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Human occupations and environmental changes in the Nile valley during the Holocene: The case of Kerma in Upper Nubia (northern Sudan)

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ABSTRACT

Our article presents a detailed Holocene archaeological sequence from the Nile Valley at Kerma in Upper Nubia, northern Sudan. This sequence retraces the evolution of human populations thanks to the study of several sites, supported by 90 14C dates. Reconstruction of the environmental changes was supported by a study of dated stratigraphic sections located near the archaeological sites studied, and illustrates the effects on human occupation of changes in river flow and floods, which are in turn forced by climatic changes. The results shed new light on the evolutionary dynamics of the Holocene populations in Nile Valley, little known due to the numerous hiatuses in occupation. When compared with the situation in the Sahara and the rest of the Nile Valley, they confirm that the initial occupation took place ca. 10.5 kyr BP after the start of the African Humid Period, followed by a migration towards the banks of the Nile commencing 7.3 kyr BP. They also confirm the appearance of the Neolithic by ca. 8.0 kyr BP. The Kerma stratigraphic sequences show two prosperous periods (10–8 and 7-6 kyr BP) and two hiatuses in the occupation of the sites (7.5–7.1 and 6.0–5.4 kyr BP), resulting from increased aridity.

1. Introduction

During recent prehistory, North-East Africa was a particularly dynamic region in which certain major innovations appeared at an early date, such as sedentism, the adoption of an economy based on production (stock-breeding and agriculture), and the appearance of centralised states (Emberling, 2014; Honegger, 2014; Tassie, 2014). The environment, influenced by the arid Sahara and the Nile Valley, made it distinctive in that the climatic variations and the fluctuations of the River Nile played a fundamental role on patterns of human occupation. The Sahara was subject to important environmental changes with the return of the summer monsoon shortly before the start of the Holocene, which initiated the African Humid Period (12-5 kyr BP), also known as the time of the "Green Sahara" (deMenocal et al., 2000; Gasse, 2000a and b; Tierney and deMenocal, 2013; Costa et al., 2014; Otto-Bliesner et al., 2014). This period, which saw the reoccupation of the desert by groups of hunter-gatherers after 10.5 kyr BP, was followed by a progressive desertification during the Middle Holocene, which led to a progressive abandonment of the arid zones and withdrawal to the banks of the Nile (Kuper and Kröpelin, 2006).

This general situation, known for a long time, has become much more precisely known thanks to several research programmes undertaken in the Eastern Sahara, at Nabta Playa (Wendorf and Schild, 2001) in particular and in the western desert (Kuper, 2002). The increase in excavations, archaeological data and radiocarbon dates has permitted the drawing of an overall picture of human occupation of the arid environments, supported by a large number of calibrated radiocarbon ages. One of the best known reviews of archaeological sites in North-East Africa is based on more than 500 dates emanating from approximately 150 sites (Kuper and Kröpelin, 2006), whilst another more recent one, covering the entire Sahara, incorporates 3287 dates from 1011 sites (Manning and Timpson, 2014). Both of these highlight the same principal events, namely, an intensive occupation of the Sahara starting about 10.5 kyr BP, a first withdrawal to the Nile Valley about 7.3 kyr BP, followed by an abandonment of the principal desert regions commencing 5.5 kyr BP.

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Notwithstanding the abundance of data concerning the Sahara and the clarity of the tendencies observed, the situation in the Nile Valley remains poorly known, even if it was the central zone for the Holocene population. Since the first syntheses of the human occupations (Hassan, 1985, 1986), the number of excavations and ^{14}C dates has increased, but the same gaps remain. In the Egyptian valley, a hiatus occurs between the end of the Epipalaeolithic (8.5 kyr BP) and the Initial Neolithic of the Fayoum ca. 7.4 kyr BP (Midant-Reynes, 2006; Vermeersch, 2002). In Upper Egypt, the hiatus is spread over two millennia (8.5–6.5 kyr BP). In Lower Nubia, between the first and second Nile cataracts (Fig. 1), the archaeological sequence established during the 1960s is difficult to use due to its lack of precision (Wendorf, 1968). Further south, around the sixth cataract (Fig. 1), Central Sudan has been the subject of numerous excavations since 1970 (Usai, 2014), which have also established a sequence marked by gaps. The first occupations are by hunter-gatherers who manufactured pottery ca. 9.5–7.5 kyr BP (Khartoum Mesolithic). This is followed by a hiatus in occupation of half a millennium prior to the development of the Neolithic (7–5.5 kyr BP), which is itself followed by a hiatus of more than two millennia.

These disparities in the information between the different sectors of the valley have caused confusion as to the chronology regarding the evolution of human society. This is in particular the case for the least well-documented period (8.5–6.5 kyr BP), which corresponds to the beginning of the Neolithic. The transition to this new economic base is poorly understood, as are the cultural and economic relations, which the valley might have entertained at this time with the surrounding desert, for which the archaeological situation is far better documented. It would appear essential to be able to compare the different sectors of the valley one with another, and to compare these with the data from the desert, to understand the social evolutionary processes in North-East Africa (cf. Wengrow et al., 2014).

With a view to filling some of these gaps, systematic excavations have been ongoing these past 20 years east of the Nile in the region of Kerma in Upper Nubia (Sudan). On the basis of 130 identified sites located in or adjacent to the Holocene floodplain, some of which have been excavated, a chronological sequence has now been established that covers much of the Holocene and is based on 90 ^{14}C ages. This work has highlighted the evolution of the habitation structures, the mortuary practices, the material culture and the economic base (Honegger, 2014). Through study of the location of the settlements over time, and the evolution of their density, we will attempt to reconstruct the rhythm of occupation in the region, identifying those periods when the population was subjected to environmental pressures. In parallel, a geological survey has been undertaken on the basis of 21 stratigraphic sections exposed in the alluvial plain, some of which have yielded ^{14}C or OSL ages. One of our aims was to investigate the effects on human occupation of changes in river flow and floods, which are in turn forced by climatic changes. The confrontation of these data with those obtained from the archaeological excavations, followed by comparisons with the entire Nile Basin, allows us to propose a scenario for the

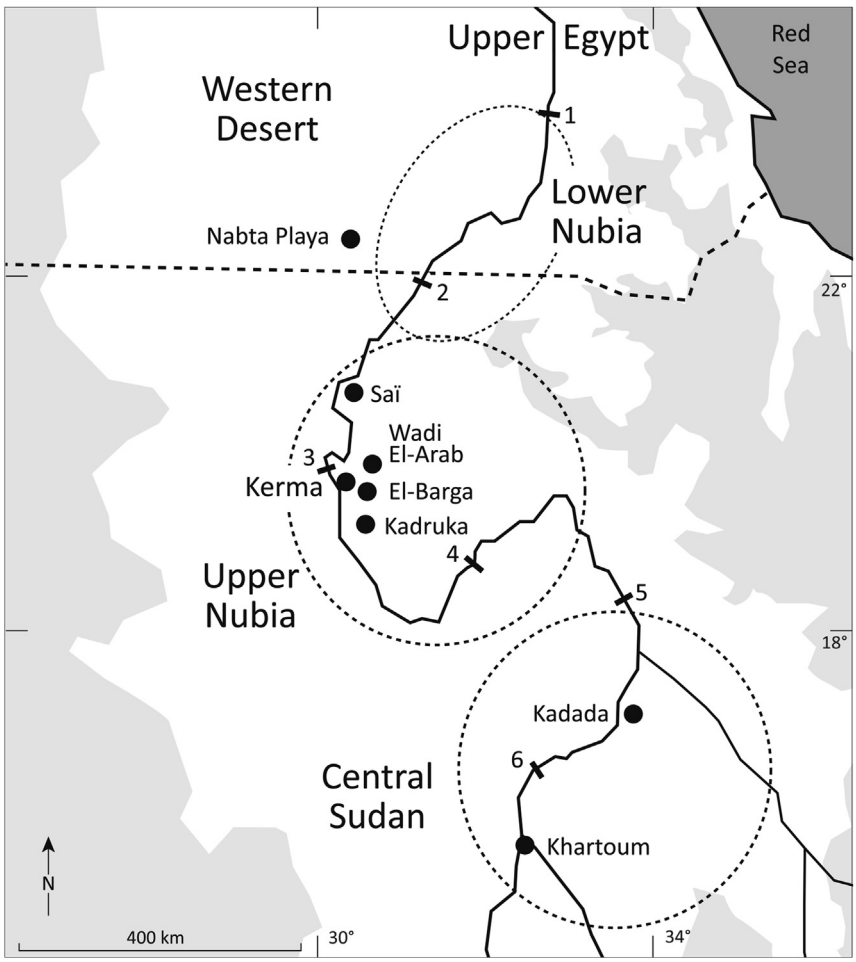

Fig. 1. Location of the Kerma area in the Nubian Nile valley with the other areas which deliver the main chronological sequence of the Holocene prehistory. Numbers are cataracts.

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