

Defining the Late Neolithic in Dogon Country (Mali): a chrono-cultural, spatial and methodological appraisal

Sylvain Ozainne

In 1997, the discovery of the Ounjougou site complex on the plateau of Bandiagara (Mali) has motivated the creation of the multidisciplinary project "Human settlement and palaeoclimatic evolution in West Africa". Located along the Yamé River Valley (Fig. 1), this site complex provides an access to a long term archaeological sequence, from the Middle Pleistocene to sub-recent occupations. Eleven fieldworks campaigns (Fig. 2) have revealed the importance of human occupations during the Late Holocene period at Ounjougou (3500-300 cal BC). During this interval, two major settlement phases constitute the regional Late Neolithic, which witnesses great environmental, cultural and economical changes.

Three main archaeological sites were used to develop a first Late Holocene chrono-cultural sequence (Phase 4, 5 and 6 of the overall Holocene cultural sequence of Ounjougou; Huysecom et al. 2004; Ozainne et al. 2004; Ozainne 2006; Rasse et al. 2006). Those phases were recently put back in a more precise chrono-stratigraphical framework made up of 7 main units (HR1A to HR2C; Fig. 3a, 3b), in order to acquire a comprehensive perception and a higher chronologic resolution for cultural and environmental events of the Late Holocene (Ozainne et al. 2008; Lespez et al. in press). Stratigraphical information issued from 14 archaeological and environmental Late Holocene sites at Ounjougou was synthesized by elaborating a general diagram, which allowed to realize a Bayesian statistical analysis with 54 ¹⁴C dates (Oxcal V 4.0.5 and IntCal04 atmospheric calibration curve; Bronk Ramsey 1995, 2008; Reimer et al. 2004). The start/end ranges used to delimit each chronostratigraphic unit in the next section and in Figure 3 correspond to boundaries (95.4% and 68.2% confidence) calculated by Oxcal.

The Late Neolithic at Ounjougou begins with the archaeological Phase 4, included in the HR1B chronostratigraphic unit (Start 2777-2531 cal BC; End 2244-1914 cal BC). During this episode, vegetation change show a gradual aridification of landscapes (Le Drezen 2008), and ceramic patterns reveal Northern cultural influences, with large hemispherical bowls and several types of stamp impressions located under pot's borders (Fig. 3c).

The archaeological Phase 5 covers the HR2Aa, HR2Ab and HR2B units (Start 1820-1640 cal BC; End 1000-765 cal BC). During this phase, climatic deterioration coincides with an increasing human impact in the vegetation (Le Drezen 2008, Eichhorn & Neumann in press).

Two AMS-dated pearl millet caryopses (*Pennisetum glaucum* ssp. *Glaucum*; Eichhorn & Neumann in press), found in the HR2Aa (Fig. 3a) and HR2Ab units, indicate that agriculture appears by the 17th-

16th centuries cal BC at Ounjougou. The appearance of food production in the region also parallels some significant cultural changes. We particularly note the appearance of globular bowls, everted rim vessels and complex roulette decorations (Fig. 3c), as well as polished stone axes and settlement structures indicating the presence of small villages.

The archaeological phase 6, included in the HR2C unit (Start 866-550 cal BC; End 747-323 cal BC), correspond to the last regional Neolithic episode, during which pottery characteristics seem to show only slight evolution of decoration techniques. After HR2C, the Late/Terminal Holocene transition at Ounjougou corresponds to a sedimentary and archaeological hiatus (HT1) between about 300 cal BC and 300 cal AD.

Research has been recently extended to the Bandiagara cliff area and the Séno-gondo plain, in order to test the spatial validity of the Ounjougou chrono-cultural phases, and to explain or fill in the sequence hiatuses. Near the village of Yawa, several Late Neolithic sites were discovered (Fig. 1, 4). The presence of both Phase 5 and 6 cultural patterns in the cliff area was confirmed, but their theoretical area remains restricted (Standard deviation ellipse (95.4%) realized with Arcgis 9.2; Fig. 1) and does certainly not correspond to their real expanse.

The end of Neolithic and the transition to the first protohistoric occupations in our study area remain unclear, mainly due to the HT1 sedimentary and archaeological hiatus. Since the end of the first millennium cal BC is a period of great changes of the cultural, technical and environmental context in the upper Niger basin and in the whole of West Africa, it needs further investigation in Dogon country. Additional investigations in the Séno-Gondo plain and on its margins are planned to resolve those questions.

References

Bronk Ramsey, C. 1995: Radiocarbon calibration and analysis of stratigraphy: The OxCal program. *Radiocarbon* 37(2), 425-30.

Bronk Ramsey, C. 2008. Oxcal 4.0 manual. http://c14.arch.ox.ac.uk/oxcalhelp/hlp_contents.html. Accessed 20th of July 2008.

Eichhorn, B. & Neumann, K. In press. Holocene vegetation change and land use at Ounjougou (Mali). In: Fuller DQ, Murray MA, editors. *Flora, Past Cultures and Archaeobotany in Africa*. Walnut Creek Ca.: Leftcoast Press.

Huysecom, E., Ozainne, S., Raeli, F., Ballouche, A., Rasse, M., Stokes, S. 2004. Ounjougou (Mali): A history of Holocene settlement at the southern edge of the Sahara, *Antiquity* 78(301), 579-93.

Le Drezen, Y. 2008. Dynamiques des paysages de la vallée du Yamé depuis 4000 ans. Contribution à la compréhension d'un géosystème soudano-sahélien (Ounjougou, Pays dogon, Mali). PhD dissertation. Caen: University of Caen Basse Normandie. 418 p.

Lespez, L., Rasse, M., Le Drezen, Y., Tribolo, C., Huysecom, E., Ballouche, A. In press. L'évolution hydrogéomorphologique de la vallée du Yamé (Pays Dogon, Mali): signal climatique et hydrosystème continental en Afrique de l'Ouest entre 50 et 4 ka BP. *Géomorphologie*. 17 p.

Ozainne, S. 2006. Pulsations sahariennes et premiers cultivateurs : le Néolithique récent du Plateau dogon (3500 - 500 av. J.-C.). *Etudes Maliennes* 65, 69-88.

Ozainne, S. Huysecom, E, Ballouche, A, Rasse, M. 2004. Le site des Varves à Ounjougou (Mali) : nouvelles données sur le peuplement néolithique des zones subsahariennes en Afrique de l'Ouest. In : Schneider J, Roost Vischer L & Péclard D, editors. *Forum Suisse des Africanistes 4*. Münster: LIT Verlag, 265-281.

Ozainne, S., Lespez, L., Le Drezen, Y., Eichhorn, B. 2008. Developing a chronology integrating archaeological and environmental data from different contexts: the Late Holocene sequence of Ounjougou. Paper presented at the Radiocarbon and Archaeology 5th international symposium (March 26th-28th 2008, Zürich, Switzerland).

Rasse, M., Ballouche, A., Huysecom, E., Tribolo, C., Ozainne, S., Le Drezen, Y., Stokes, S., Neumann, K. 2006. Evolution géomorphologique, enregistrements sédimentaires et dynamiques paléoenvironnementales holocènes à Ounjougou (Plateau dogon, Mali, Afrique de l'Ouest). *Quaternaire* 17(1), 61-74.

Reimer, P.J., Baillie, M.G.L., Bard, E.; Bayliss, A., Beck, J.W., Bertrand, C.J.H., Blackwell, P.G., Buck, C.E., Burr, G.S., Cutler, K.B., Damon, P.E., Edwards, R.L., Fairbanks, R.G., Friedrich, M., Guilderson, T.P., Hogg, A.G., Hughen, K.A., Kromer, B., McCormac, G., Manning, S., Bronk Ramsey, C., Reimer, R.W., Remmele, S., Southon, J.R., Stuiver, M., Talamo, S., Taylor, F.W., van der Plicht, J., Weyhenmeyer, C.E. 2004: IntCal04 terrestrial radiocarbon age calibration, 0-26 cal kyr BP. *Radiocarbon* 46(3), 1029-58.

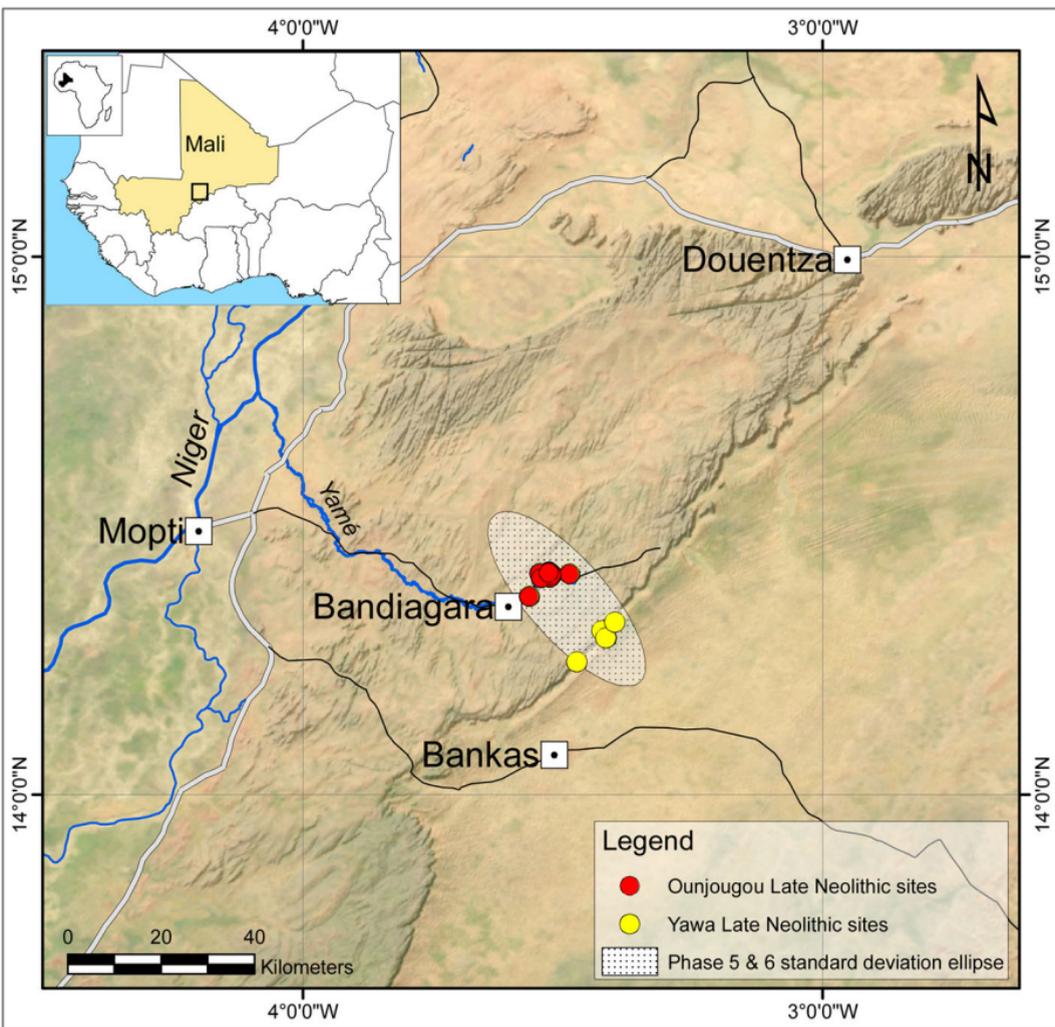
Figures captions

Fig. 1. Ounjougou and Yawa research areas location, with the theoretical expanse of the Phase 5 and 6 cultural patterns. Cartography S. Ozainne. Data: MODIS satellite and FAO.

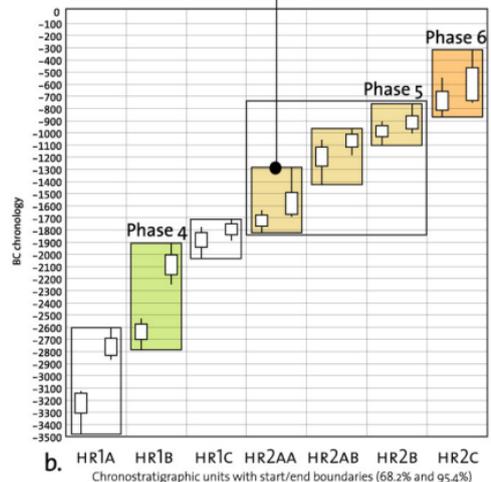
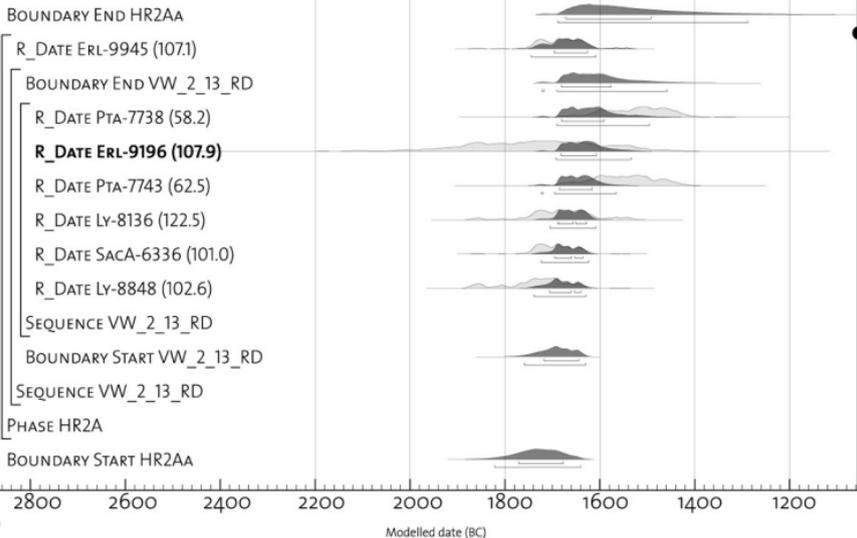
Fig. 2. Excavations at the Kélisogou Late Neolithic site, February 2005. Photo S. Ozainne.

Fig. 3. Chrono-cultural model for the Late Holocene at Ounjougou. Photo MAESAO, CAD S. Ozainne. a - Bayesian model (Oxcal V 4.0.5) of unit HR2Aa. The light grey histograms show the calibrations probability distribution, before Bayesian analysis. The dark grey histograms represent posterior distributions (hpd), incorporating stratigraphical information. In brackets, the agreement indice (A) gives a measure of the agreement between the modelled distribution and the prior likelihood (simple calibration). The bold Lab. Nr. (Erl-9196) correspond to a AMS-dated pearl millet caryopse (*Pennisetum glaucum* ssp. *glaucum*), indicating that agriculture certainly appears by the 17th-16th centuries cal BC at Ounjougou. b - Representation of the whole Late Holocene sequence of Ounjougou. Start/end ranges used to delimit each chronostratigraphic unit correspond to boundaries calculated by Oxcal (68.2% and 95.4% confidence). c - Cultural phases main characteristics.

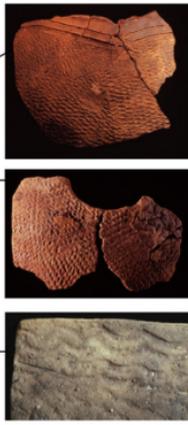
Fig. 4. Archaeological survey near the village of Yawa, february 2007. Photo S. Ozainne.







- 6
 Bowls, "cord-based" roulette decorations
- 5
 Globular and everted rims vessels, multiple-frame roulette decorations, multiple parallel stamp incisions
 Polished stone axes
Onset of agriculture
 (Pearl millet)
- 4
 Fine-wall hemispherical vessels, covering roulette decoration with stamp impressions and wavy patterns



c.

