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Winter is coming: What happened in western European mountains between 12.9 and 12.6 ka cal. BP (beginning of the GS1)

Antonin Tomasso [a, b, *], Célia Fat Cheung [c], Sophie Fornage-Bontemps [d], Mathieu Langlais [e], Nicolas Naudinot [a]

[a] *Université Côte d'Azur, CNRS, CEPAM, France*
[b] *TraceoLab / Préhistoire, University of Liège, Belgium*
[c] *Université de Toulouse, Traces, UMR 5608, France*
[d] *Université de Franche-Comté, Laboratoire de Chrono-environnement, UMR 6249, CNRS, France*
[e] *CNRS, UMR 5199, PACEA, Université de Bordeaux, France*

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ABSTRACT

This paper builds on recent research on the abrupt cooling event known as GS1 (Younger Dryas) from ca. 12.9 to 11.7 ka cal. BP. These studies have indicated the diversity of local responses to this period between different regions across Europe. Research has indicated both responses and lack of responses of humans to this event in different regions. In accordance with this research, this paper argues that it is necessary to move away from global models of human responses to the analysis of regional scales. We argue that it is necessary to consider the evolutionary dynamics that predated the GS1 cooling event before identifying its potential impact. This paper focuses on this aspect of the problem by considering evidence from three mountainous areas: the Pyrenees, the northern French Alps and Jura, and lastly southern and Apuan Alps. Recently studied sites are considered with specific attention to lithic industries. Our analysis focuses on (1) the identifiable changes in each industry and (2) the relationship with pre-existing cultural and technological dynamics. The analysis has produced two main results. First, there was a tendency towards a decrease in the standardization of blanks, especially in blades, which was common to the different areas. This change, however, predated GS1 and can therefore not be associated with cooling at the start of GS1. Second, the Northern Alps and Jura, in contrast to the two other areas, seems to reveal a break from the lithic technological traditions that occurred around 12.9 ka cal BP or the early stages of GS1. These results enable a discussion of the different mechanisms that can explain differential regional responses to GS1.

1. Introduction

The abrupt cooling event known as GS1 (Greenland Stadial-1; commonly referred to as the 'Younger Dryas') spans the end of the Lateglacial global warming from ca. 12.9 to 11.7 ka cal BP, just before the onset of the Holocene (Alley, 2000; Rasmussen et al., 2014). Recently, numerous scholars have focused on this climatic event and the important role it played not only in environmental changes, but also in mechanisms of cultural change (among others: Kobusiewicz, 2002; Ballenger et al., 2011; Lothrop et al., 2011; Weber et al., 2011; Naudinot et al., 2017b). However, some studies have questioned the suggested impact of this global event on human societies, or more specifically its visibility in lithic technologies (e.g. in Italy after Mussi and Peresani, 2011 or in Mediterranean Spain after Straus, 2011).

Studies of the GS1 cooling event have yet to fully demarcate the range of various human responses to this event (but see Straus and Goebel, 2011). In order to build knowledge of human reaction to GS1, it is necessary to focus on analyses of environmental and archaeological data at a regional scale. This requires two prerequisites. First, a climate event does not imply a homogenous set of responses within a specific environment throughout the world. There may be very distinct responses depending on the region under study (Aura et al., 2011; Fiedel, 2011; Holliday et al., 2011; Naudinot et al., 2017b). Investigation of the relationship between

* Corresponding author. TraceoLab / Préhistoire, University of Liège, Place du 20-Août 7, 4000 Liège, Belgium.
E-mail address: antonin.tomasso@ulg.ac.be (A. Tomasso).

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any climatic event and the evolution of human societies requires the analysis of local environmental proxies. Second, when discussing the impact of climate events, one must acknowledge that human societies are not an adaptive 'blank-slate', but rather respond according to past histories. Several dynamics of cultural changes can be assessed before a climatic event: it is therefore crucial to not interpret them as a priori arising from the climatic event that we consider. We address this issue in the following paper.

To address this problem we need to restrict the investigation to a short time interval: the GS1 is not a monolithic climatic period (e.g. for the Jura: Richard and Bégeot, 2000) and we need to avoid mixing up different phenomena. We therefore restrict our investigation to the early centuries of GS1, from 12.9 to 12.6 ka cal BP. We ask the following question: is it possible to connect the early beginning of GS1 with rapid changes within lithic industries? In order to do this we must consider only accurately dated archaeological assemblages. Three areas in France and Northern Italy were recently studied and provide sites with layers securely dated between 12.9 and 12.6 ka cal BP: namely the Pyrenees, the northern Alps and Jura, and lastly the southern and Apuan Alps. We emphasize that no sites can be identified for this period in northwestern France, Paris Basin or in south-western France (Aquitaine). Data were gathered with the same method and can be compared. The three areas are related to different technocomplexes, namely the Azilian and the Epigravettian.

Data between 12.9 and 12.6 ka cal BP (Table 1 and Fig. 1) in each region are considered here. In each of them we will seek to identify the changes (in comparison to what we know in each area for GI1) and we will look at the issue of the continuity between the GI1 and the GS1.

2. Methods

Lithic industries are ubiquitous in archaeological sites. In comparison to other fields of human material culture, taphonomic biases are not critical when investigating comparisons between different regions. Data is therefore comparable, even though the sedimentary contexts constituting the documentation in the different areas studied in this paper are contrasted. By contrast, the osseous industries are for example not documented in the southern French and Apuan Alps.

Lithic technology has proven to be efficient in exploring the variability of tool industries (among others: Bodu et al., 1991; Inizan et al., 1992; Pelegrin, 1995; Valentin, 1995). Technological studies do not limit themselves solely to the description of finished products, but rather consider all lithic artefacts in order to reconstruct the techniques, methods and objectives, as well as to understand the interactions with other fields of the entire technical system (Lemonnier, 1986). The variability between distinct assemblages can be interpreted within this framework as a result of various parameters that need to be evaluated by the analysis: site function, technical traditions, specific local constraints (e.g. raw material availability) and others. In this context, this study will focus on sites where technological studies have been conducted (Table 2, Fig. 2).

3. Data

3.1. South-eastern France and north-western Italy

A major portion of GS1, after 12.6 ka cal. BP, is undocumented in both north-western Italy and south-eastern France (Naudinot et al., 2017b). By contrast, the documented data preceding 12.9 ka cal. BP has recently been improved (Bertola et al., 2007; Tozzi and Dini, 2007; Tomasso, 2014, 2016; Tomasso et al., 2014).

In the focus period here, only two recently studied open air sites provide accurate information and can be considered in this study: Isola Santa, located in a valley of the Apuan Alps (Dini and Tozzi, 2005; Tomasso, 2016) and Saint-Antoine in the Durance valley, southern French Alps (Montoya, 2002, 2004; Montoya and Bracco, 2005). Both are middle mountain altitude sites (circa 500 m high) with well-documented hunting activities, but without evidence of specialization (Bracco, 2004; Tomasso, 2014). At Isola Santa, layer 5 (Table 1: #9) is the oldest documented occupation of the site, whilst more recent layers document the Mesolithic (Kozlowski et al., 2003). There were no major problems identified in the preservation of the stratigraphy. In Saint-Antoine, the excavation documents a single occupation (Table 1: #16–17) with no evidence of disturbance from other periods (Jaubert et al., 1991; Gagnepain, 1999; Gagnepain and Bracco, 2006).

According to data published, the production processes seem analogous for the two sites. All blanks were obtained through a single production scheme that was primarily oriented toward the production of bladelets. Irregular blades and flakes were obtained

Table 1
Dates for archaeological sites in the 12.9–12.6 ka cal. BP interval. Dates outside this interval are cited if associated with dated layers falling with this interval (* = AMS).

#	Outed dates	Site	Level	Date BP	SD	Cal. BP	Code	Material	Bibliography
1	x	Abeurador	F8b	11090	90	13100-12746	Ly-951	Charcoal	Vaquer and Ruas, 2009
2		Balma Guilanyá	E	10940	50	12950-12707	Beta-210729	Charcoal	Martínez-Moreno and Mora, 2009
3	x	Balma Guilanyá	E	11110	40	13080-12838	Beta-247706	Charcoal	Martínez-Moreno and Mora, 2009
4	x	Balma Guilanyá	EJ	12180	50	14230-13864	Beta-185066	Charcoal	Martínez-Moreno and Mora, 2009
5	x	Balma Guilanyá	Ej	12190	50	14250-13920	Beta-18506	Charcoal	Martínez-Moreno et al., 2007
6		Balma Margineda	8 sup.	10760	120	12931-12421	Ly-4406	Charcoal	Guilaine et al., 2008
7	x	Balma Margineda	8 sup.	11130	120	13204-12735	Ly-5417	Charcoal	Guilaine et al., 2008
8	x	Balma Margineda	8	11320	120	13443-12955	Ly-4407	Charcoal	Guilaine et al., 2008
9		Isola Santa	5	10720	120	12886-12250	R-1524	Charcoal	Dini and Tozzi 2005
10		Mannlefelsen I	R	10770	50	12751-12631		Charcoal*	Mevel et al., 2014a, b
11		Pont d'Ambon	2	10730	100	12805-12427	GifA-99102	Bone (dog)	Célérier et al.,1999
12		Rhodes II	7	10630	45	12709-12535	Ly-10255-SacA-33730		Fat-Cheung, 2015
13		Rhodes II	7	10630	45	12709-12535	Ly-10255 (SacA 33730)	Bone (red deer)	inedite
14		Rochedane	A4	10830	70	12858-12632	GrA-21518	Charcoal*	Mevel et al., 2014a
15		Rochedane	A4	10880	50	12836-12691	GrA-23147	Charcoal*	Mevel et al., 2014a
16		Saint-Antoine	B	10825	55	12806-12668	Lyon – 1526 (OXA)	Charcoal*	Montoya, 2004
17	x	Saint-Antoine	B	11180	60	13160-12854	Lyon – 1525 (OXA)	Bone (red deer)*	Montoya, 2004
18	x	Troubat	6	10225	45	12114-11765	Ly-9968 (SacA32593)	Bone (red deer)	Fat Cheung, 2014
19		Troubat	6b	10770	100	12877-12438	Ly-5275	Charcoal	Barbaza et al., 1998

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