



## Middle-to-Upper Palaeolithic site formation processes at the Bordes-Fitte rockshelter (Central France)



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### ARTICLE INFO

#### Article history:

Received 17 April 2014

Received in revised form

13 September 2014

Accepted 15 September 2014

Available online

#### Keywords:

Middle-Upper Palaeolithic transition

Site formation processes

Lithic technology

Luminescence and radiocarbon dating

### ABSTRACT

Transformation in technological patterns associated with the Middle-to-Upper Palaeolithic transition between 50 and 40 ka in Western Europe and their relationship with the Neanderthal and Anatomically Modern Human populations and behaviors are issues that continue to stimulate heated debate. In this article we use the Middle and Early Upper Palaeolithic archaeo-stratigraphic record from the Bordes-Fitte rockshelter (les Roches d'Abilly site, Central France), a Bayesian analysis of the ages obtained by accelerator mass spectrometry radiocarbon on ultrafiltered collagen and by luminescence on quartz and feldspar grains, to establish a timeline for material culture and sedimentary dynamic changes during the Middle-to-Upper Palaeolithic transition. Technology, refitting studies and taphonomy of lithic artifacts recovered in the geoarchaeological field units D1 and D2 permit to characterize 3 reduction strategies (Levallois, Discoidal and Châtelperronian blade) that took place between the cold Heinrich events 5 and 4. We discuss the implications of the results to characterize the end of the Middle Palaeolithic, and for distinguishing anthropogenic and non-anthropogenic factors in Middle-to-Upper Palaeolithic assemblage's variability.

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### 1. Introduction

Changes in material culture associated with the Middle-to-Upper Palaeolithic transition between 50 and 40 ka in Western Europe, and their relationship with the Neanderthal and Anatomically Modern Human populations and behaviors are issues that continue to stimulate heated debate (Bordes, 1971; Howells, 1976; D'Errico et al., 1998; Mellars, 1996, 2005; Bar-Yosef and Bordes, 2010; Zilhão, 2013). Two main characteristics of the geoarchaeological record of this period could explain the difficulty in elaborating a reliable timeline with a resolution sufficient to understand material culture changes observed during this period.

Firstly, the key Middle-to-Upper Palaeolithic (MUP) sequences of Western-south France were affected by successive cold Heinrich events (HE) (Heinrich, 1988) that caused a periglacial environment

along the Atlantic continental margin (Sanchez-Goni and Harrison, 2010), propitious to erosive processes attested by stratigraphical discontinuities and post-depositional disturbances in archaeo-stratigraphic sequences (Bertran et al., 2010; Goldberg and Macphail, 2006). Lithic assemblage technology and typology (Rigaud, 1996), refitting between lithic (Bordes, 2003; Bachellerie, 2011) or faunal remains (Morin et al., 2005; Discamps et al., 2012), surface damage analysis correlated with technological study of lithic remains (Zilhão et al., 2006; Villa and Soressi, 2000; Soressi, 2011), and study of patterns in the orientation of elongated artefacts (Bertran et al., 1997; Lenoble and Bertran, 2004; McPherron, 2005) have been applied to evaluate mixing disturbances and stratigraphic coherence for MUP archaeological assemblages. However, these taphonomic analyses have been realized independently of the reconstruction of sedimentary and pedogenic processes, and have yet to be applied systematically to the key MUP sequences in order to establish the relationship between dated samples and occupation by human or carnivores (Zilhão, 2013).

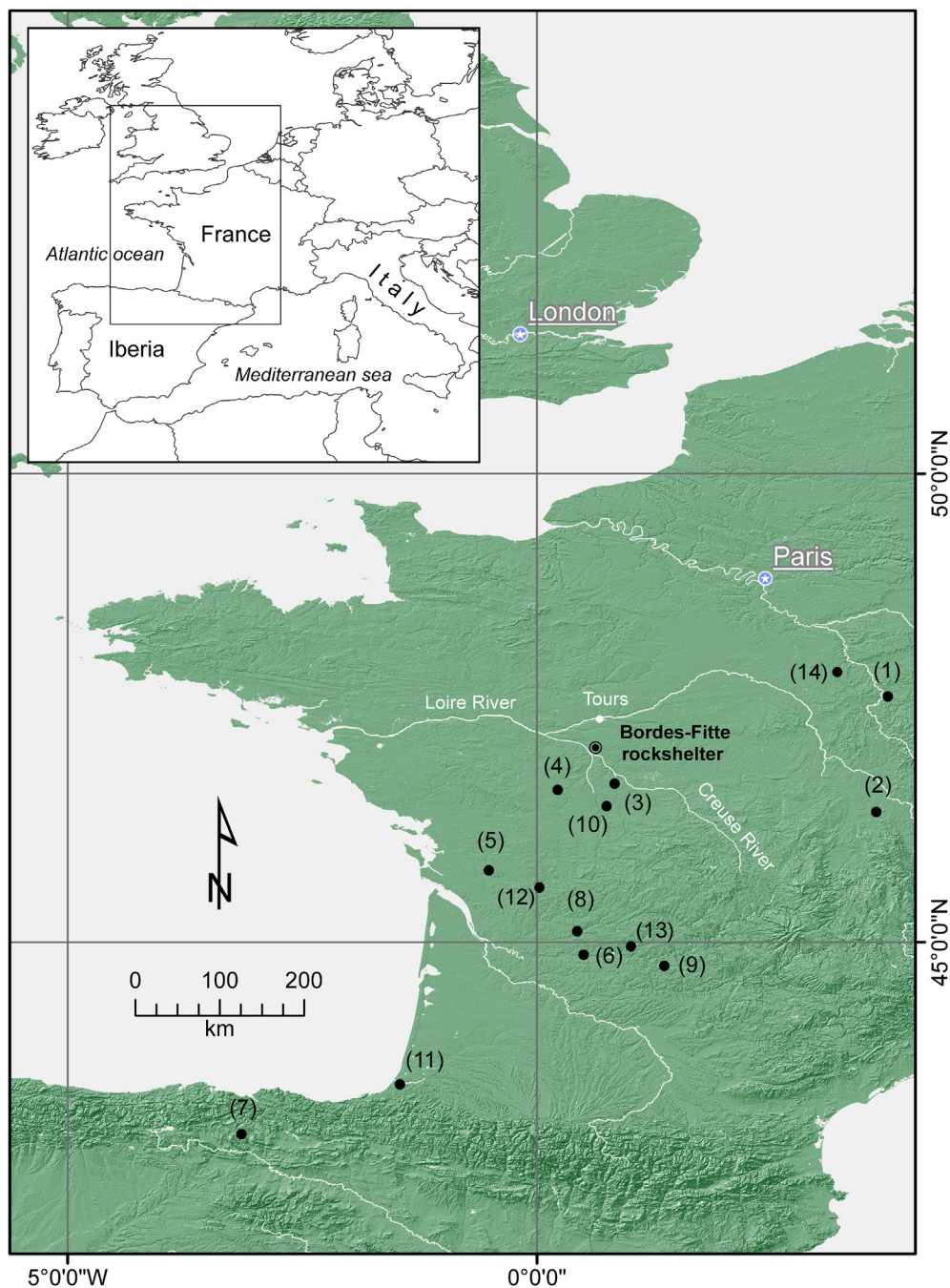
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Secondly, the limitations of  $^{14}\text{C}$  dating beyond 35 ka cal BP have been proven by studies which have re-dated sites using AMS radiocarbon dating with ultrafiltration. These have systematically revealed older results compared to those obtained when other pretreatment chemical methods were applied (Higham et al., 2006; Jacobi et al., 2006). Despite some controversies (Hüls et al., 2007; Hublin et al., 2012), using this sample preparation protocol is leading to the creation of a new chronological framework for the Late Middle Palaeolithic (LMP) and Early Upper Palaeolithic (EUP) in Western Europe (Gravina et al., 2005; Hublin et al., 2012;

Higham, 2011; Higham et al., 2010, 2011, 2014; McPherron et al., 2012; Richter et al., 2013; Talamo et al., 2012). Until very recently, there are still few cases of application of the ultrafiltration protocol to date occupations corresponding to the very end of the Middle Palaeolithic in Europe (Higham et al., 2014), and most of the contexts attributed to this period were based on lithic technology, faunal biozonation or their relative position in archaeological stratigraphic sequences (Jaubert et al., 2011).

Les Roches d'Abilly is an archaeological site located in Central France, along the Creuse Valley, that consists of small, horizontal



**Fig. 1.** Location map of the Châtelperronian and Late Middle Palaeolithic sites mentioned in the text, and Bordes-Fitte rockshelter (LRA-BF). (1) La Grotte du Renne, Grotte du Bison and Galerie Schoepflin (Arcy-sur-Cure), (2) Grotte des Fées (Châtelperron), (3) Grotte des Cottés (Saint-Pierre-de-Maillé), (4) Grotte de Grande Roche (Quincy), (5) La Roche à Pierrot (Saint-Césaire), (6) Canaule II (Creyse), (7) Labeko Koba (Arrasate), (8) La Côte (Neuvic), (9) Roc-de-Combe (Payrignac), (10) Les Rochers-de-Villeneuve (Lussac-les-Châteaux), (11) Le Basté (Saint Pierre d'Irube), (12) La Quina (Gardes-Pontaroux), (13) Le Moustier (Peyzac-le-Moustier), (14) Les Bossats (Ormesson).

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