Review and a Cosmogenic Nuclide (10-Be and 21-Ne) Chronology, *Cadernos do Laboratorio Xeolóxico de Laxe*, 38, p. 25-44.

VIDAL-ROMANÍ J.R., GRANDAL-D'ANGLADE A. (2018) – Nota sobre la última transgression marina en la costa de Galicia, *Cadernos del Laboratorio Xeolóxico de Laxe*, 40, p. 229-246.

Vilaseco Vázquez X. I. (2000) – A problemática dos enterramentos na Cultura Castrexa do NW. Unha aproximación desde as culturas limítrofes, in *Actas do Congresso de proto-história europeia* (*Guimarães, 1999), Revista de Guimarães*, vol. especial 2, p. 495-513.

Vilaseco Vázquez X. I. (2012) – Os Pericos (Ribeira, A Coruña). Bronce Final e segunda Idade do Ferro no extremo meridional da península do Barbanza, in R. Fábregas and C. Rodríguez Rellán (eds.), *A arte rupestre no Norte do Barbanza*, Santiago de Compostela, Andavira, p. 135-150.

Viveen W., Schoorl J.M., Veldkamp A., Van Balen R.T., Vidal-Romaní J.R. (2013) – Fluvial Terraces of the Northwest Iberian Lower Miño River, *Journal of Maps*, 9, p. 513-522.

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