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Vegetation, firewood exploitation and human settlement in northern Spain in relation to Holocene climate and cultural dynamics

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ABSTRACT

Charcoal data from archaeological sites located in the Cantabrian region (N Spain) presented aims to reconstruct the interactions between climate dynamics, vegetal landscape and woodland exploitation developed by humans throughout the different Holocene cultural stages. The transition to the Holocene was a period of important changes. The increase in temperature and moisture implied the expansion of deciduous *Quercus* over the previous pioneer taxa *Pinus* and/or *Betula*, coinciding with the Azilian-Mesolithic cultural transition in the Cantabrian region. The development of deciduous oak woods recorded during the Holocene climatic *optimum* was reported as the main vegetation formation exploited by Cantabrian Mesolithic and Neolithic groups. The different geographical locations of the sites (shoreline, pre-littoral elevations/inner Atlantic valleys and uppermost intra-mountain valleys) as well as their topographic features, substrate, slope orientation and altitude explain the floristic variations observed in the anthracological assemblage. The Chalcolithic, Bronze and Iron Ages were characterised by an intensification of the exploitation of the same plant ecosystems especially those of shrubby plants. Their dominance over arboreal taxa indicates the increasing human pressure on the vegetal communities which may have been mainly related to itinerant livestock herding practises in the area.

1. Introduction

The Holocene is defined by periods of climatic instability that involve changes affecting the geographical features of territories and the subsequent distribution of animal and plant communities, resulting in a decisive influence on prehistoric groups particularly regarding their technological and cultural stages. This vegetation-climate-human interaction approach is the focus of most recent palaeobotanical (off-site) and archaeobotanical (on-site) contributions covering several areas of Eurasia (e.g. Chlachula and Catto, 2010; Hoek et al., 2015; Velichko et al., 2009; see references therein) and the Mediterranean basin (e.g. González Sampériz et al., 2009; Mercuri et al., 2011; Cortes et al., 2012; Uzquiano et al., 2016; Zanchetta et al., 2013).

As regards to the Cantabrian region here discussed, during the transition to the Holocene as well as its earlier phases the sea level rise resulted in changes in the morphology of the littoral area and the subsequent loss of exploitation territories for the last Azilian and early Mesolithic groups, who needed to adopt diverse adaptation strategies to this new scenario (Straus, 1992; González Morales, 1990a; 1990b). The interaction of climate variability, Quaternary geology, vegetation dynamics and Archaeology has a long tradition in this area resulting in various multidisciplinary works since the last decades of the 20th century (e.g. Mary et al., 1975; Cearreta and Ugarte, 1990; Cearreta et al., 2010, 2015; Straus, 1992, 2008; Ontañón et al., 2013). The first charcoal synthesis for the area was actually developed in this framework (Uzquiano, 1992). So far, anthracological investigations in N Spain over the past 23 years has resulted in a large number of new charcoal data leading to the drawing of new synthetic works such as the recent paper on vegetation, climate and human interactions in Late Upper Palaeolithic settlements during the Marine Isotope Stage 2 (MIS 2) (Uzquiano, 2014). In this way, the present study should be regarded as a continuation of such research, being chronologically placed within the Marine Isotope Stage 1 (MIS 1), and following the same dual and closely-related purpose -namely, the interaction between natural and human factors as far as Anthracology is concerned (e.g. Vernet, 1997; Uzquiano, 1997; Théry et al., 2010).

Although Anthracology has proved a useful tool to picture past wood vegetation, the interpretation of charcoal data (Fig. 1a, b,

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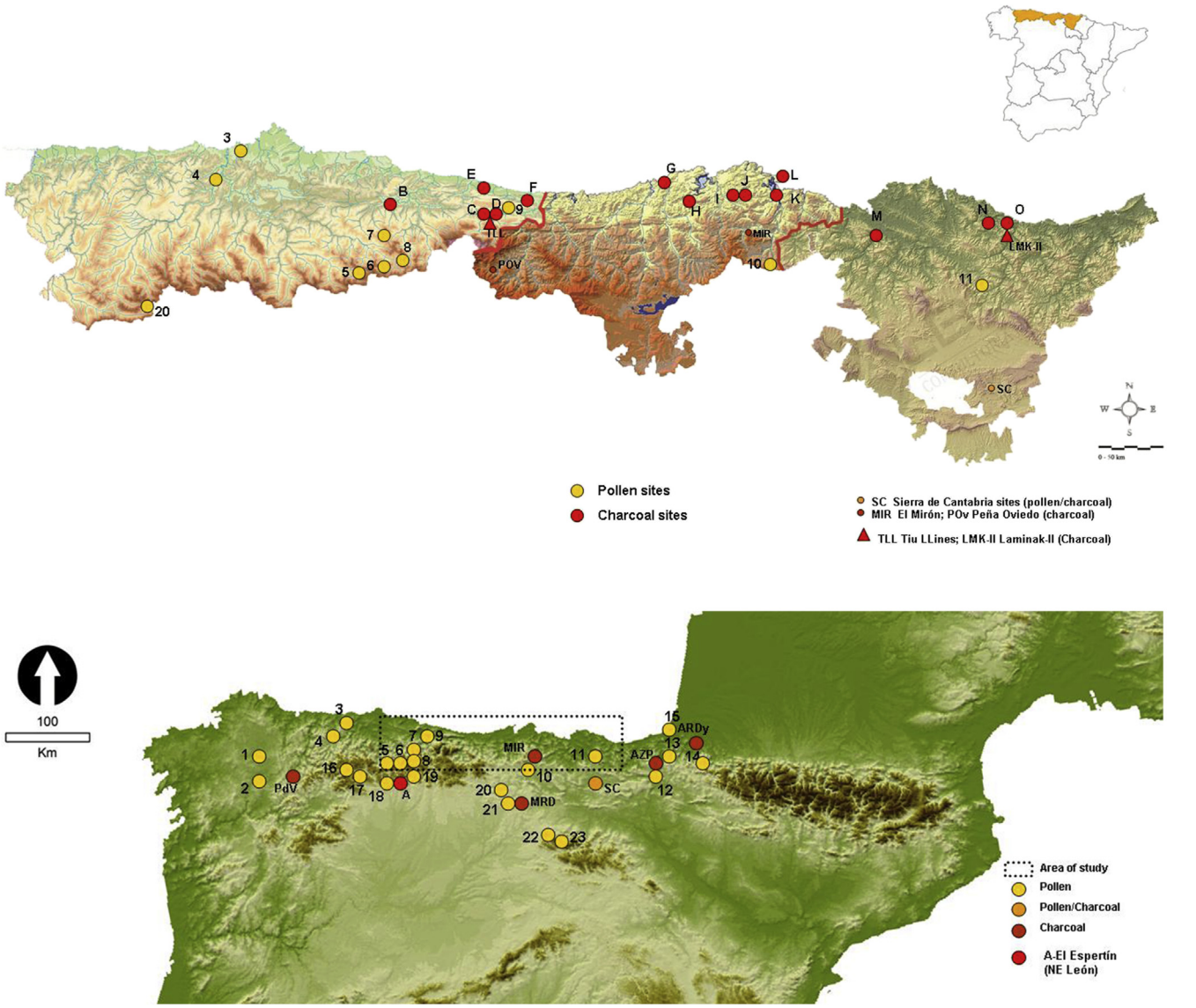

Fig. 1. a: Location of Charcoal sites aim of this interdisciplinary study in red dots and lettered as shown in Table 1, together with some pollen deposits (yellow dots) numbered as appears in Table 2. The sites LMK-II Laminak II (Uzquiano, 1995); TLL Tiu Llines (Uzquiano unpublished), appear in red triangles beside other archaeobotanical studies conducted in the area of study (see Fig. 1b for the names corresponding to their respective abbreviations). b: Location of selected Holocene pollen sites mentioned in the text in yellow dots and numbered as shown in Table 2, together with some selected archaeological sites (in brown dots and abbreviations) having yielded pollen and/or charcoal studies. From west to east: PdV: Pala da Vella (Galicia); MIR: El Mirón (Cantabria); MRD: El Mirador (Burgos); SC: Sierra de Cantabria sites (Basque Country); AZP: Aizpea (Navarra); ARDy: Arudy sites (Western Pyrenees, France). The site of El Espertín (NE León), aim of this study, is included here in red dot and lettered as shown in Table 1. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Table 1) is supplemented by integrating the available pollen information from peat/lakes sites from N Spain (Fig. 1b, Table 2).

Additional published charcoal information from N Spain (Carrión-Marco, 2005; Euba et al., 2015; Ruiz-Alonso et al., 2011; Zapata, 2012) as much as some carpological and archaeozoological evidence available for the area (Altuna, 1990; Arias, 2007; Bailey, 1983; Gutiérrez Zugasti, 2009; Lopez-Dóriga, 2013; Ontañón et al., 2013; Peña et al., 2005; Uzquiano and Zapata, 2000; Zapata, 2000) was also integrated in the discussion.

2. Geographical setting of sites

The Cantabrian region comprises the territories located between the Cantabrian Sea and the watershed of the homonymous mountain range, covering a land strip about 20–40 km wide (Cendrero et al., 1986). The area discussed here includes the Basque-Cantabrian shoreline (Basque Country, Cantabria and Asturias) and several inland areas located in the lower Atlantic valleys and the Prelittoral Depression (Asturias) (Fig. 1a) until the uppermost Cantabrian intra-mountain basins (El Espertín site, NE León) (Fig. 1b).

The geographical distribution of main the mountains and valleys together with the density of the hydrological system generate a clear sectoring of the territory into diverse natural regions, from the littoral areas to the uppermost intra-mountain basins. Both slope orientation and the nature of dominant substrate are responsible for the current floristic diversity, characterised by several plant communities with different ecological needs but growing nearby. The E-W arrangement of the mountains also generates different sheltered situations (Bertrand, 1974), especially on the E Asturias-

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