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Corrélation entre formations superficielles et crise environnementale (c. 3000–2000 BP) au Gabon (Afrique centrale) : arguments géochronologiques

Denis Thiéblemont [a,*], Christine Flehoc [a], Michel Ebang-Obiang [b], Christophe Rigollet [a], Jean-Pierre Prian [a], François Prognon [a]

[a] *BRGM, B.P. 6009, 45060 Orléans Cedex 2, France*
[b] *DGMG, Libreville, Gabon*

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ABSTRACT

We present new ^{14}C data on charcoal fragments recovered from the lower (coarse-grained Stone Line) and upper (fine-grained Cover Horizon) portions of surficial formation profiles in Gabon. These data and others compiled from the literature enable a reconstruction of the Upper Holocene geological regional history of Gabon. The connection between the geological events recorded in the surficial formations and the Upper Holocene environmental crisis is discussed and a scenario connecting geological events with climatic and environmental changes is proposed. Such a scenario suggests that following the climatic crisis, the reconstitution of soils by aeolian sedimentation could have been an important factor of Bantu expansion.

RÉSUMÉ

Nous présentons de nouvelles datations (méthode ^{14}C) de fragments de charbon échantillonnés dans les parties inférieures (*Stone Line*) et supérieures (Horizon de couverture) de profils de formations superficielles au Gabon. Ces données et d'autres issues de la littérature permettent une reconstitution de l'évolution géologique de la partie occidentale de l'Afrique centrale au cours de l'Holocène supérieur. La relation entre les événements géologiques et la crise environnementale de l'Holocène supérieur est discutée et un scénario mettant en parallèle ces événements géologiques et les changements environnementaux et climatiques est proposé. Ce scénario suggère que, postérieurement à la crise climatique, la reconstitution des sols par apports éoliens pourrait avoir joué un rôle essentiel dans l'expansion Bantu.

* Corresponding author.
E-mail address: d.thieblemont@brgm.fr (D. Thiéblemont).

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1. Introduction

As pointed out by many authors (Lecomte, 1988; Schwartz, 1996; Vogt and Vincent, 1966), the profiles of surficial formation in western Central Africa (Gabon, Congo) display a very constant organization including three superposed units (Fig. 1):

- the variably altered local basement (saprolite to fresh rock);
- an intermediate coarse-grained layer known as the 'Stone Line', made of more or less reworked lithic elements (including human artefacts);
- an upper sandy to clayey homogeneous horizon of yellow to red colour known as the 'Cover Horizon'.

The thickness of each of the upper two layers is generally around 1 to 2 m but reaches 10 m or more in the coastal basins of Congo and Gabon, where the yellow sandy layer appears to be spread over Mesozoic sedimentary rocks or Pliocene to Pleistocene sands (Thiéblemont, 2013; Thiéblemont et al., 2009).

Outside western Africa, profiles that show the superposition of a lower coarse-grained unit and upper sandy clayey cover appear as an almost constant feature of intertropical regions (Alexandre and Soyer, 1989; Vogt and Vincent, 1966) and their formations have fed an intensive scientific debate for more than 50 years. Crucial in this debate is the precise knowledge of the interval of time necessary for the formation of the profiles.

The frequent occurrence of archaeological artefacts in these profiles provides a first approach to this problem. In western Central Africa, the lithic industry recovered in the Stone Line is of Old to Middle Stone Age (Locko, 1991), thus suggesting a rather young age (*i.e.* $\leq$ 40,000 BP) for the upper part of the profiles (Schwartz, 1996). However, the interpretation of this time constraint is strongly dependent on the model adopted for the formation of the profiles, and strongly different models do exist which lead to strongly different interpretations. Amongst many others, a fundamental difference between models concerns the role of biogenic activity. Assuming a major role to this activity leads to the conclusion that the present organization of the profiles has nothing to do with stratigraphy thus precluding the use of the superposition law to constrain the relative age of the two superposed (therefore not successive) units (Johnson, 2002).

Quantitative constraints on the age of the profiles may be derived from ^{14}C dating, especially when such a method is applied to charcoal fragments these latter being present at all levels of the profiles. The ^{14}C age obtained may be considered as the oldest possible age provided that the

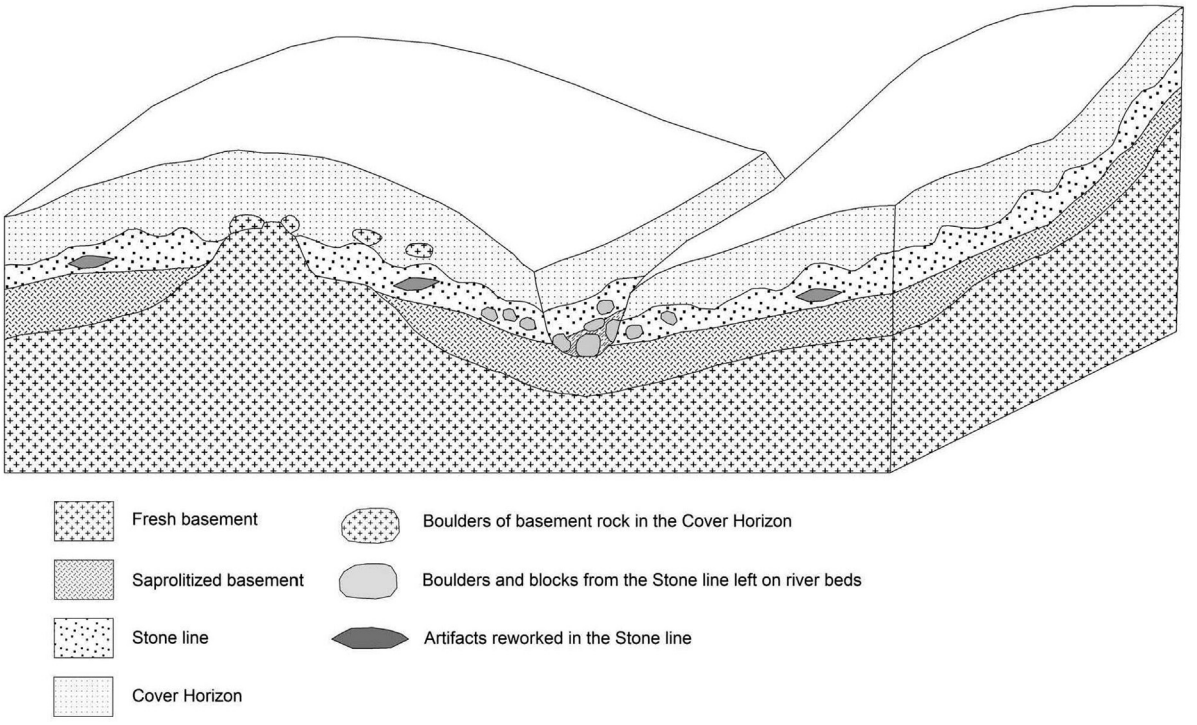

Fig. 1. Schematic sketch showing the spatial organization of surficial formations over the Gabonese territory. Modifications from the representation proposed by Vogt and Vincent (1966) include: (i) the incision of the whole profile in the valley bottoms along the rivers; (ii) the common absence of weathering (saprolitization) of the basement below the surficial formations; (iii) the occurrence of isolated boulders of fresh basement rock within the Cover Horizon.

Fig. 1. Représentation schématique de l'organisation spatiale des formations superficielles sur le territoire gabonais. Relativement au schéma proposé par Vogt et Vincent (1966), les principales modifications portent sur : (i) l'incision des profils de formations superficielles dans les fonds de vallées le long des rivières actuelles ; (ii) l'absence commune d'altération (saprolitisation) du substrat rocheux sous les formations superficielles ; (iii) la présence de blocs isolés de roches fraîches issues du substrat rocheux au sein de l'Horizon de couverture.