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Human resilience to Lateglacial climate and environmental change in the Scheldt basin (NW Belgium)

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ABSTRACT

Recent palaeoenvironmental analyses in the Scheldt basin in NW Belgium have identified significant hydrological and vegetation changes between Greenland Interstadial-1b (GI-1b) and Greenland Stadial-1 (GS-1)/Younger Dryas (YD) that enable us to develop hypotheses to explain the radical changes in land-use and lithic technology observed between the *Federmesser* and post-*Federmesser* occupation of the region. The highly productive lacustrine environments of the lower Scheldt basin during the Allerød enabled relatively high population packing by *Federmesser* groups exploiting the region within a residential mobility system. *Federmesser* assemblages indicate a flexible lithic technology centered on the production of unstandardized blades and flakes that were intensively backed to shape various tool forms. The destabilization of these landscapes in the Scheldt basin between GI-1b and GS-1/YD, and the ensuing cold of the YD, changed the composition of important secondary biomass from less mobile ungulate species to seasonally mobile reindeer populations. Human populations were resilient to these changes by developing a highly standardized (micro)blade technology and microlithic toolkit.

1. Introduction

As a result of intensive interdisciplinary research over the past decades, numerous Lateglacial sites have been detected and studied in the basin of the Scheldt River in NW Belgium. One of the most important observations is the marked contrast in site density between the *Federmesser* Culture, generally dated to the Allerød, and the Younger Dryas/early Preboreal (YD/PB) occupations. The former is represented by numerous sites, which often cluster in extensive site-complexes (Crombé et al., 2011, 2013), while only few sites are currently known from the YD/PB (Crombé et al., 2014a). Recent palaeoenvironmental research has provided detailed information on landscape changes that help us move toward starting to explain this marked difference in occupation density at the transition from the Lateglacial to the Early Holocene.

2. Regional setting

After the Meuse, the Scheldt is the largest river in Belgium with a total length of 430 km, of which 207 km traverses Belgian soils. Its headwaters are situated in northern France and its debouchment is located in the southwest of the Netherlands, where it currently flows into the Westerscheldt (Fig. 1). During prehistory, however, the Scheldt north of Antwerp had a more northern course, joining the estuary of the Rhine and Meuse in the central western Netherlands. The Scheldt is fed by numerous tributaries, the most important ones being, from south to north, the Lys, the Kale/Durme, the Dendre and the Rupel. The total catchment area amounts to 21,863 km^2, subdivided into the Upper Scheldt basin (from source to Ghent) and the Lower Scheldt basin (from Ghent to its debouchment). Within the floodplains of the Scheldt and its tributaries numerous large fossil Lateglacial oxbows occur, flanked by series of small but elongated scroll-bars and river-dunes (Fig. 2). The latter geomorphological features were preferred settlement locations during different prehistoric periods.

The area of the Upper Scheldt basin, called “the Flemish Ardennes”, is a hilly upland consisting mainly of tertiary hills with a maximum height of 157 m above present sea-level. The quaternary cover mainly consists of loam and sandy loam deposited during the Pleniglacial, forming thick packets in the valley bottoms and on ancient river terraces. On the hilltops, on the other hand, the Pleistocene cover is generally thin (<1 m), partly due to erosion, allowing tertiary sediments to outcrop. The topography along the

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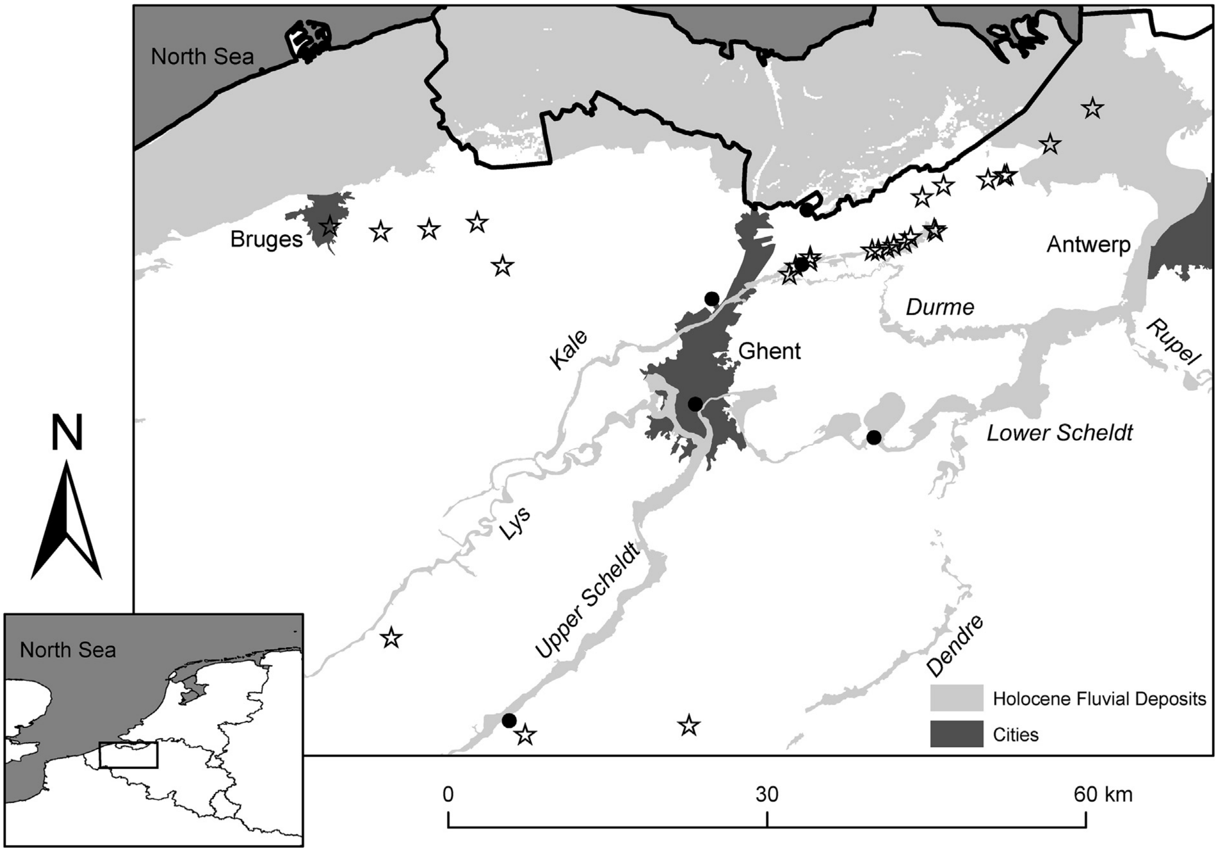

Fig. 1. The Scheldt basin with the distribution of *Federmesser* Culture (stars) and YD sites (dots).

northern Lower Scheldt basin is much less pronounced (Fig. 3). This area corresponds to a typical lowland area with numerous sand ridges formed by a local reworking of coversands mainly during the late Pleniglacial and Lateglacial cold phases (Heyse, 1979; Crombé et al., 2012). These ridges are generally relatively small and elongated, except for the massive dune-complex known as the Great Sand Ridge of Maldegem-Stekene, which runs over the sandy lowland from west to east over a distance of ca. 80 km (Fig. 3). In between these coversand dunes numerous Lateglacial palaeolakes and fossil dune-slacks occur, the borders of which were frequently occupied by prehistoric societies. The dune-slacks, also called "blowouts", were created as a result of local deflation of coversands down to the groundwater table, while the palaeolakes, all occurring along the steep southern side of the Great Ridge, correspond to local depressions in which surface and groundwater that were blocked by this massive ridge accumulated (De Moor, 1963; De Moor and Heyse, 1978; Heyse, 1983; Crombé et al., 2013).

In the northern and western extremes, resp. in the Scheldt Polders and Coastal Polders, the Pleistocene landscape is covered by Holocene peat and (peri)marine deposits, protecting prehistoric sites from erosion and destruction (Crombé, 2005, 2006).

3. Materials and methods

3.1. Palaeoenvironmental analyses

The Scheldt valley, in particular its lower course and tributaries, especially the Kale/Durme, has been studied intensively in the last decades in the context of both academic and developer-led ("commercial") research. Different aspects of the Lateglacial and Early Holocene palaeolandscapes have been investigated, allowing for a rather detailed reconstruction of the palaeovegetation through the study of pollen and plant macroremains (Verbruggen, 1971; Verbruggen et al., 1996; Deforce et al., 2005, 2011; Perdaen et al., 2011; Bos et al., 2013), as well as geomorphology and palaeohydrology (De Moor, 1963; Vanmaercke-Gottigny, 1964; Tavernier and De Moor, 1974; Heyse, 1979; Kiden, 1989, 1991; Bogemans et al., 2012). In addition, the chronological framework of the Lateglacial and Early Holocene landscape evolution is well documented by numerous radiocarbon dates (Crombé et al., 2012; Meylemans et al., 2013; Crombé et al., 2014b) and a limited number of OSL dates from aeolian sediments (Bogemans & Vandenberghe, 2011; Derese et al., 2010).

3.2. Archaeological dataset

The Scheldt basin has been the subject of extensive archaeological research, including surveys (field-walking, aerial photography, augering, test-pitting) and excavations, some of which have covered very large surfaces, e.g. Doel "Deurganckdok"(ca. 8000 m^2), Oudenaarde "Donk" (ca. 3000 m^2), Verrebroek "Dok" (ca. 6000 m^2). However, the research intensity has varied considerably between the different subregions of the Scheldt basin, resulting in somewhat biased distribution maps. Research into the Lateglacial (Final Palaeolithic) and Early Holocene (Mesolithic) archaeology has been most intensive in the coversand lowland corresponding to the Lower Scheldt basin. Systematic field walking in large parts of this area conducted mainly by avocational archaeologists from the '80s onwards (Crombé et al., 2011) has led to the discovery of numerous—albeit mostly destroyed (ploughed)—sites located on dry