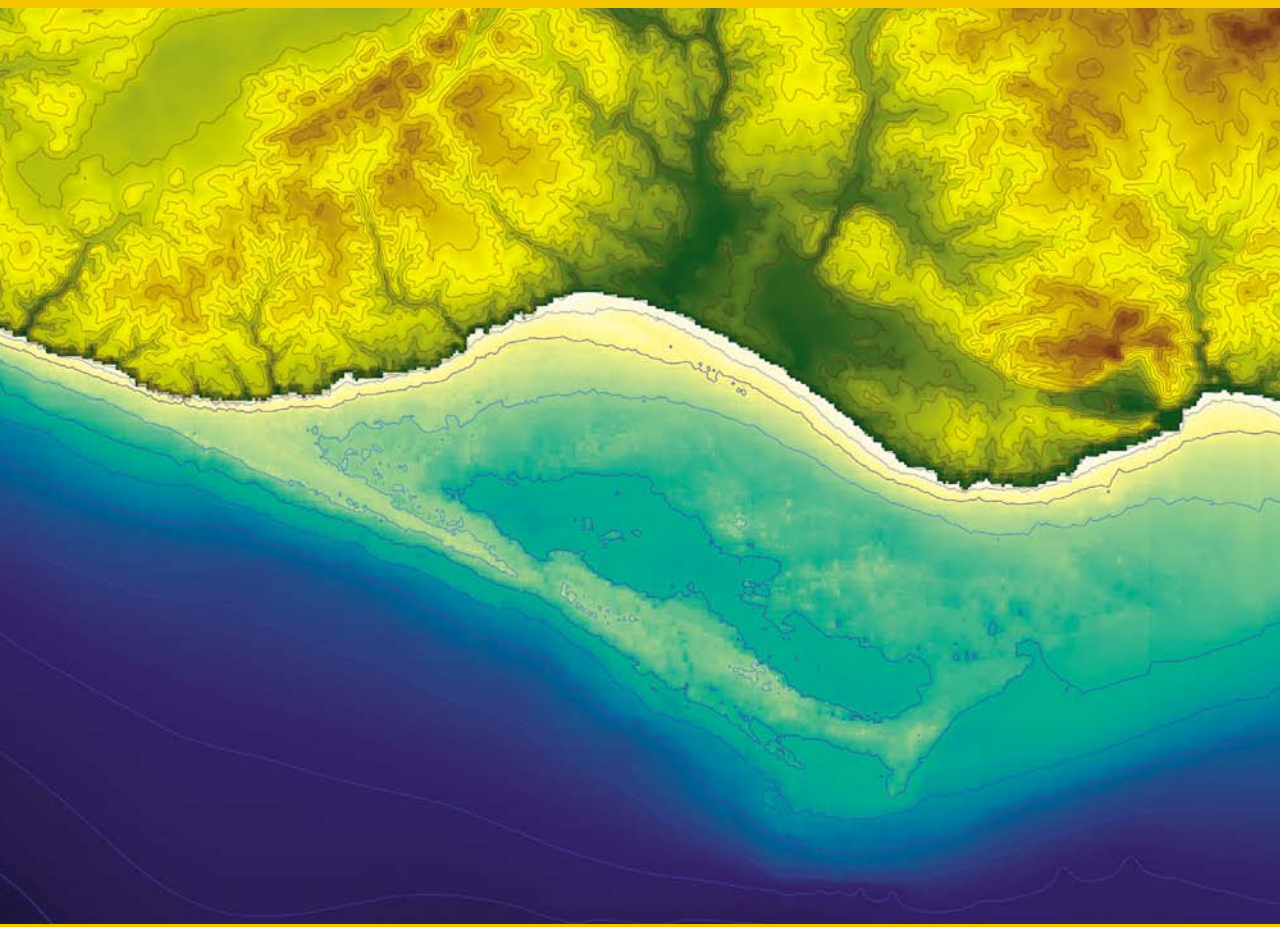
A. CAMPAR ALMEIDA · ANA M. S. BETTENCOURT · D. MOURA
SÉRGIO MONTEIRO-RODRIGUES · MARIA ISABEL CAETANO ALVES



ENVIRONMENTAL CHANGES AND HUMAN INTERACTION ALONG THE WESTERN ATLANTIC EDGE

MUDANÇAS AMBIENTAIS E INTERAÇÃO HUMANA NA FACHADA ATLÂNTICA OCIDENTAL

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Eds. A. Campar Almeida, Ana M. S. Bettencourt, D. Moura, Sérgio Monteiro-Rodrigues and Maria Isabel Caetano Alves

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Environmental changes and human interaction along the western atlantic edge

Mudanças ambientais e interação humana na fachada atlântica ocidental

2012

Contents
Índice

III
Fauna and Human Activity
Fauna e Actividade Humana

IV
Minning and Environmental Impact
Mineração e Impacto Ambiental

V
Evolution of Coastal Land
Evolução do Litoral

FOREWORD

This book is part of the project on Paleoenvironmental Changes and Anthropisation in the Quaternary of Western Iberia, a study carried out in 2010-2011 by the Portuguese Association for Quaternary Research (*APEQ*). The aim of the project was to bring together a number of research efforts leading to an explanation of environmental changes during the Quaternary, of how human communites responded to those changes, and of the role played by man in altering the landscape of the Western part of the Iberian Peninsula.

The present publication is a follow up to *Paleoenvironmental Changes and Anthropisation in the Quaternary of Western Iberia*, first published in 2010, although this time the geographical scope has been expanded to include the Western Atlantic edge and thus put the Iberian Peninsula in a wider research perspective.

For the most part the articles in this book are based on the papers first presented at "IV Jornadas do Quaternário" / 1st International Conference: Environmental Changes and Human Interaction Along the Western Atlantic Façade, held at the University of Coimbra in 9-10 December 2011.

Coming from a variety of universities and research centres in Portugal, Spain, Scotland, Switzerland, Morocco, Angola and Brazil, the authors of these studies belong to different scientific areas, from geophysics to geology to geography, archaeology and biology, thus reflecting the multidisciplinary nature of Quaternary studies.

The articles are divided into five thematic sections, according to the research interests of the authors involved.

Part I is devoted to methodological issues and opens with Philippa Ascough's article. Ascough's topical theme deals with the need to be cautious when using C14 for absolute ratings of marine samples or man-related remains, as they appear to be older than their terrestrial counterparts. What we have here is the marine reservoir effect (MRE). In the next article, António Monge Soares and his collaborators show how radiocarbon dating carried out in Portugal allowed them to determine the age of a number of apparently contemporary consolidated dunes, dating from somewhere between the last interstadial and the early Holocene. In their study, Ana Gomes, Tomasz Boski and Delminda Moura use the specificity of diatom communities in terms of ecological preferences to carry out paleoenvironmental reconstructions in the Guadiana estuary (S of Portugal) during the Holocene.

Part II is made up of articles on paleoenvironmental change and human activity. Based on their interdisciplinary study of sedimentary deposits found in the archaeological area of Campo Lameiro (Pontevedra, NW of Spain), Manuela Costa Casais and her team offer a model of Holocene environmental evolution. Their findings confirm the occurrence of significant erosion/sedimentation processes starting in the Younger Dryas and throughout the Holocene. According to the authors, some of the discontinuities found in Holocene colluvia coincide with abrupt climate events known to have occurred in the past 10,000 years, namely the 8.2 ka event, the beginning of Neoglaciation, and the 2.8 ka event. But since at least the Neolithic period, human intervention in the landscape must have played an important role in the way the landscape evolved, sometimes with far greater repercussions than those caused by natural phenomena. Alexandre Trindade, Gonçalo Vieira and C. Schaefer used the micromorphology of sediments and of soil slopes to come to a better understanding of their morphogenetic significance and thus arrive at a chronological framework of the late Quaternary in Serra da Estrela (Portugal). Using isotope datings and marine records, C. Muñoz-Sobrino, L. Gomez-Orellana and P. Ramil-Rego draw correlations between pollen sequences that help us understand the regional migration of plant species in the western end of the Cantabrian range (North of Spain) during the Post-glacial. From their pollen analysis of coastal wetlands in northwestern Iberia, L. Gomez-Orellana, P. Ramil-Rego and C. Muñoz-Sobrino derive the conclusion that between 100,000 and 32,000 BP there were conifers alongside temperate deciduous trees on the coast of northwestern Iberia, a region that served as a refuge for mesophilic and thermophilic species. Based on the study of charcoals found in a marsh, João Araújo and his colleagues offer a variation of Serra da Estrela (Portugal) vegetation dating from the end of the last glacial and the Holocene. The authors noticed that this higher concentration of charcoal was concurrent with deforestation between 3,000 and 900 BP. The paleobotanical study of Chalcolithic and Bronze Age sites located in northwestern Iberia, presented in the article by M. Seijo-Martín and his collaborators, uses the logic of operational chains as applied to the exploitation of wood resources. Using this method, the authors attempt to characterise the various stages of this particular activity – from the procurement of timber to its end use –, and from there they proceed to make inferences of a paleotechnological and paleoethnological nature. Their results show a broad-spectrum strategy for procuring firewood and timber, through the use of the resources available in the various landscape units around the habitats: climax forests, brushwood and riparian zones.

Part III covers both the fauna and human activity, *i.e.*, the ways in which humans have used a number of wildlife resources. Mariana Diniz and Pablo Arias's work on the Mesolithic shell middens of Portugal's Sado river aims, among other things, to draw attention to the specificities of these prehistoric sites. For although it is broadly possible to include them in *a typically Euro-Atlantic culturescape* to which the Muge shell middens also belong, there are certain peculiarities that have to be taken into account if one is to build an explanatory model of regional Mesolithic settlement. More

specifically, the authors believe that the analysis of these peculiarities may help assess the exact extent to which ecological and cultural factors determined how Mesolithic communities came to choose this territory. While also dealing with Mesolithic shell middens, the study carried out by Rita D. S. Dias and her team focuses on Muge (Portugal) and their article discusses the consequences of the use of spatial distribution models at Cabeço da Amoreira. Their methodology aims at identifying concentrations of artifacts and ecofacts, establishing relationships between lithic materials and osteological remains, and obtaining data on the site formation processes. Olivia Figueiredo, on the other hand, gives us a state-of-the-art type of review on the burial practices identified in Muge's diverse mounds. According to the author, there is ample evidence of the fact that the approximately three hundred skeletons found in Muge were actually the object of intentional, albeit nonstandard, burials. In the context of a much later chronological framework, Cleia Detry and Ana Margarida Arruda sought to identify the causes of the decrease of cockle (Cerastoderma edule) remains and the increase in grooved carpet shell clam (Ruditapes decussatus) and mussel (Mytilus edulis) remains at Monte Molião (Lagos, Portugal) during its Roman occupation. The findings suggest that the variation may be due to environmental changes caused by some sudden, brief event such as a storm or tsunami, leading to the disruption of this cockle-rich estuarine ecosystem. While giving this hypothesis its due, the authors do not rule out the possibility that the changes in the frequency of these molluscs were caused by habit changes with regard to the exploitation of water resources. This study also led to a dietary reconstruction of the inhabitants of Monte Molião.

In Part IV, devoted to mining and its impact on the environment, Nuno Inácio and his collaborators assess the environmental impact of copper mining and metallurgy in the Huelva region (Sw of Spain) in the third millennium BC. Palynological data, chemical analyses of sediments and other biomarkers of the Guadiana, Tinto, Odiel and Guadalquivir drainage basins for the period in question point to severe deforestation with consequent soil erosion as well as land and water contamination by various heavy metals. Based on these impacts, the authors suggest the possibility of copper mining and metallurgy as a specialised activity in the 3rd millennium BC. The Chalcolithic period is also the focus of the research carried out by Patricia Jordan and Nuno Pimentel, who submit a model for the management and movement of lithic resources, namely flint, in the Nazareth-Peniche region (central Portugal). Methodologically, this model derived from the petroarchaeological approach used for the Village of S. Mamede (Óbidos), which in turn resorted, among other things, to petrographic analyses and to studies based on lithic technology.

Part V deals with coastal evolution in four different geographical areas: the Algarve (SW of Iberian Peninsula), Galicia (NW of Iberian Peninsula), Morocco (NW of Africa) and Angola (West Africa). As far as the Algarve is concerned, Delminda Moura, Ana Gomes, Selma Gabriel and J. Horta discuss the relationship between the mean sea level and the coastline and how that relationship is reflected in terms of archaeological finds. L. Infantini, on the other hand, shows the occurrence and probable dynamics of

an immersed lagoonal form in the Armação de Pêra bay (Algarve). J. M. García-Rey and X. Vilaseco Vasquez analyse the loss of sand on an island in the ria de Arousa (Galicia) to study its archaeological sites and trace the island's evolution throughout the Quaternary. Pedro Dinis and his colleagues seek to explain the sedimentary dynamics of two river deltas near Benguela, in Angola, an area marked by a sharp seasonal contrast. Finally, El Khalidi, B. Zourarah and A. Aajjane use sequential analysis of aerial photos as well as a geographical information system to explain landscape and coastline changes on a stretch of the Moroccan coastline.

This book is thus the materialisation of APEQ's goals as expressed in the above-mentioned project and in the Association's activity over a two-year period.

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