SUPPLEMENTARY MATERIAL 2. Graphics of regional, national and local radiocarbon datasets

Section 1. Regional datasets

1.1 - Stone Age

The assemblages consist of lithics to the exclusion of any pottery or iron working evidence; the sites are never associated with pits. From *c.* 50,000 to *c.* 13,000-14,000 cal BP, we have a small and irregular "background" noise of hunter-gatherer activity (Figure 1, green line). Then, we witness an increase of Stone Age carbon recovered, peaking between 6000 and 7000 cal BP. We cannot be unresponsive to the joint expansion of the Holocene rainforest and the increase in the number of Late Stone Age (hereafter LSA) ^{14}C dates. The similarity between the Holocene Forest expansion and the number of dated hunter-gatherer camp sites is further fuel to a recent study arguing about the close relationship between hunter-gatherers and their forest environment in the last 120,000 years (Padilla-Iglesias *et al.* 2022a, 2022b). Since *c.* 3000 cal BP (Figure 1, blue line) there is a clear drop of the number of LSA dates. We link the drop to the progressive disappearance of stone knapping, after 3000 cal BP, when the first villagers started their expansion from southern Cameroon towards the south and south-east through the rainforest and initiated long-term contacts and exchanges with existing forest hunter-gatherers.

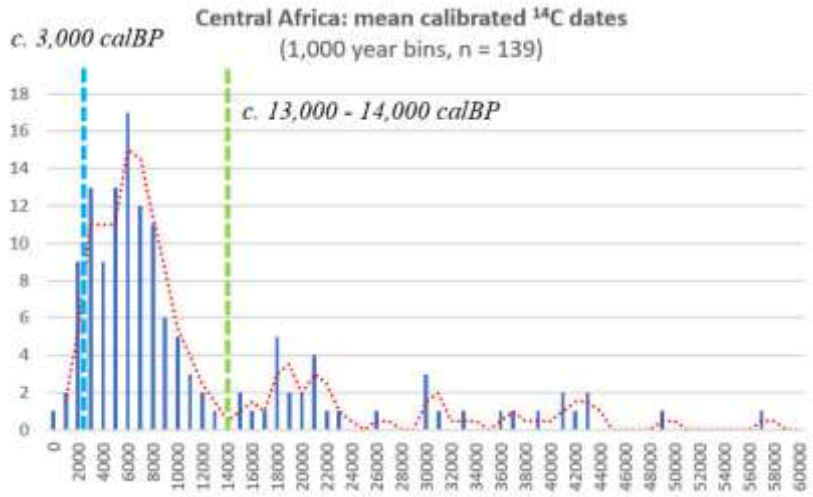

Figure 1: Stone Age associated radiocarbon dates since 60,000 cal BP

1.2 - Iron Age

The focus in this section is on the "Neolithic" and Iron Age dates of Central Africa. The vast majority are associated to pits and pottery. The earliest evidence of iron-working comes from the Gbabiri site in the CAR, *c.* 2700-2800 cal BP (Robion Brunner 2018). A rapid increase of assays starting in the period 3000-3200 cal BP is coeval with the expansion of incoming communities moving south and south-east through the rainforests from southern Cameroon, and still making and using polished stone adzes and axes (Figure 2). The graphic illustrates the Early Iron Age (hereafter EIA) maximum of dates of *c.* 1600-1700 cal BP, preceding the decreasing level of carbon retrieved and dated from *c.* 1500 to 1000 cal BP. This leads to the last increase of carbon dated after *c.* 1000 cal BP, during the Late Iron Age (hereafter LIA). The overall picture is similar to what has been published since 2006 (Wotzka 2006; Oslisly *et*

al 2013; de Maret 2018; Seidensticker *et al* 2021; de Saulieu *et al* 2021; Clist 2021). All the studies only differ by the slight chronological differences found or interpreted from the radiocarbon dates. It further emphasizes the point whichever statistical and graphical system we use to improve our understanding of similar radiocarbon catalogs – mean calibrated dates, Kernel Density Estimation (KDE), Summed Probability Distribution (SPD) – it generates similar graphical results.

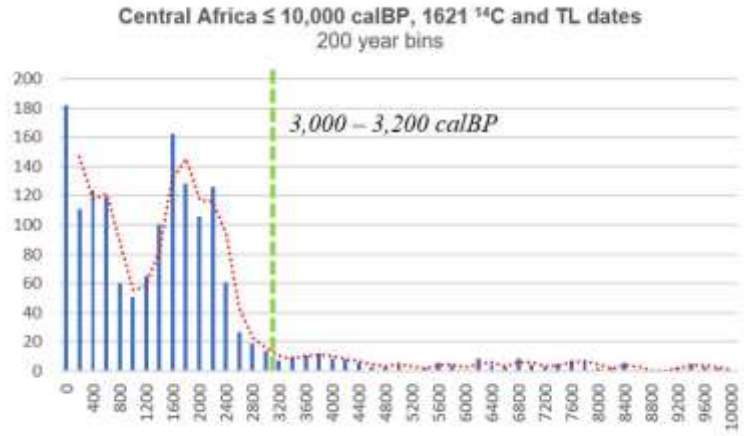

Figure 2: Radiocarbon dates in 200-year bins since 10,000 cal BP.
The green dashed line c. 3200 cal BP represents the period when pottery-using communities were present in southern Cameroon and started their movement southwards as recorded by archaeology.

Using the *South African Radiocarbon Database* as a reference (Loftus *et al.* 2019), it is telling the regular increase throughout the Southern African Iron Age of retrieved carbon (Figure 3) is not visible in Central Africa (Figure 2). In Central Africa, the fall in retrieved carbon after *c.* 1500 cal BP needs to be addressed. This regional picture must then be confronted to the national situation, itself subdivided into its provincial series. This is illustrated below in our sections 2 and 3.

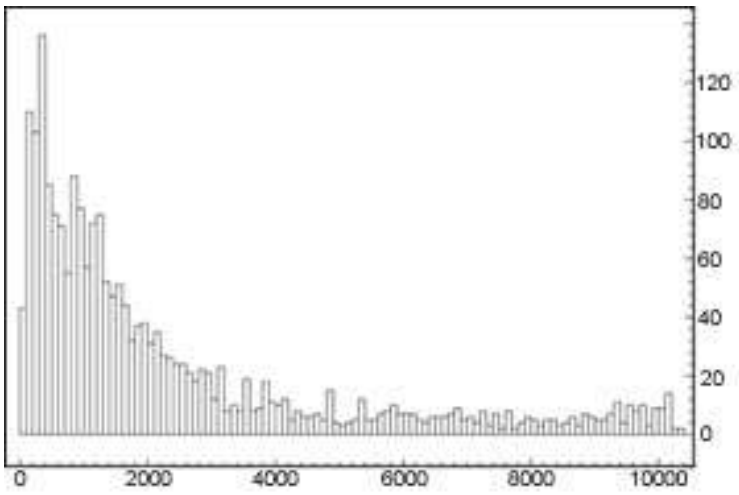

Figure 3: Radiocarbon dates younger than 10,000 cal BP from southern Africa using the South African Radiocarbon Database, and 200-year bins.

Section 2. National datasets

Histograms of national datasets since 10,000 cal BP, using 200-year bins (abscissa: dates in cal BP; ordinate: number of dates). All the dates mentioned in the texts are in cal BP.

2.1 – Cameroon

As with all the other countries of this region, since the Late Pleistocene, we have a background 'noise' of Stone Age people (Figure 4). Pottery-using villagers are identified in Cameroon from probably *c.*3200. Two peaks seem to exist between *c.*2300-1600 (2300/2200 and 1700/1600); caution is called for because we are dealing with a limited dataset. It is followed by a gradual fall off of retrieved carbon between ***c.*1600-1000**, reaching **its lowest level at c.1000-1200**. The carbon deposits increase from *c.*1,000-900 to modern times, creating a **V-shaped profile**, centered c. 1000-1200.

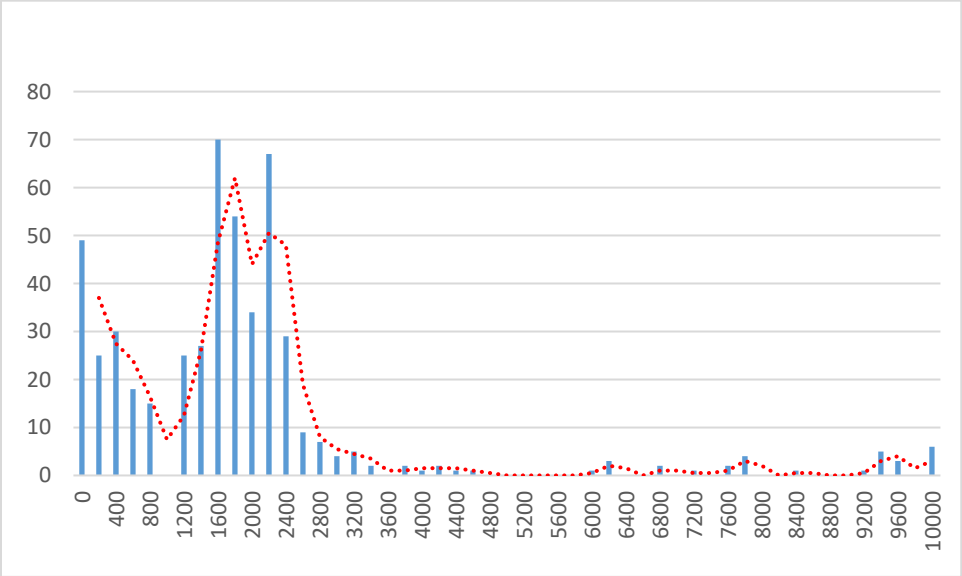

Figure 4: Radiocarbon dates from Cameroon (n=505).

2.2 - Central African Republic

We first group two separate series, dates from the north-west and south-west of the country (Figure 5). Following on the usual Stone Age activity, pottery-using people appear *c.*4000 associated to the construction of megaliths. A trough is visible at *c.*3400, followed by a rise in carbon until the peak of *c.*2400. The next low level of carbon at *c.*2000-2200 precedes the peak of *c.*1400-1800. A possible low level of deposited carbon exists between *c.*1400-1000, preceding the rise in deposits since then. But the overall picture is one of a continuous though irregular increasing pattern, an **L-shaped profile** similar to Southern Africa (Figure 3). We believe the limited irregularities we have today result from our research biases. This is confirmed considering separately the two series from the north-west and the south-west (Figures 18 and 19).

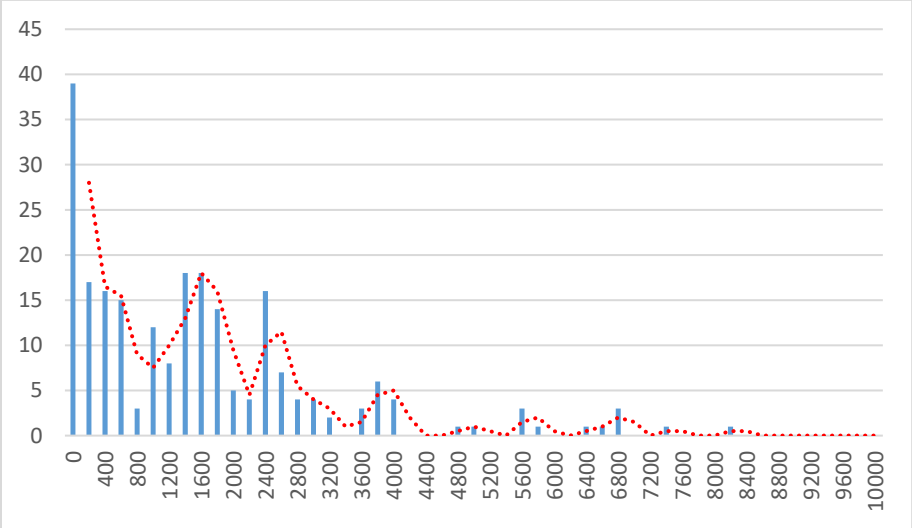

Figure 5: Radiocarbon and TL dates from the Central African Republic (n=228).

2.3 - Equatorial Guinea

With Angola, Equatorial Guinea is a country where archaeological research is poorly developed, explaining its statistically unsound corpus of 57 ^{14}C dates, 53 of them younger than 10,000 cal BP (Figure 6). Because of its geographical position between Cameroon and Gabon, future research should find the same series of early villages as in both countries. They will probably date from *c.* 2600 or earlier. Similarly, the same peak of assays during the LIA should be identified.

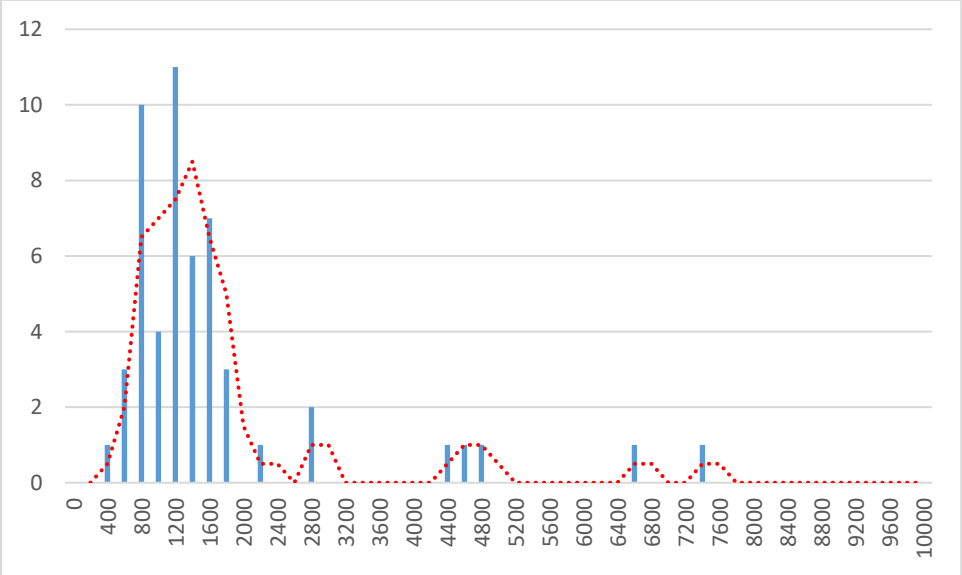

Figure 6: Radiocarbon dates from Equatorial Guinea (n=53).

2.4 – Gabon

After the low-level Stone Age evidence, we find pottery-using communities from *c.*2600 (Figure 7). A sharp rise in carbon between *c.*2600-2200 creates the peak of *c.*2200-1600. After ***c.*1600** we record a drop in the retrieved carbon, reaching relatively **a low level at 1400-1200**. A sharp rise seems to start off *c.*1000, creating as in Cameroon a **V-shaped profile**. It is probable, as in other better LIA documented sequences, this rise went on into modern times.

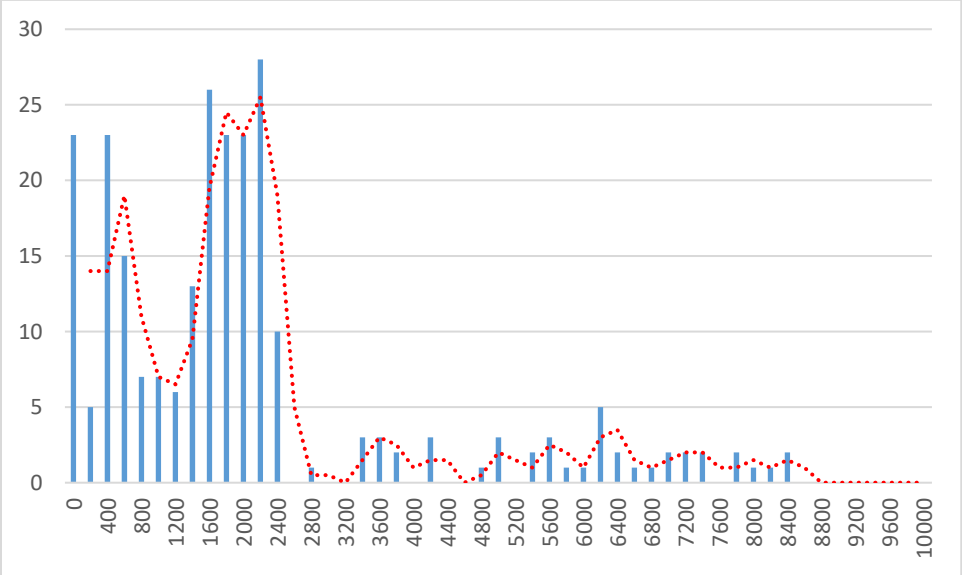

Figure 7: Radiocarbon dates from Gabon (n=253).

2.5 – Congo

Stone Age hunter-gatherers are followed until *c.*2400-2500. It is *c.*2500 pottery-using people are identified on the coast (Figure 8). A rise in retrieved carbon follows until the peak of *c.*1800-1900. A trough starts after ***c.* 1400 until *c.* 1000/1200** giving way to a **V-shaped curve**. The sequence sees a last peaking in carbon since *c.*1000. As with Cameroon, we decompose in our section 3 the national profile into its three main geographical constituents, the coast, the southern and northern sectors to understand the national level gives an incorrect view (cf. Section 3, sub-sections 3.7 and 3.8).

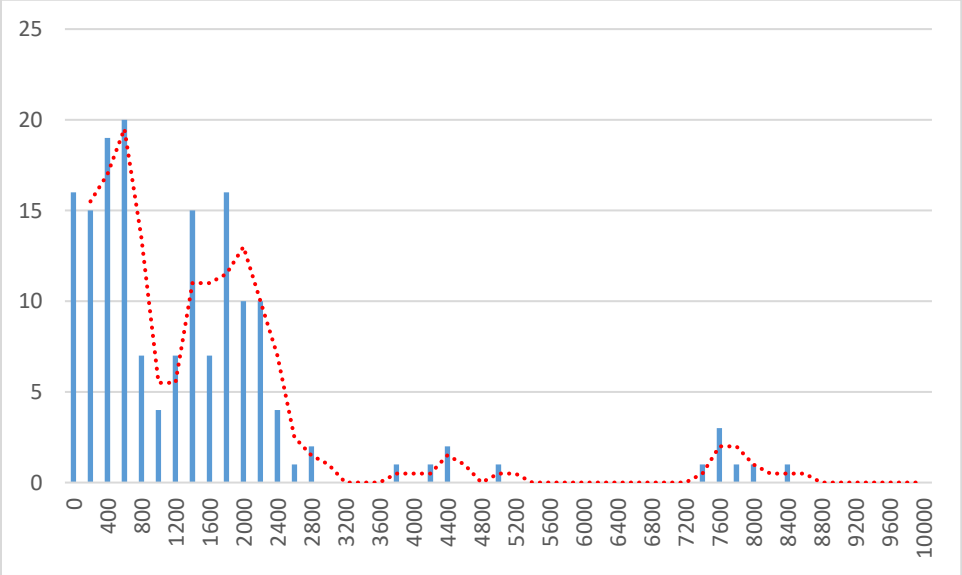

Figure 8: Radiocarbon dates from Congo (n=165).

2.6 - Democratic Republic of Congo

A quite regular background 'noise' of forest hunter-atherers precedes the first pottery-using people found from *c.*2400 (Figure 9). This leads to a high level of deposits between *c.*2200-1600. A fall exists from ***c.*1600 until c. 1200/1400**, leading to a rise since *c.*1200 to modern times, again illustrating a **V-shaped curve**. A better picture must be discussed as for

Cameroon and Congo using the distant provincial series of Lower Congo, the Inner Congo Basin and Katanga (Section 3, sub-sections 3.15-3.17).

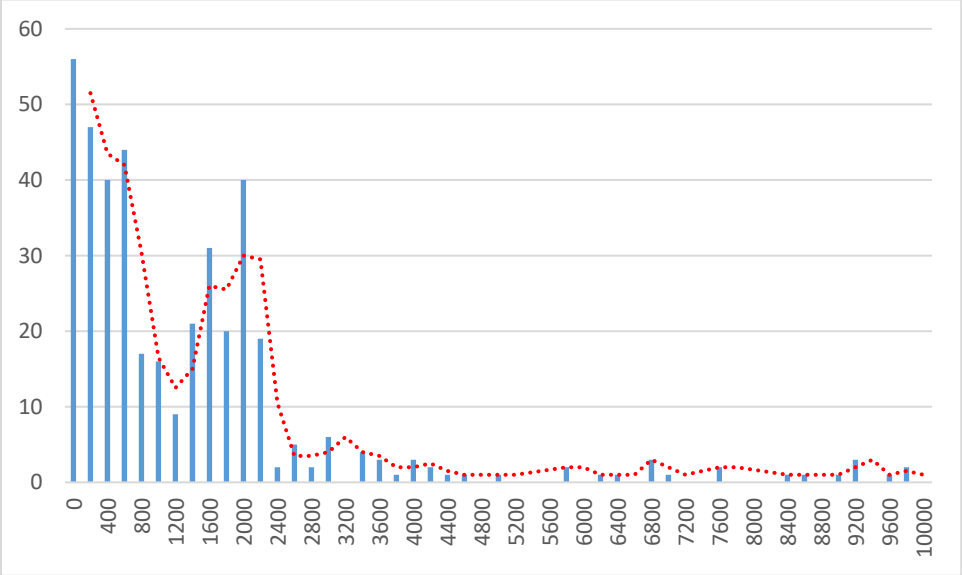

Figure 9: Radiocarbon dates from the Democratic Republic of Congo (n=410).

2.7 – Angola

It has already been mentioned we have a too small corpus, only 69 ^{14}C dates, of which 59 younger than 10,000 cal BP (Figure 10). Our understanding of it is thus quite limited. However, as in all the other countries of the region, we have evidence of Stone Age camps until *c.*2000. Then, following on a probable presence of pre-metallurgical communities in the north of the country, iron and pottery-using people spread out from *c.*1900. Though our ^{14}C corpus is still too limited, it seems our Figure 10 has the start of an **L-shaped profile**.

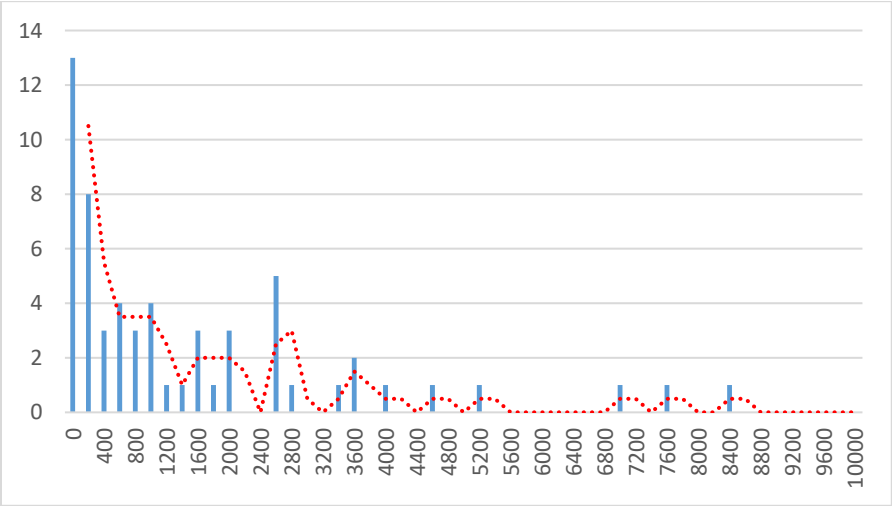

Figure 10: Radiocarbon dates from Angola (n=59).

Section 3. Sub-regional datasets –

To test the validity of the national radiocarbon dates profiles, we made use of the location of the Tier 3 and 4 archaeological sites' concentrations shown on Figure 5 of the paper, deemed better than colonial inherited country borders. We identified 17 cases (Figure 11). They are showcased on our figures 12-28 whose timeframe is limited to 4000 cal BP, the period within which the pottery-users' communities are geolocated.

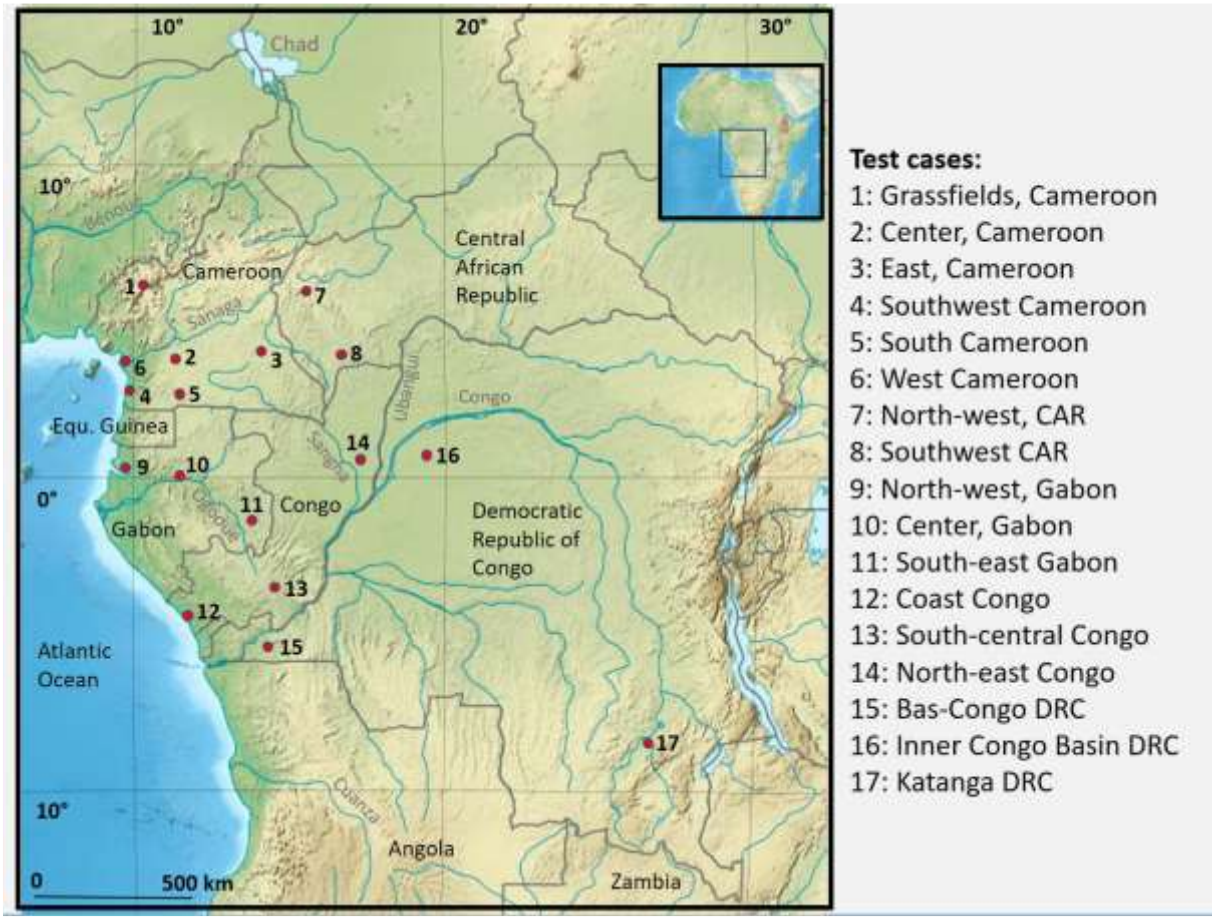

Figure 11: Location of the 17 test cases in Central Africa

3.1 - Grassfields, Cameroon

The 'Grassfields' are well known for their Stone Age camps, importing a few pots from neighboring villages, but there is nothing to testify to sedentary communities in the putative Bantu-speakers' homeland (Clist 2021). Flimsy evidence suggests the local Iron Age starts *c.* 2000. The 34 dates since 4000 cal BP illustrates how little we know about this important area (Figure 12).

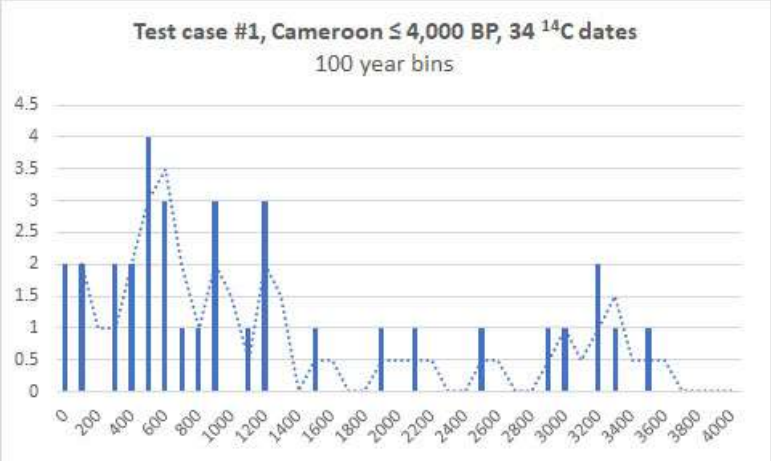

Figure 12: Radiocarbon dates from the Cameroon "Grassfields" (n=34).

3.2 - Central Cameroon

The oldest long term semi-sedentary villages were excavated here. They are traced since *c.* 3200 (Figure 13). A relatively slow rise in carbon deposits peaks at *c.*2200. A slow drop from **c. 2200 to *c.*1600** precedes an abrupt rise to *c.*1500-1300 is then documented. From *c.*1300 to 500 rare dates exist. The LIA rise from *c.* 500 to modern times is also attested here. There exists a long interval between ***c.* 1300 and 600** when virtually no charcoal has been (yet) dated. The somewhat irregularly shaped profile of this area with slightly more than 100 radiocarbon dates is suggestive of incomplete fieldwork and it shows 100 dates is not enough to render a good perspective about past social events.

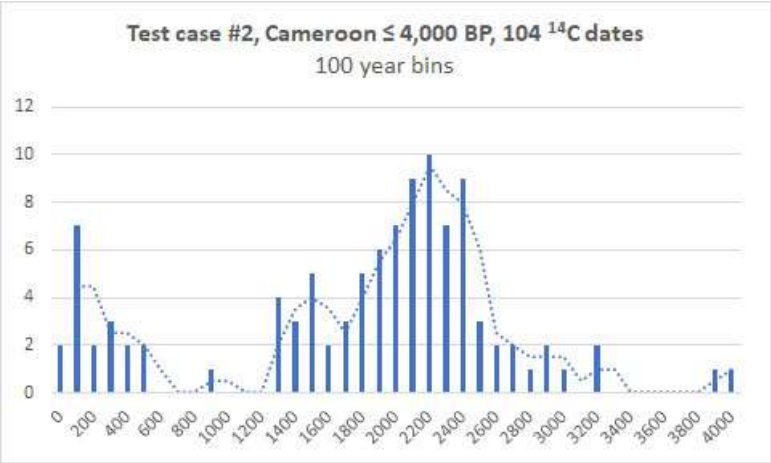

Figure 13: Radiocarbon dates from Central Cameroon (n=104).

3.3 - East Cameroon

The 88 dates from East Cameroon consist of 84 assays younger than 3400 Cal BP and 4 older (c.7602, 9295, 9716, and 10,816 cal BP) (Figure 14). The profile is similar to the one from Central Cameroon (Figure 13): a presence of the earliest pottery-users c.2300, followed by a peak of the carbon sampled and dated c.2000-2200, then probably a low but continuous deposit of carbon between c.1600 and 600, leading to the peak of the Late Iron Age c.300-400. Later, we can only assume a continuous series of settlements up to modern times. The irregular profile hints again to incomplete fieldwork and the less than 90 dates is not enough to give a correct perspective of the past.

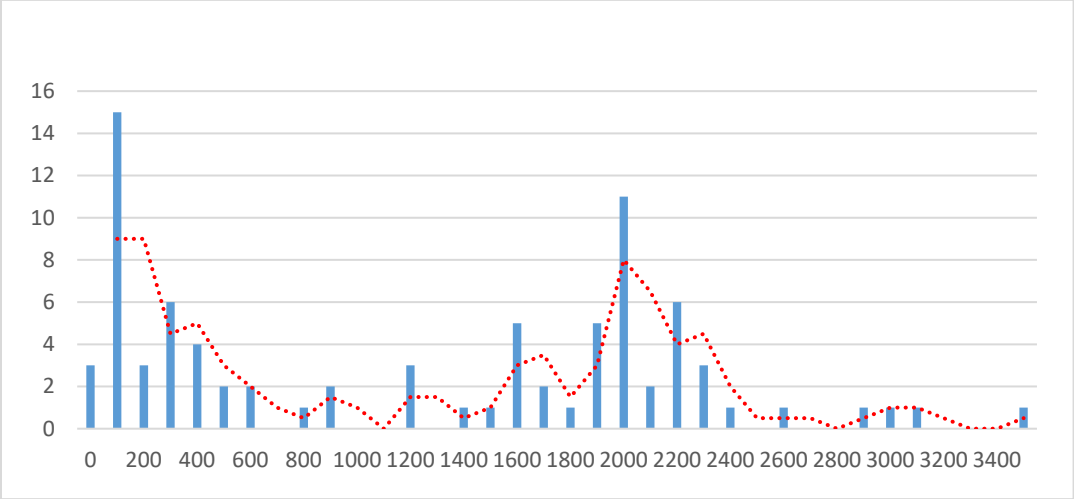

Figure 14: Radiocarbon dates from East Cameroon (n=84), 100-year bins

3.4 - South-West Cameroon

Pottery-using settlements seem to exist before *c.*2800. A regular increase of dated carbon peaks at *c.*2200-2300. It is followed by a sharp drop ***c.*2000-2200**, preceding another major increase *c.* 2000-1700, peaking between *c.*1700-1300 (Figure15). We visualize a drop starting after *c.* 1300. There seems to be a plateau of deposits since *c.*1000. Once again, compared to the preceding profiles, it seems incomplete fieldwork is the amin reason for the irregularly shaped curve. Especially troubling is the absence of an increase in LIA dates after c. 1200. This area's corpus, though reaching 115 dates, is proof it is not a good

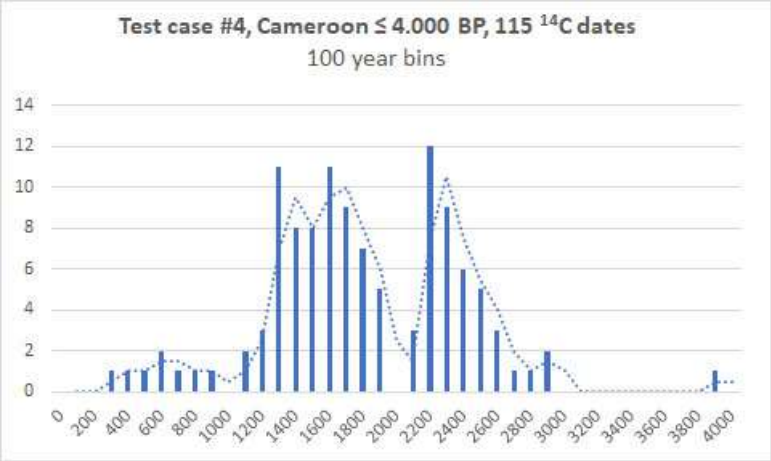

Figure 15: Radiocarbon dates from South-West Cameroon (n=115).

3.5 - South Cameroon

We have grouped the dated sites in southern Cameroon extending from the Atlantic Ocean to the Gabonese border (Figure 16a) before testing the picture obtained by grouping sites in Cameroon near the border with Gabonese dates from the northern reaches of the Woleu-Ntem province (Figure 16b).

Putting aside the isolated date of Sangmelima (*c.*2800 cal BP) permit us to identify *c.*2400-2500 the setting up of early pottery-using communities. Their carbon deposit peaks at *c.*2200-2300, followed by a low level between *c.*2000-2200. A second rise *c.*2000-1800 peaks at *c.*1800-1600, soon followed by a drop after *c.*1600. A plateau may exist after this.

Though both profiles are similar, with the interesting addition of 400 cal BP and younger LIA sites present in Gabon, they illustrate with profile no17b the importance of getting to a minimum of 100 radiocarbon dates before exploiting with confidence the data.

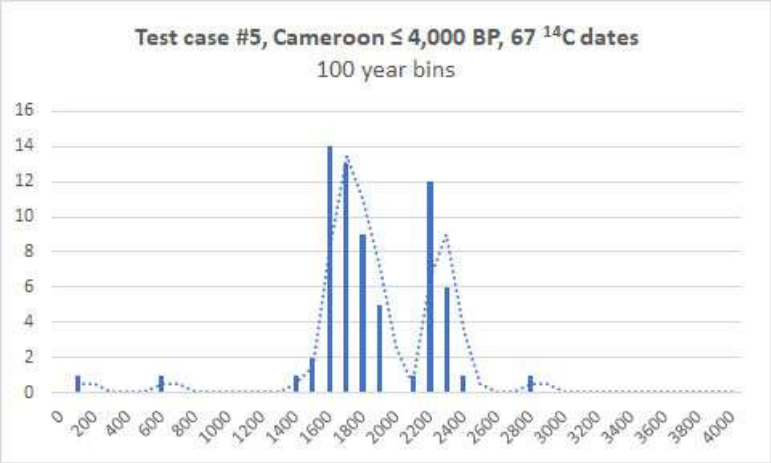

Figure 16a: Radiocarbon dates from South Cameroon (n=67).

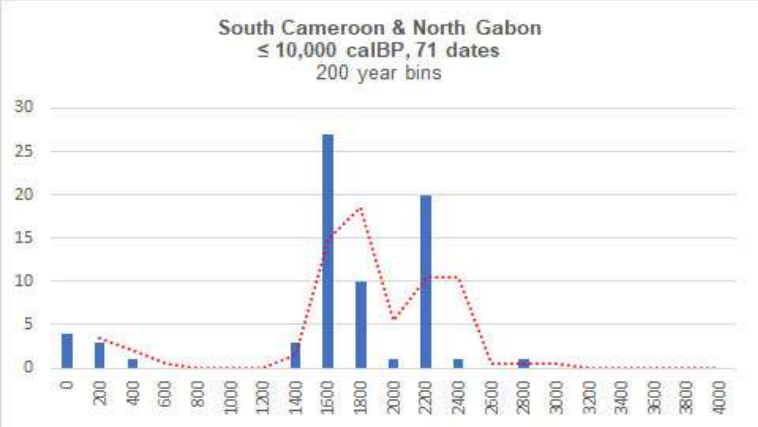

Figure 16b: Radiocarbon dates from South Cameroon-North Gabon (n=71).

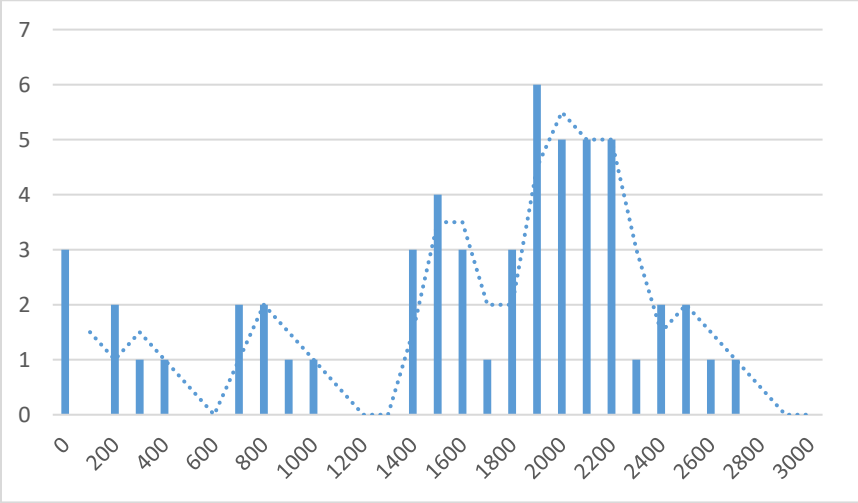

Figure 16c: The 55 radiocarbon dates, South Cameroon, along part of the pipeline project (from Lavachery et al 2008: 184, appendix F).

3.6 - West Cameroon

At Dibamba Yassa, the earliest settlement is found *c.*2500 cal BP. In this area, it is followed by an increase of carbon deposits until a peak at *c.*1800-1700 (Figure 17). A low level of deposits is found *c.*1400-1700. Another short rise gives way to a peak at *c.*1200-1300 before a low level marked at *c.*900-1100. After *c.*900 an increase in dates to modern times is illustrated, helped by the single Dibamba Yassa site with its high number of processed samples. A single site, Dibamba Yassa, provided 59% of the overall number of dates for this zone. Again, this profile is obviously incomplete with a corpus slightly over 70 dates.

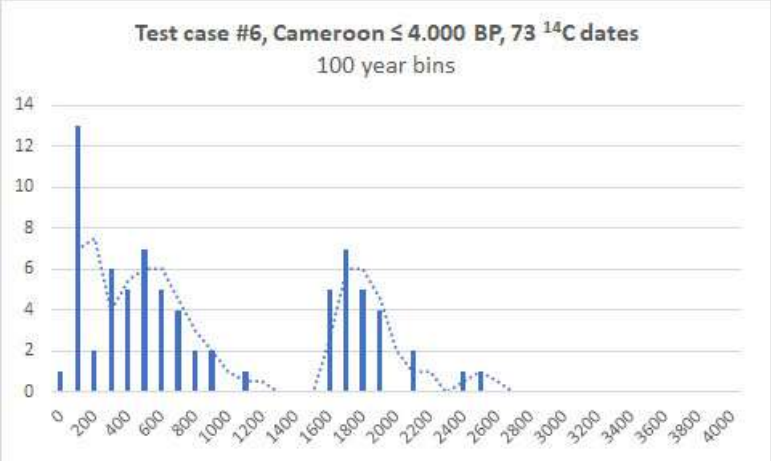

Figure 17: Radiocarbon dates from West Cameroon (n=73).

3.7 - North-West Central African Republic

This part of the CAR is well known for its *tazunu*, the CAR megaliths built by pottery-users since *c.*2900 cal BP. Iron production is present from *c.*2800-2700 at Gbabiri. Several distinct peaks in recovered carbon deposits are visible but the overall trend is rather a continuous occupation, the very irregular profile suggesting incomplete fieldwork, neither illustrating an L or V shaped curve (Figure18).

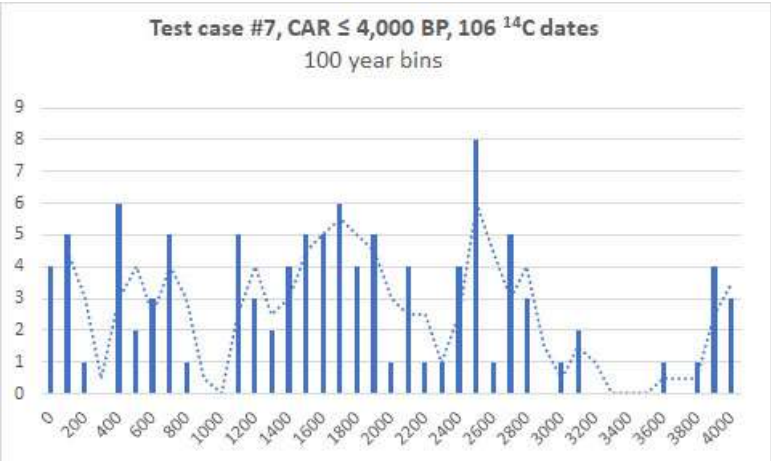

Figure 18: Radiocarbon dates from North-West CAR (n=106).

3.8 - South-West Central African Republic

The overall profile is of a continuous occupation of this part of the rainforest (Figure19). We have a few 'bumps' along the way and the usual increase of recovered carbon deposits for the second part of the LIA after *c.*400. The first pottery-users are *c.*2400 cal BP around the

Nangara Komba rock shelter and *c.*2200 near the Congo border (Z02 site). Iron-working is not attested before *c.*2000-1900. The corpus exhibits the start of an **L-shaped profile**.

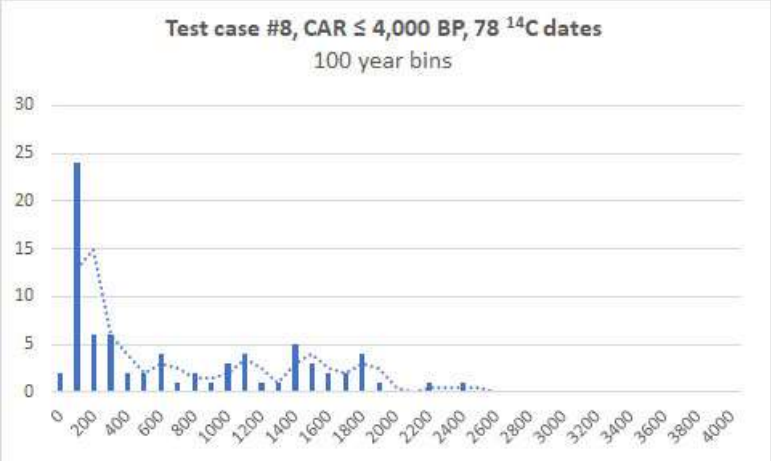

Figure 19: Radiocarbon dates from South-West CAR (n=78).

The profiles no.18 and no.19 are completely different and probably reflect a difference in the land-use strategies and historical trajectories of both communities.

3.9 - North-West Gabon & Corisco Island

Settling probably next to LSA hunter-gatherers, villages exist since *c.*2500-2600 cal BP (Figure20). Local iron-working is not attested before *c.*2200-2000. Three distinctive peaks in carbon deposits exist at *c.*2200-2300, 1,800-1,900 and 800-900. In between these peaks, we find continuous occupation. The rarity of ^{14}C dates for the last segment of the LIA suggests a research bias.

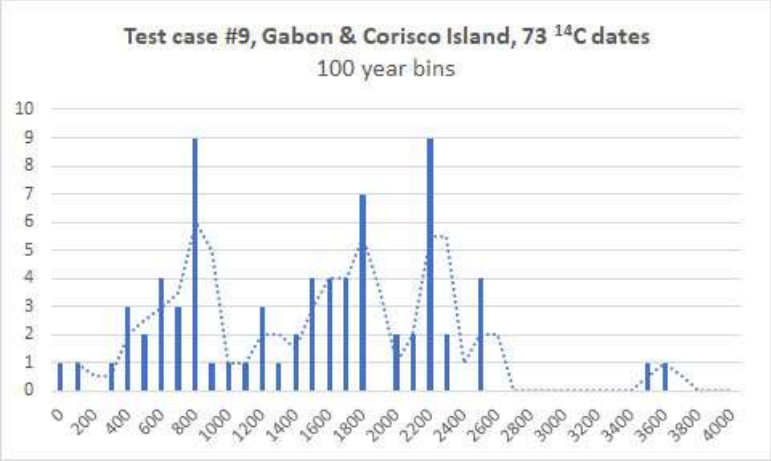

Figure 20: Radiocarbon dates from North-West Gabon and Corisco Island (n=73).

3.10 - Central Gabon

Since *c.*2400 cal BP, pottery-using villages ignoring iron thrive (Figure 21). The carbon extracted from them create a distinct peak between 1600-1900. We can follow the spread of local iron-working since *c.*2200. A fall of dated carbon exists after *c.*1700 until *c.*1200. Between c. 1200 and 800 the corpus does not register any date. What can be interpreted as the outline of the typical regional surge of LIA dates is visible since *c.*800.

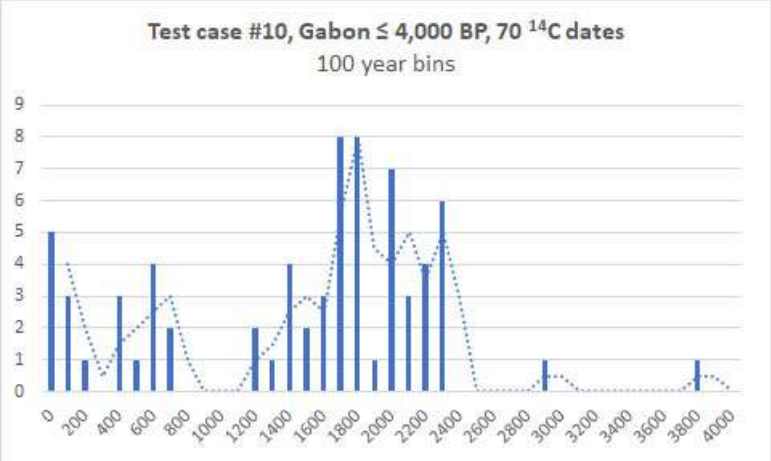

Figure 21: Radiocarbon dates from Central Gabon (n=70).

3.11 – South-East Gabon

We have evidence of early pre-metallurgy villages *c.*2400 cal BP, rapidly followed by iron-workers *c.*2300 (Figure 22). What seems to be an important iron smelting site is located at Moanda with an important production phase *c.*2100-1900. The small corpus from Haut-Ogooué province only permit us to speak of a probable continuity of occupation since c.2400.

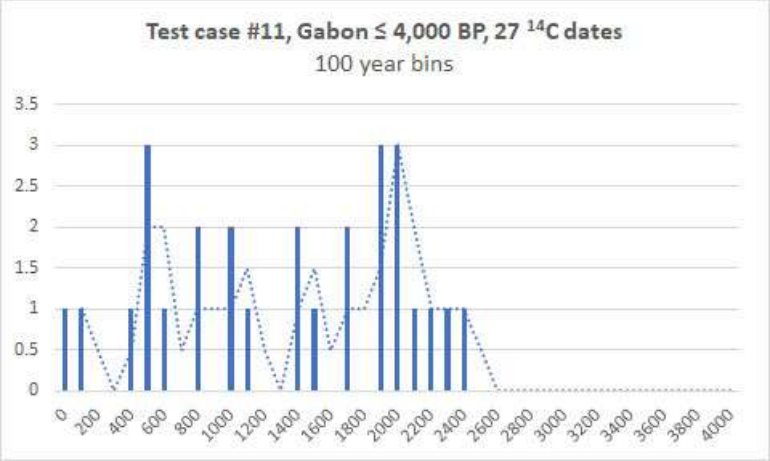

Figure 22: Radiocarbon dates from Haut Ogooué, Gabon (n=27).

3.12 - Coastal Congo

Alongside stone-using hunter-gatherers, pottery-users' villagers are set up *c.*2500-2600 cal BP on the coast around the Kouilou River (Figure 23). Iron-users follow *c.*2200-2300. After a relatively small reduction in carbon deposits *c.*1700-2100, a peak is registered *c.*1400-1500. After *c.*1400, the LIA is clearly not correctly represented. J. Denbow has suggested convincing explanations on this issue (2014).

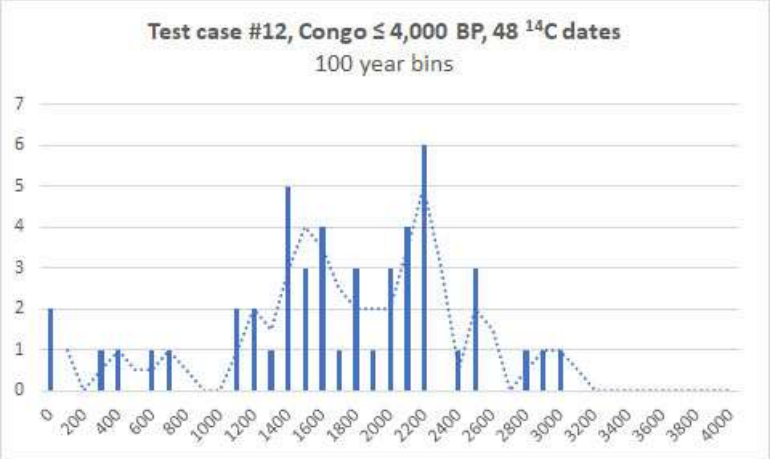

Figure 23: Radiocarbon dates from Coastal Congo (n=48).

3.13 - South-Central Congo

The sequence is surprisingly quite different from case n°12 (Figure 23). The earliest pottery appears *c.*2250 cal BP in the north of the case area (Figure 24). Iron-working is attested to its south from *c.*1800. It is only *c.*1400-1500 a seemingly continuous occupation is attested, with a sharp increase in carbon recovery after *c.*900 coeval with early copper working. This is probably also linked, as for case n°15, to the history of the rise of local kingdoms.

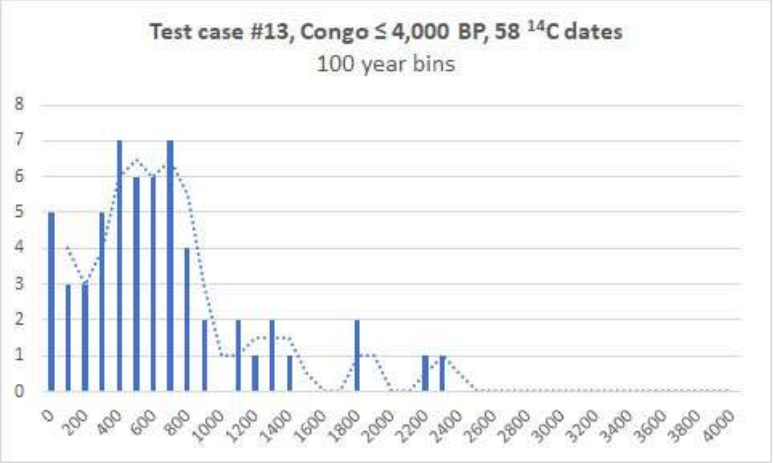

Figure 24: Radiocarbon dates from South-Central Congo (=58).

3.14 - North Congo

The northern part of Congo is the least well known. The inadequate radiocarbon sequence outlines two periods of occupation: the first one by the Imbonga and Batalimo-Maluba Groups users since *c.*2200-2300 cal BP until *c.*1,400-1,500, the second one during the LIA from *c.*800-900 to probably modern times.

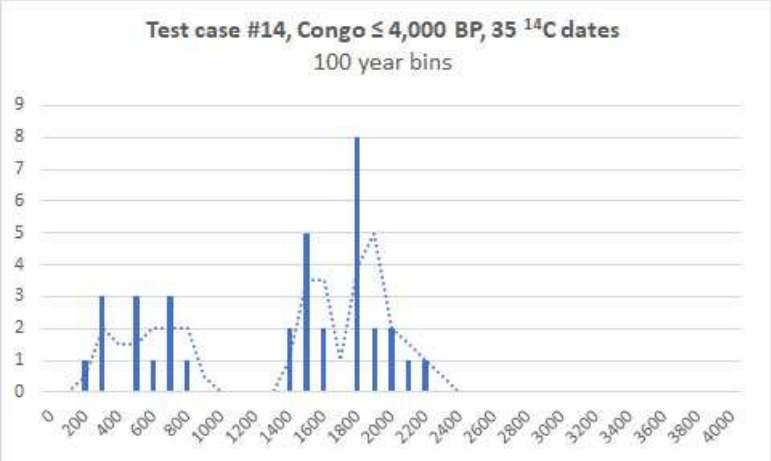

Figure 25: Radiocarbon dates from North Congo (n=35).

3.15 - Lower-Congo, Democratic Republic of Congo

The sequence starts with pre-metallurgy pottery using people found *c.*2300-2200 cal BP. The ensuing fall in the number of dates, *c.*2000-1800, precedes the introduction of iron-working *c.*1850. A new rise in dates peaks at *c.*1700-1600. A long plateau of low activity is found from *c.*1400 to 800. The usual increase of LIA carbon deposits starts *c.*800, probably associated to the rise of the local kingdoms.

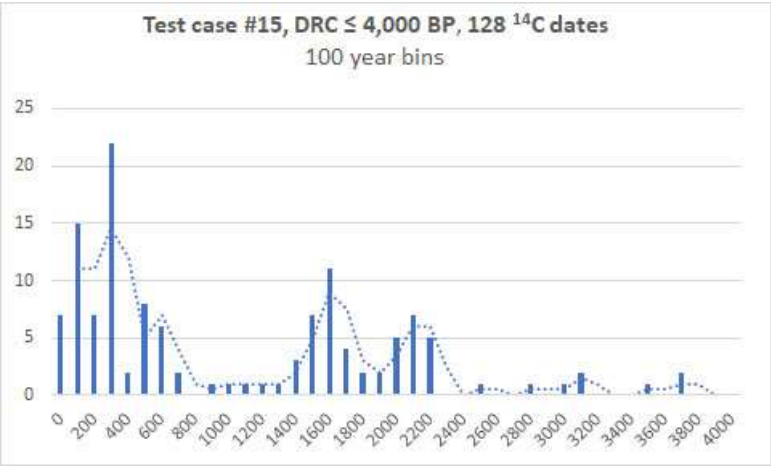

Figure 26: Radiocarbon dates from Lower Congo, DRC (n=128).

3.16 - Inner Congo Basin (ICB), Democratic Republic of Congo

Both are about the ICB. Case no.16, mostly about sites east of the Congo River; case no.16bis grouping case n°16 sites with those from west of the Congo River. Adding sites from Congo only strengthens the profile from case no.16.

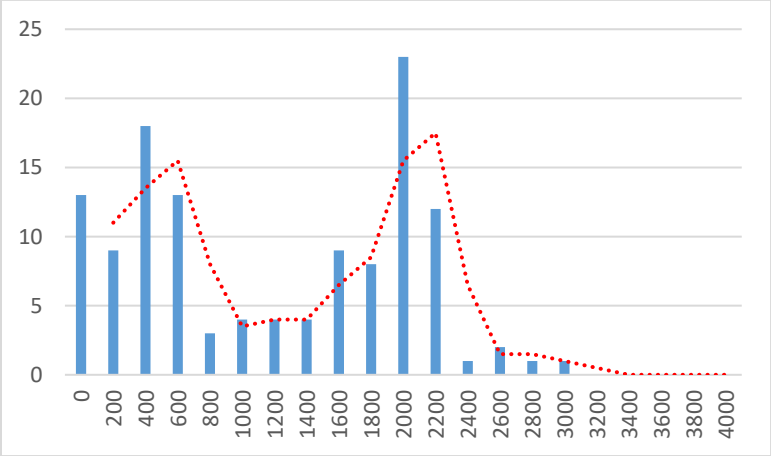

Figure 27a: Radiocarbon dates from the ICB, DRC (n=125).

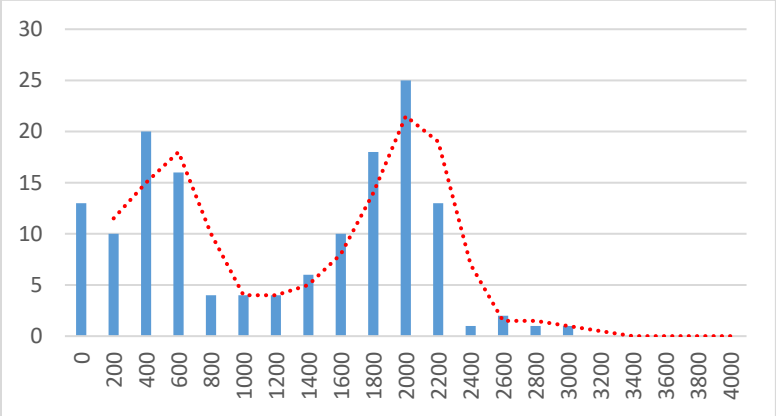

Figure 27b: Radiocarbon dates from the ICB, DRC and northern Congo (n=148).

The first credible evidence for early villages, probably iron-using because of the lack of stone tools and of polished stone adzes and axes, a characteristic of the contemporaneous communities west of the Congo River from Cameroon to northern Angola, is found c.2400-2200 cal BP, peaking at c. 2200-2000 (Figure 27b).
It is not before *c.*2000-1900 local iron production is found. The sites are of the Pikunda-Munda Group, considered as a western expansion of villagers from east of the Congo River. After the peak of *c.*1800-1900, we find a low activity period, but not its absence, from c.1600 to 800. An increase in the recovered carbon is followed since *c.*800 until the peak of *c.*400-500.

3.17 – South-East (Katanga), Democratic Republic of Congo

Most of the data is coming from a small area of the province, the Upemba depression where the Luba kingdom later thrived. While the Stone Age is documented, and surface collected polished stone axes and adzes are catalogued, evidence of iron and copper working villagers are followed since only *c.*1400-1450 (Figure 28). Their activity grows until the peak of *c.*600-700. The decrease after *c.* 600, is probably due to a research bias of some sort. Again, care must be taken this slump is based on only a few 'missing' radiocarbon dates. As most of the dates come from cemeteries, if the bias is not linked to the excavation strategy, the better explanation is a smaller number of burials set up since the 14th century where the excavations took place. If we accept the low number of dates after c.600 corresponds to a research bias, then the profile obtained better fits an **L-shaped** one.

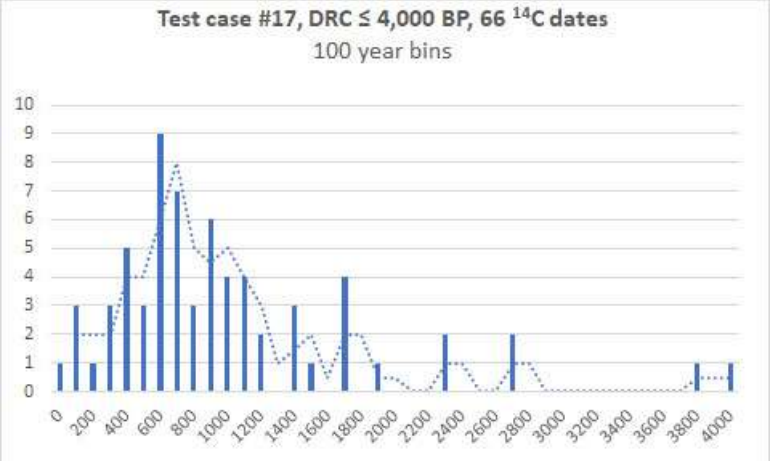

Figure 28: Radiocarbon dates from Katanga, DRC (n=66).

Section 4: Tier 4 sites, multi-component sites

All the graphics of our 34 Tier 4 sites use 200-year bins and a 10,000 cal BP age limit.

4.1 – Cameroon, nine sites

1. Shum Laka: Out of its 34 radiocarbon dates, 28 are Holocene (Figure29). The dated components are evidence to irregular use of the rock shelter. Since 4000 cal BP, we have at least 6 episodes when the stone 'chaînes opératoires' are mainly devoted to basalt, and when potsherds are associated. This differs markedly from preceding times when it was quartz the main purveyor of lithic tools, without any pottery. Looking at the pre-10,000 dates, outside the range of our figure, we find also a very irregular use of the rock shelter, at c. 11,000-15,000, 21,000-24,000, and 34,000-36,000.

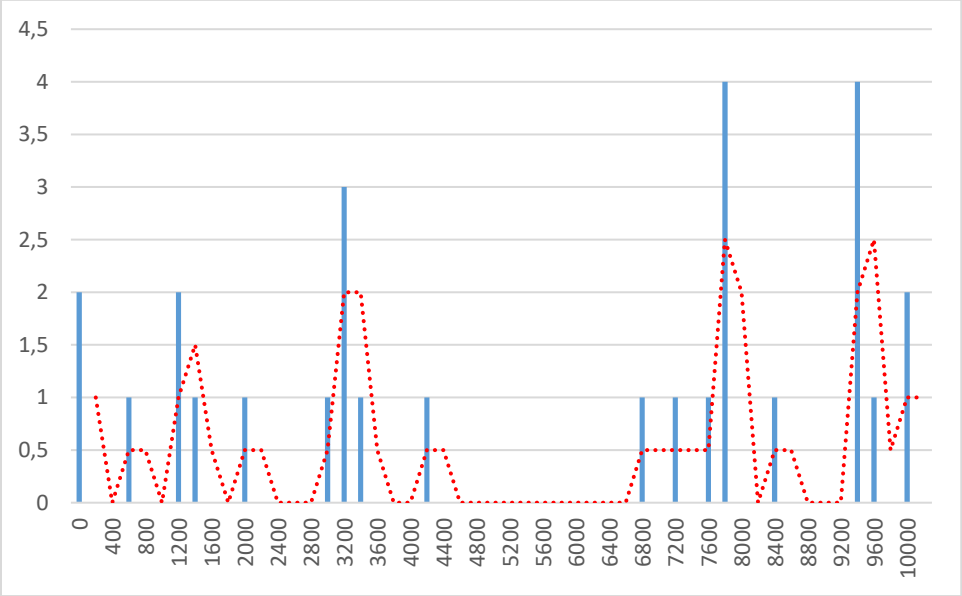

Figure 29: Radiocarbon dates from Shum Laka (n=28).

2 – Dibamba Yassa: The 43 Holocene dates cluster into 3 separate time segments: *c.* 2400-2600, 1600-2000 and 100-1000 (Figure 30). This new grouping of dates closely corresponds to the pottery sequence (de Saulieu *et al.* 2017). The 36 dates between 200 and 1000 are LIA and associated to pottery styles A, B and C, while the 7 dates between c.1600 and 2600 are EIA and linked to the pottery styles D and E.

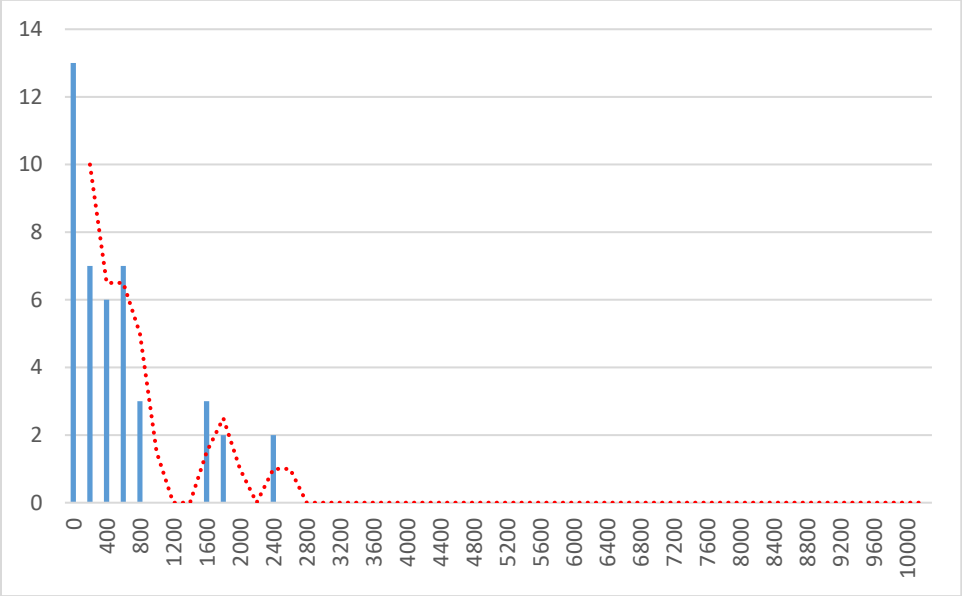

Figure 30: Radiocarbon dates from Dibamba Yassa (n=43).

3 – Mouanko Lobethal: The 20 dates illustrate 5 settlement periods (Figure31). Two relate to the Stone Age (*c.* 9500 and 10,000 cal BP), and 3 to the Iron Age, at *c.* 1600-2100 (EIA), 550-750 (LIA), and 150-200 (LIA or History). The major period of settlement seemingly being c. 1600-2100.

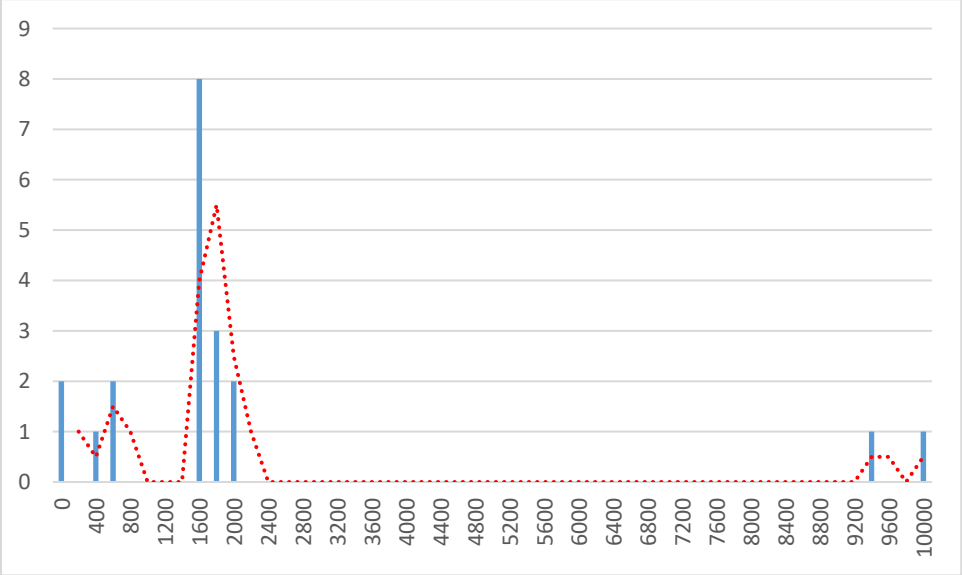

Figure 31: Radiocarbon dates from Mouanko Lobethal (n=20).

4 – Obobogo: The 12 dates illustrate several settlement periods (Figure 32). Two relate to the Stone Age *c.* 6800-7000 cal BP and 3800-4000, and three others to the Neolithic/EIA, younger than 3400.

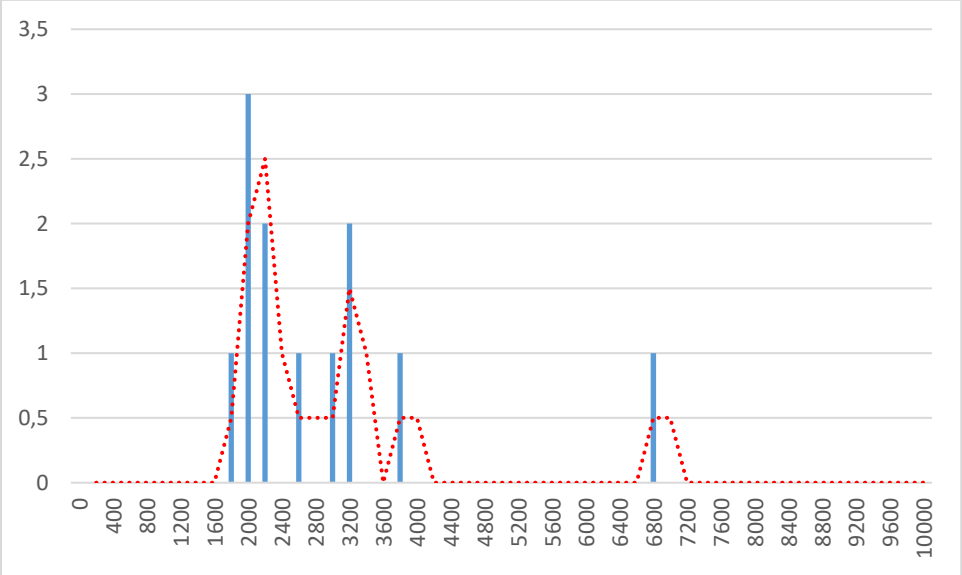

Figure 32: Radiocarbon dates from Obobogo (n=12).

5 – Bwambé "sommet": The 21 dates show a similar distribution shape as Akonétyé south. The main EIA activity period at Bwambé is c. 2100-2700 cal BP; it is earlier than at Akonétyé. A later occupation dates to c. 1600-1700 (Figure 33).

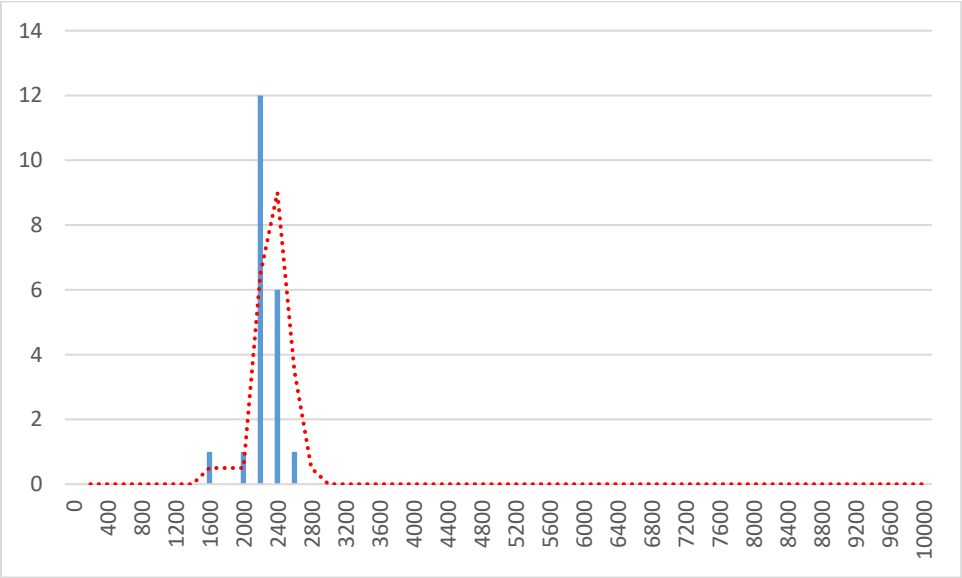

Figure 33: Radiocarbon dates from Bwambé "sommet" (n=21).

6 – Campo "église": A first screening of this site's ^{14}C dates identifies 4 activity periods in the Holocene: two are LIA (*c.* 750-800, 1100-1150), and two EIA (1500-1950, and 2100-2350 cal BP) (Figure 34).

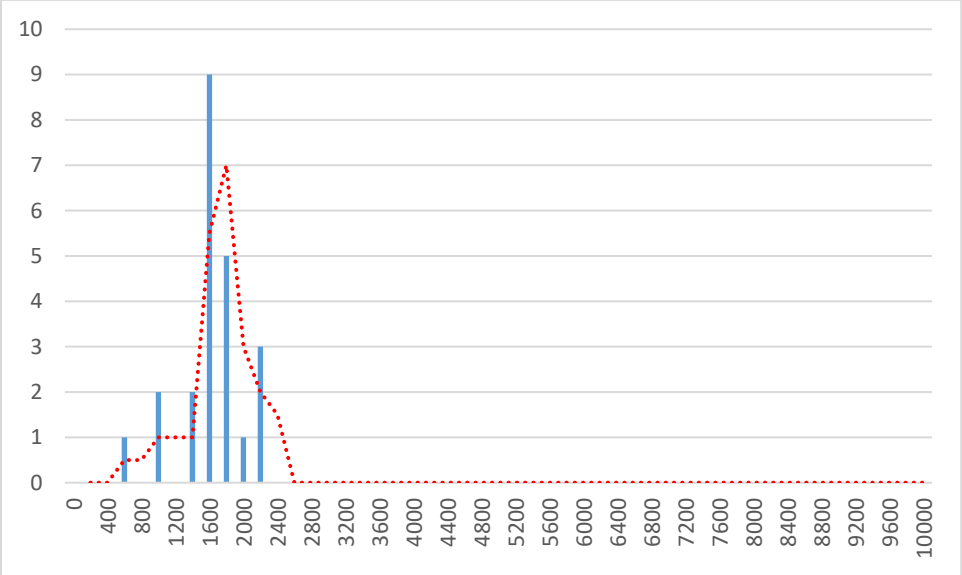

Figure 34: Radiocarbon dates from Campo "église" (n=22).

7 – Campo: The main occupation period of Campo is younger by several centuries from Campo "église". We have, following the EIA settlement of c. 1300-1400 cal BP, three other short-term settlements at c. 1850 cal BP (EIA), 4500 (LSA), and 6300 (LSA) (Figure 35). Three other dates from Campo are older than 10,000 cal BP (c. 13,100, 14,100 and 24,500).

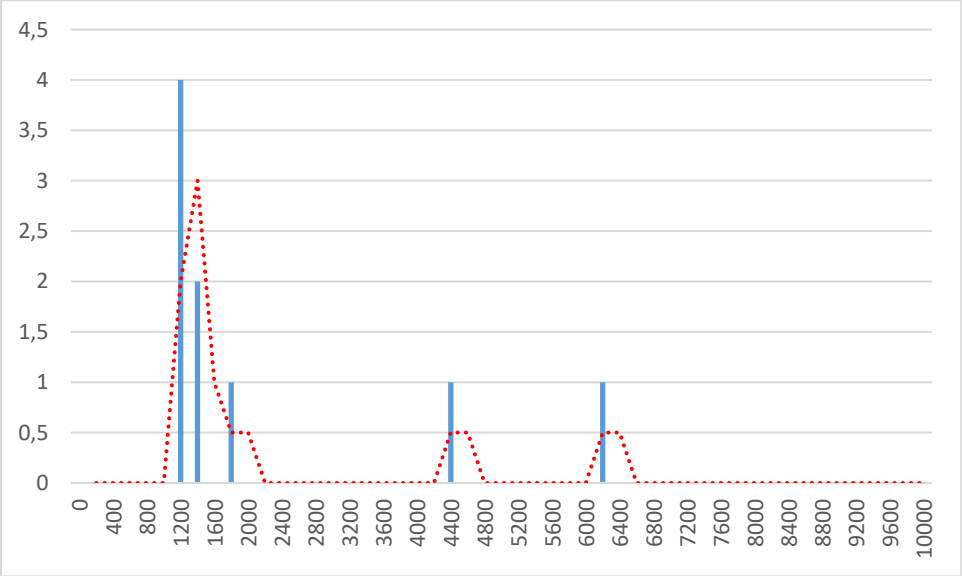

Figure 35: Radiocarbon dates from Campo (n=12).

8 – Akonétyé south: The 17 dates show two periods of occupation, both EIA, a major one between 1350 and 1950 cal BP, and a secondary one at 2450-2500.

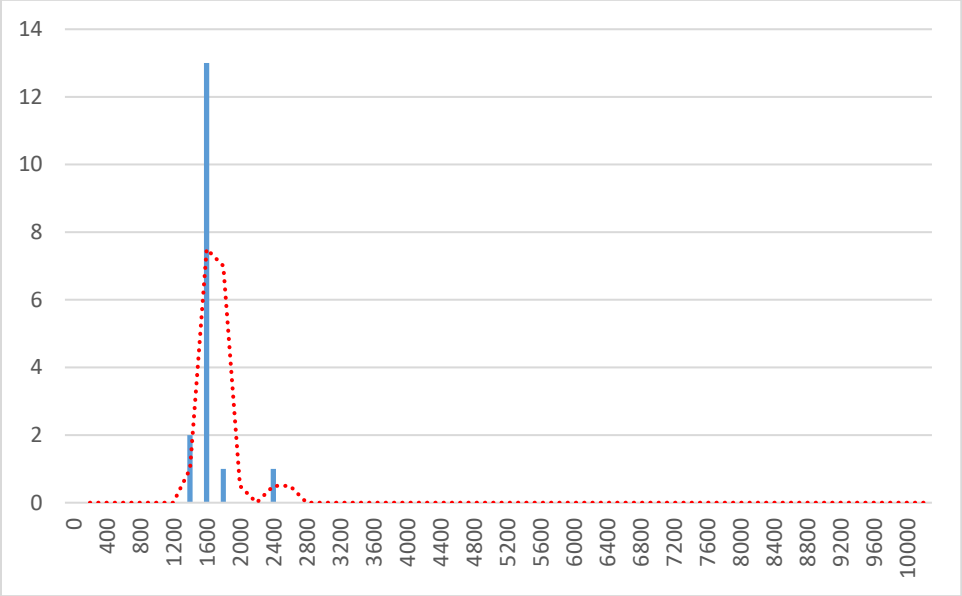

Figure 36: Radiocarbon dates from Akonétyé south (n=17).

9 – Nya Zanga: The only EIA occupation period of Nya Zanga is limited to *c.* 2100-2400 cal BP.

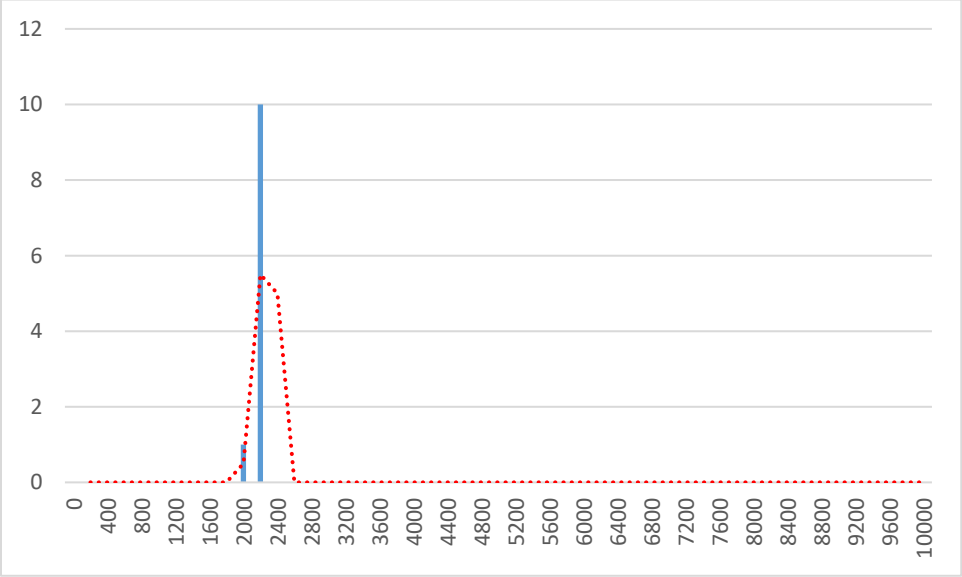

Figure 37: Radiocarbon dates from Nya Zanga (n=11).

4.2 – Central African Republic - two sites

1 – Nangara Komba: This rock shelter has a minimum of 8 periods of occupation, from the Stone Age to the Iron Age (Figure38). When using 100-year bins, they show up as neatly separated small clusters of ^{14}C dates at c. 1-700 cal BP (LIA?), 1500-1700 (EIA?), 2300-2600 (EIA?), 2900-3300 (LSA), 3900-4000 (LSA), 5600-5800 (LSA), 6500-6700 (LSA), and 6900-7000 (LSA). Using 200-year bins, as in Figure 38, the two earliest clusters are grouped.

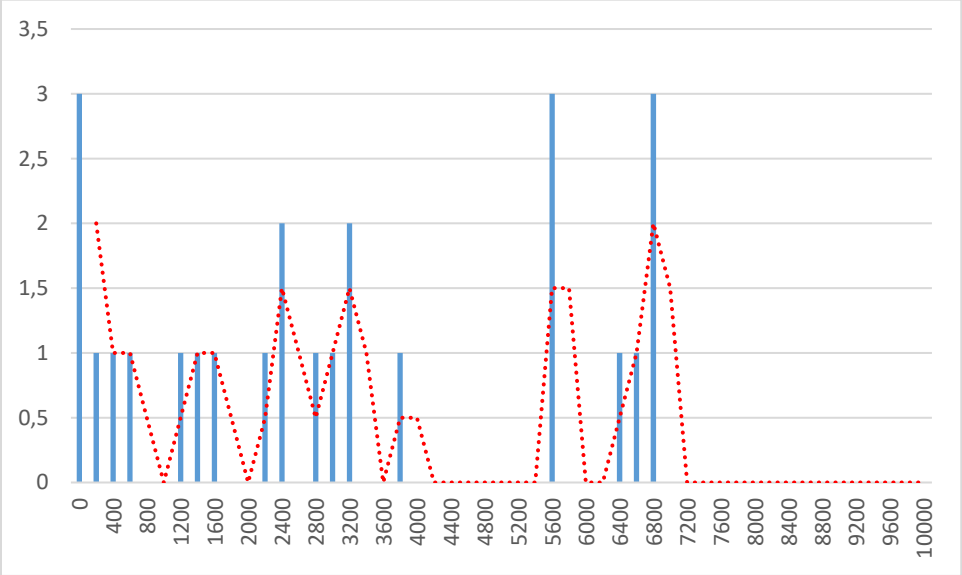

Figure 38: Radiocarbon dates from Nangara Komba, CAR (n=25).

2 – Oboui: A first look at the Oboui settlements shows three main periods (Figure39). a first high intensity one at c. 3900-4200 cal BP, a second one at c. 1400-2300, and a last, probably short term one, c. 1100. The 7 ^{14}C dates of the oldest period overlap each other suggesting a continuous occupation. The 16 ^{14}C dates of the second high intensity occupation, even with 50-year bins, cannot permit us to identify sub-clusters. But several short-term breaks exist and suggest discontinuous occupations.

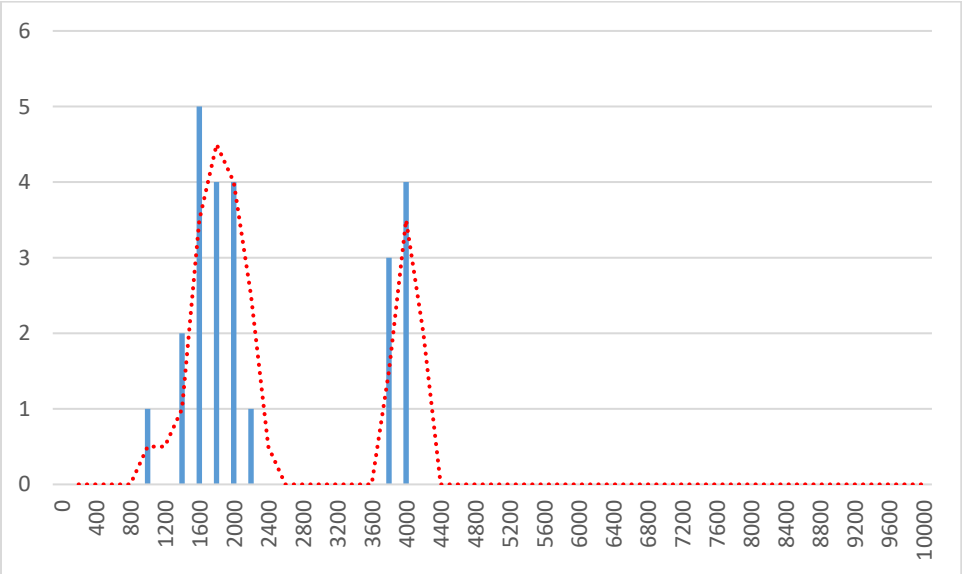

Figure 39: Radiocarbon dates from Oboui, CAR (n=24).

4.3 – Gabon - four sites

1 – Okala: The 16 dates from Okala illustrate 6 periods of occupation. One is off chart because it dates twice to before 40,000 cal BP (Middle Stone Age?) lithics from a single layer. The remaining 14 Holocene dates group themselves into 5 periods (Figure 40), Late Stone Age c. 6300, Neolithic/EIA of the Okala Group at c. 2500-2600, 2000-2300, and 1700, and LIA of the Angondjé Group at 400-600. It must be noted the excavations were carried out through the clayey soil down to the local "bedrock". The two c.2500 cal BP dates fall onto the so-called "Halstatt plateau" of c. 2500-2425 bp, and might be better associated to the 2000-2300 cal BP group.

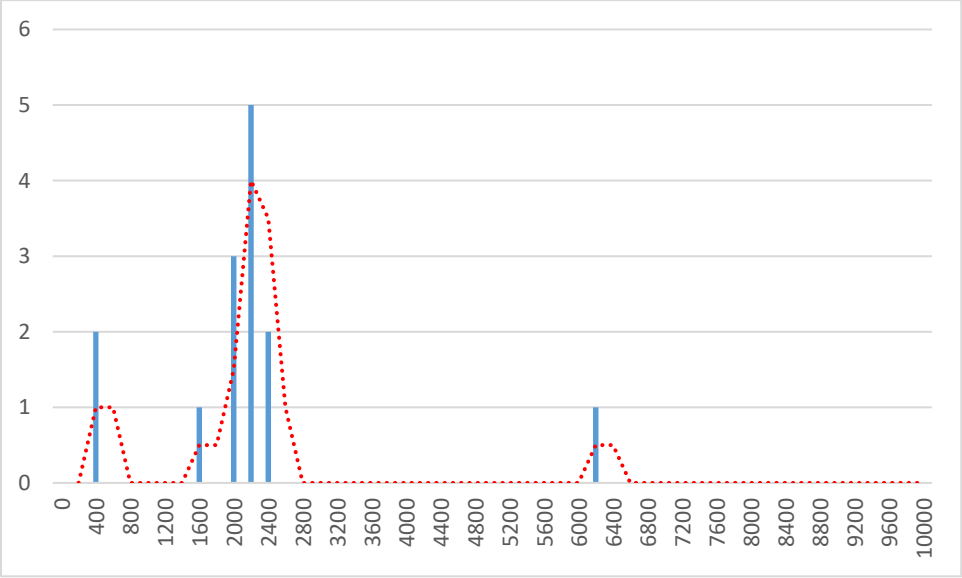

Figure 40: Radiocarbon dates from Okala, Gabon (n=14).

2 – Ikengué 1: The sequence at Ikengué is made up of 4 Late Stone Age episodes at c. 5800, 5400, 4200, and 3400, one possible Neolithic one at c. 2400-2600, and a LIA period from c. 500 to modern times (Figure 41).

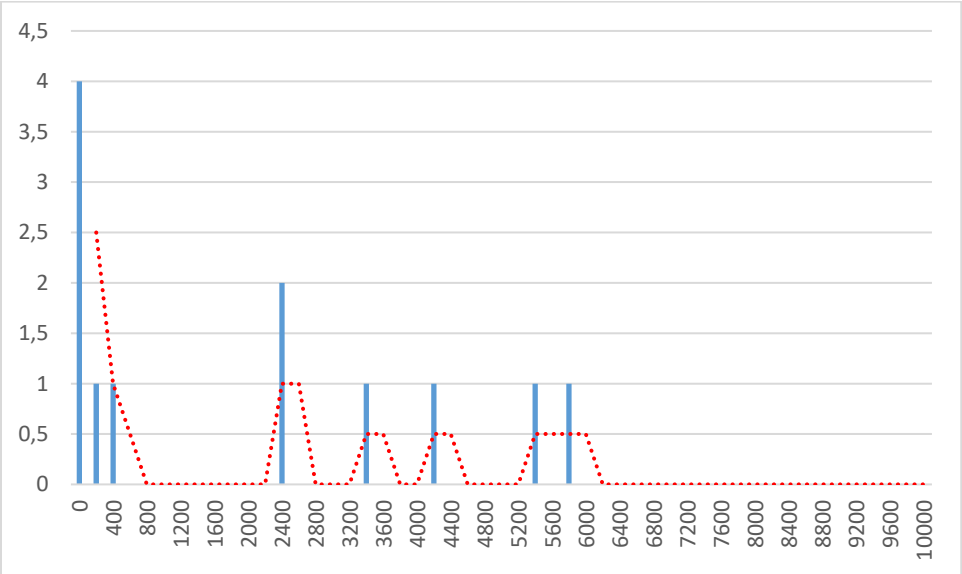

Figure 41: Radiocarbon dates from Ikengué 1, Gabon (n=12).

3 – Iroungou: The Iroungou site is very specific because it consists of an aven inside a cave which served presumably as a burial ground, or more precisely of a place to dispose of the dead with some accompanying (?) artefacts. Whatever the conclusions of the ongoing study (see Villotte *et al.* 2021), the deposit period seems to have been short, between c. 400-700 cal BP, slightly before the first European ships passed along the Atlantic Ocean coast (Figure 42).

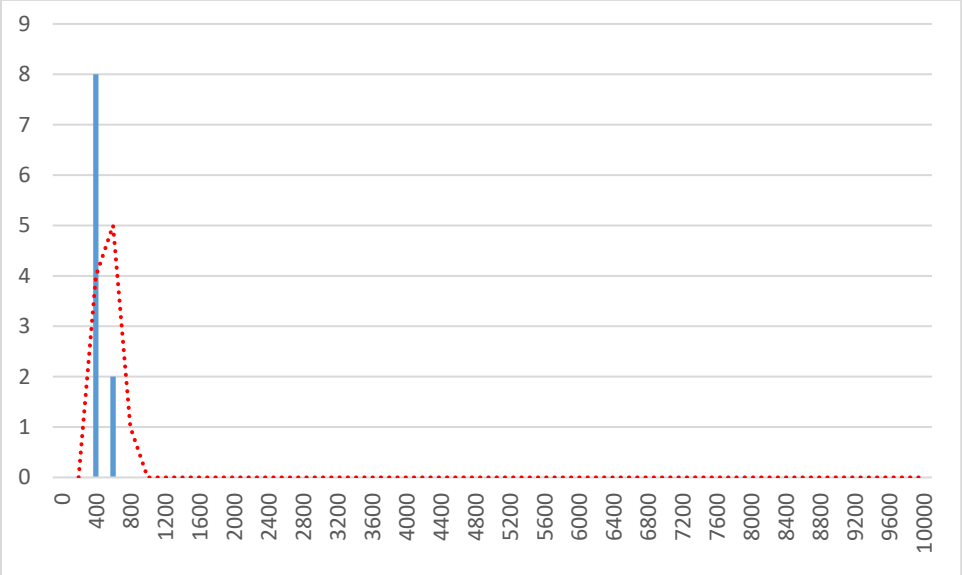

Figure 42: Radiocarbon dates from Iroungou, Gabon (n=10).

4 – Moanda: The sequence at Moanda is exclusively Iron Age (Figure 43). It is one of the few ancient iron working sites of Central Africa where furnaces were studied. We can single out 4 periods of activity: the main one at c. 1900-2,400 cal BP, and 3 short term ones at c. 1700, 1400 and 500 (LIA) well circumscribed using 100-year bins.

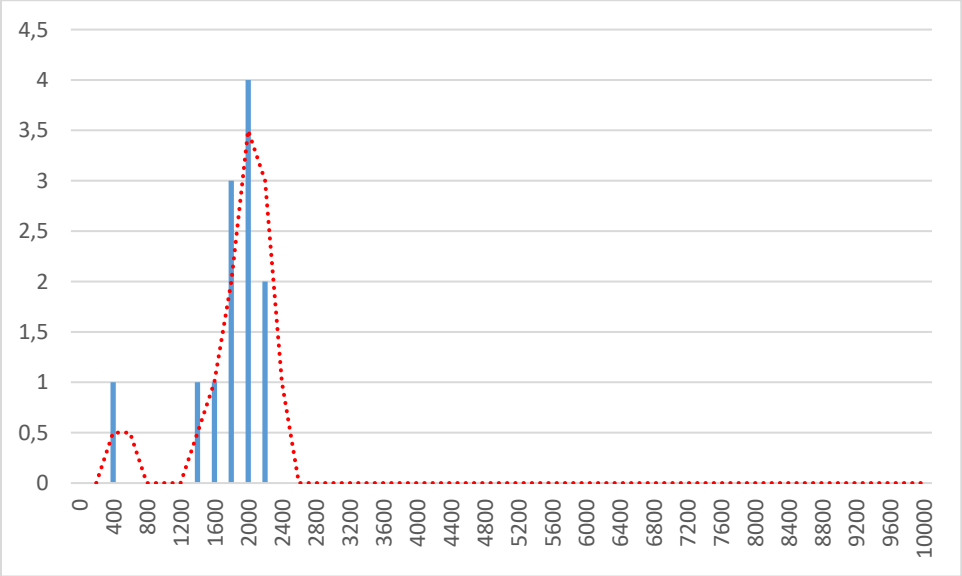

Figure 43: Radiocarbon dates from Moanda, Gabon (n=12).

4.4 – Equatorial Guinea - three sites

1 – Carboneras: The Carboneras beach site, today destroyed by the urban expansion of the capital, Malabo, had two settlement periods identified. The main one between *c.* 1000-1400 cal BP, a secondary one around 500.

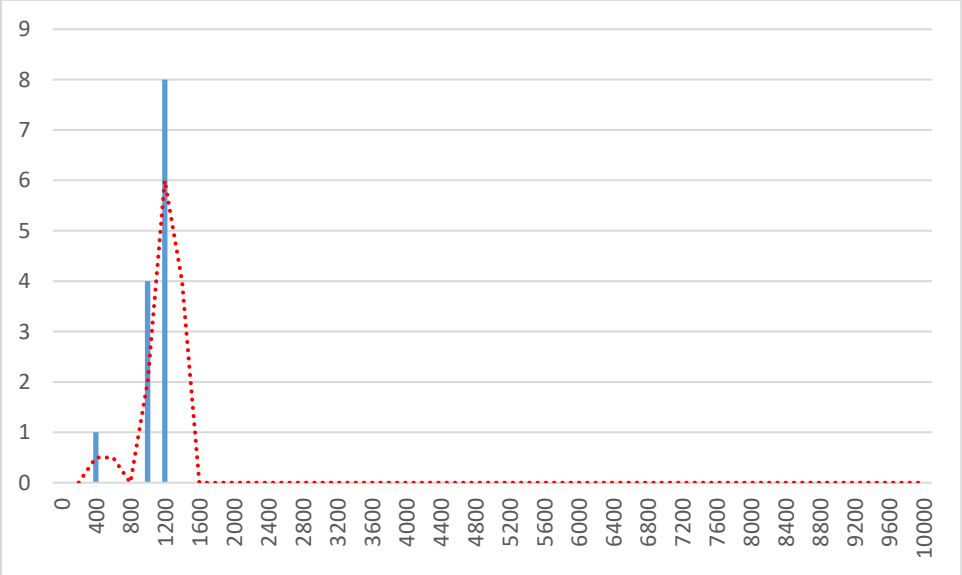

Figure 44: Radiocarbon dates from Carboneras, Equatorial Guinea (n=13).

2 – Nanda: Nanda is both an Iron Age cemetery and a village site located on Corisco Island off the coast of Equatorial Guinea and Gabon. The graph shows clearly a subdivision between a first period of activity from *c.* 1900 to 1200 cal BP, then another one from *c.* 800 to 1000 (Figure 45). The first one is related to the Oveng pottery Group, the younger one to the Nanda pottery Group. There is a hiatus between the two of about two centuries.

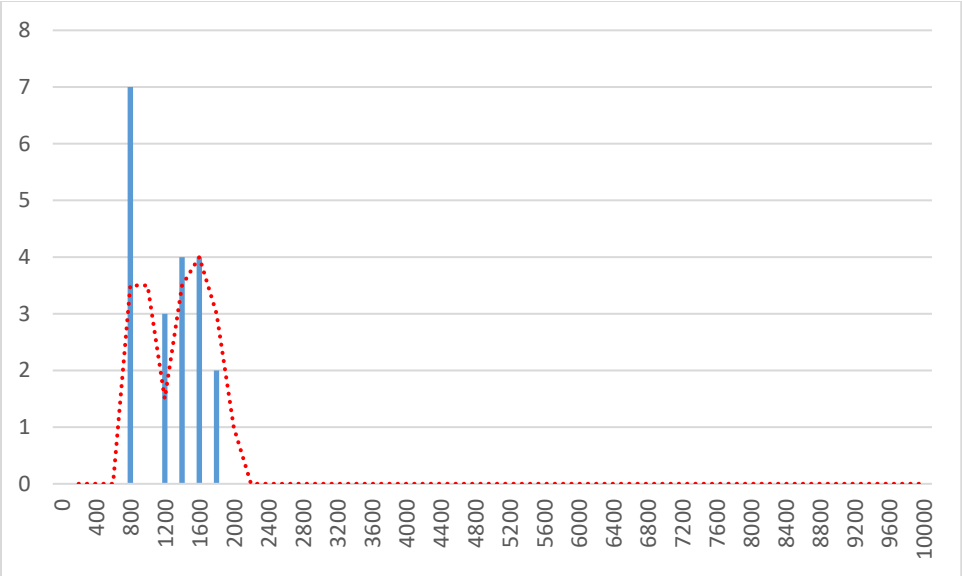

Figure 45: Radiocarbon dates from Nanda, Equatorial Guinea (n=20).

3 – Mosumu: Mosumu is better known for its Middle Stone Age component whose ^{14}C dates extend beyond 10,000 cal BP, at *c.* 12,000, 16,000, 22,000, and 34,000. The 4 dates at *c.* 7500, 6600, 4700-4900 are better associated to a Late Stone Age. Likewise, the 2 dates around 2800 could be linked to the LSA. The isolated date around 2200 could be Iron Age but also LSA. The cluster of 6 dates at *c.* 1400-2000 would better fit an Iron Age village (Figure 46). Though the overall picture is one of Stone Age through to the Iron Age irregular and short-term settlements, no pottery was found on site (Marti Lezana 2003: 97-229; confirmed p.c. Julio Mercader, email of 5 November 2021). The younger charcoals could be the

signature of natural forest fires, of human agricultural use, or of late stone-using hunter-gatherers.

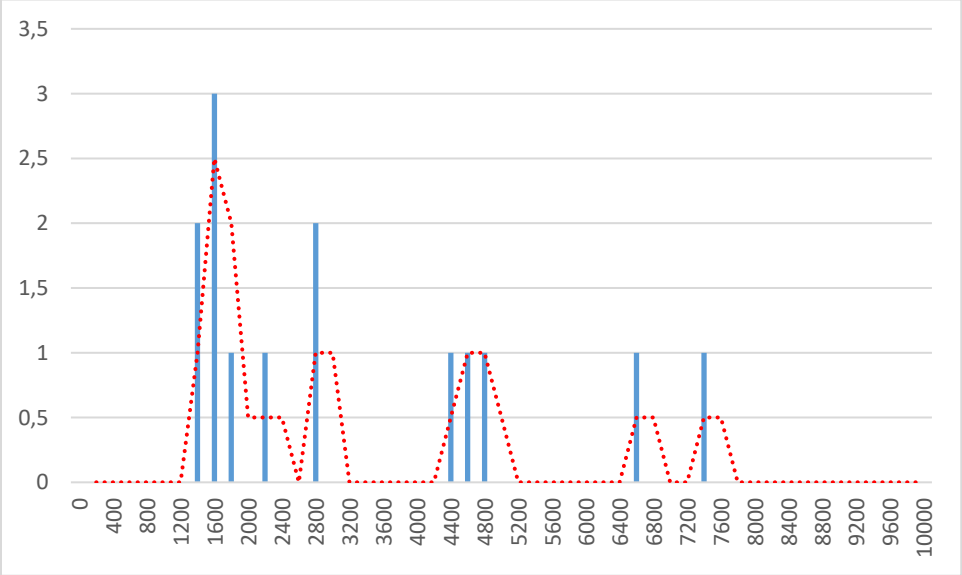

Figure 46: Radiocarbon dates from Mosumu, Equatorial Guinea (n=18).

4.5 – Congo - two sites

1 – Mayoko: The settlement consists of an iron ore mine and an iron-working site. Preventive archaeology work under a contract with the mining company yielded important information, still unpublished, about the ancient mining and iron processing activity. A paper is being prepared by J.-P. Ndanga with whom two of the present co-authors are associated (BC and RL). Regarding the chronology, some limited early iron-working is evidenced around 1300 cal BP, while the main production is around 100-700, i.e., during the second part of the LIA (Figure 47).

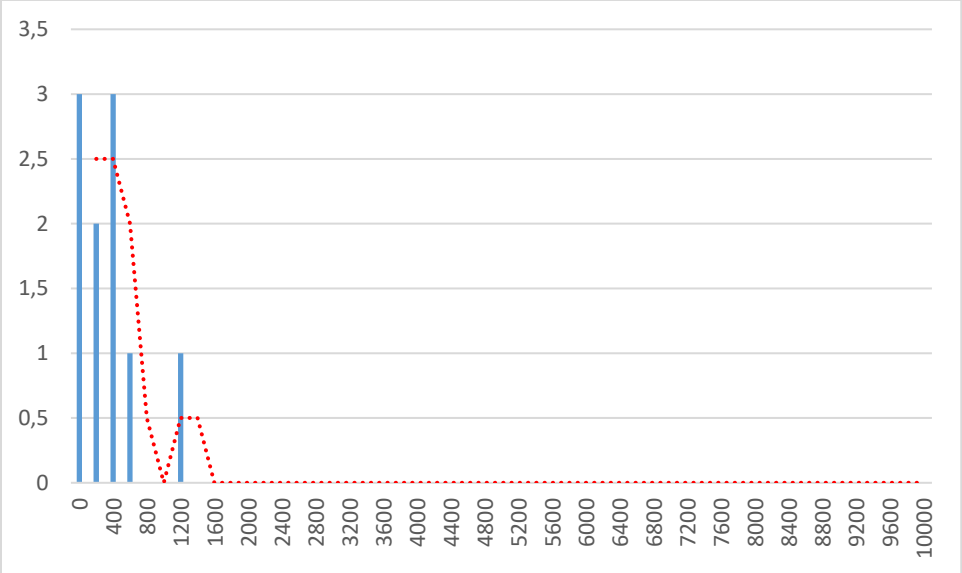

Figure 47: Radiocarbon dates from Mayoko, Congo (n=10).

2 - Munda: The first Iron Age village of Munda dates back to *c.* 1400-2000 cal BP. It was followed by another *c.* 700-1000, and a last one c. 200, both of them being LIA (Figure 48).

Once again, a discontinuous pattern of occupation existed in the excavated area of the site. The use of 100-year bins isolates a possible split of the 1400-2000 period.

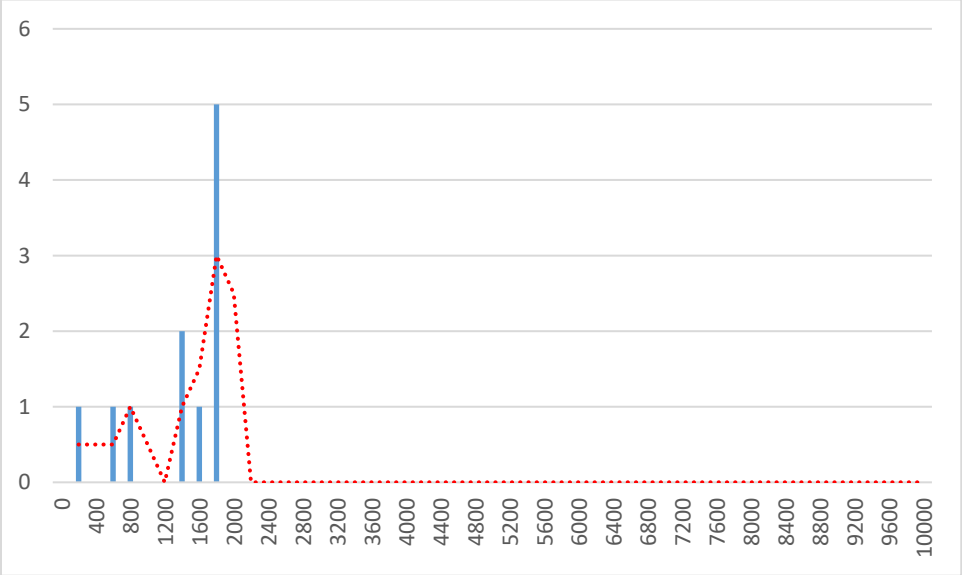

Figure 48: Radiocarbon dates from Munda, Congo (n=11).

4.6 – Angola - one site

1 – Mbanza Kongo: Mbanza Kongo was the capital of the Kongo kingdom. It is accepted its foundation could have been around the 12th-13th centuries (Thornton 2020). It follows the occupation of the Mbanza Kongo plateau overlooking the surrounding area might date back to *c.* 700 cal BP, and since its founding date, evidence of a continuous settlement should be found. Our graph presents the 20 radiocarbon dates processed, still unpublished (Figure 49). Nothing is yet known before *c.* 550 cal BP. But the two oldest dates (547 and 495 cal BP) come from a probably disturbed context, and several other samples were collected in an already excavated location by the Portuguese in the late 1960s, suggesting a contextual problem (Clist *et al.* 2015).

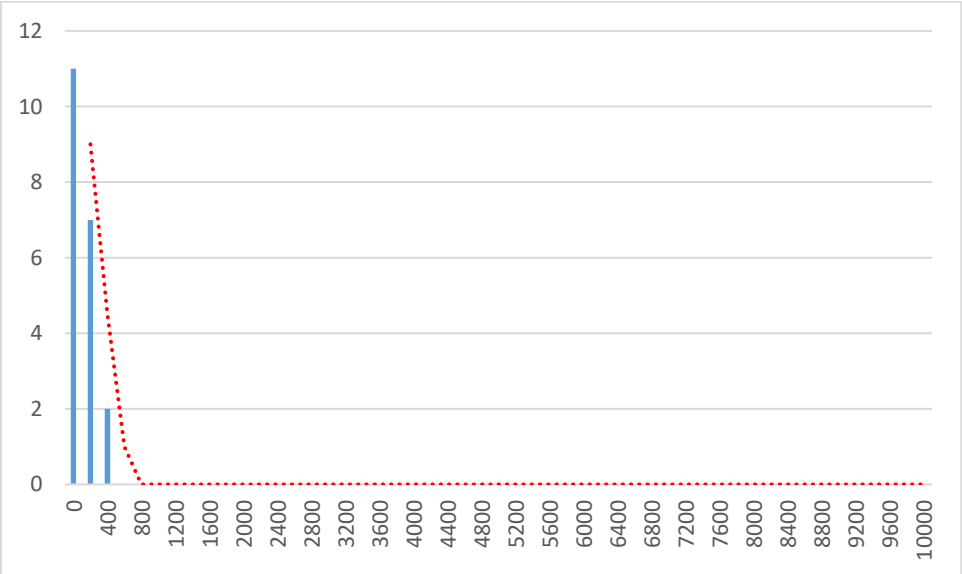

Figure 49: Radiocarbon dates from Mbanza Kongo, Angola (n=20).

4.7 – Democratic Republic of Congo - thirteen sites

1 – Bolondo: The 19 radiocarbon dates using 100-year and 200-year bins illustrate three periods of activity: c. 700-100 cal BP, c. 1100-1000, and c. 1600-1500.

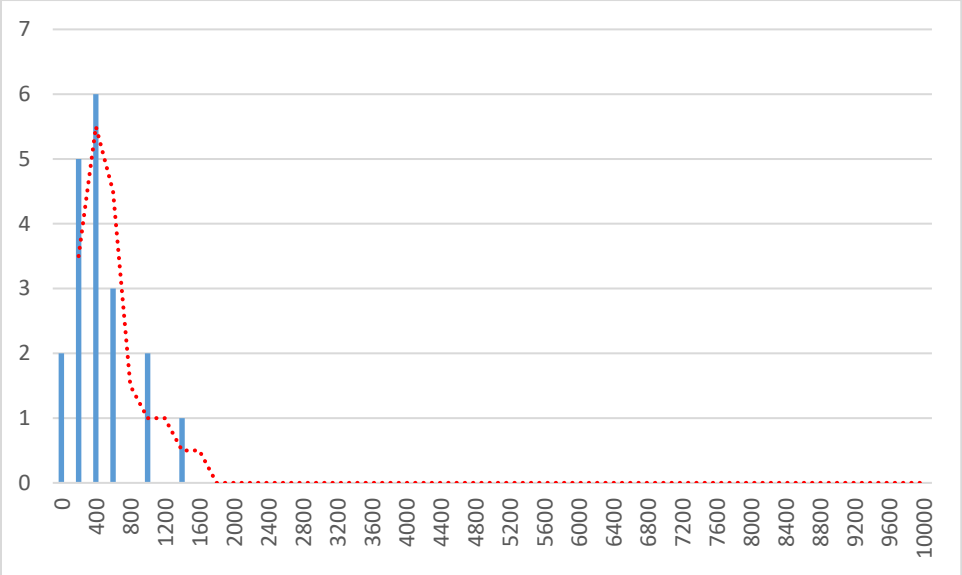

Figure 50: Radiocarbon dates from Bolondo (n=19).

2 – Gombe: This site is known worldwide because D. Cahen and J. Moeyersons were able to show for the first time the strong perturbations of archaeological deposits on open-air sites. This led D. Cahen to consider that except for charcoal collected inside features like pits, all artefacts and ecofacts from open-air sites could not be considered as *in situ* (Cahen 1976, 1978; Cahen *et al.* 1983). Though we cannot associate in a direct fashion lithics and pottery to the 28 ^{14}C and TL dates, the 18 Holocene ^{14}C and TL assays clustering as illustrated in our Figure 51 is strongly suggestive of intermittent use of the site through the Late Pleistocene and the Holocene. Furthermore, the 3 thermoluminescence dates obtained from pottery, c. 1600-1700 cal BP, are congruent with the latest research and the identification of a Kitala pottery Group dated in that time range (Clist *et al.* 2019). Gombe yielded 10 dates older than 11,000 cal BP: c. 49,000, 41,000, 31,000, 18,000, 17,000, 13,000, 12,000, and 11,000.

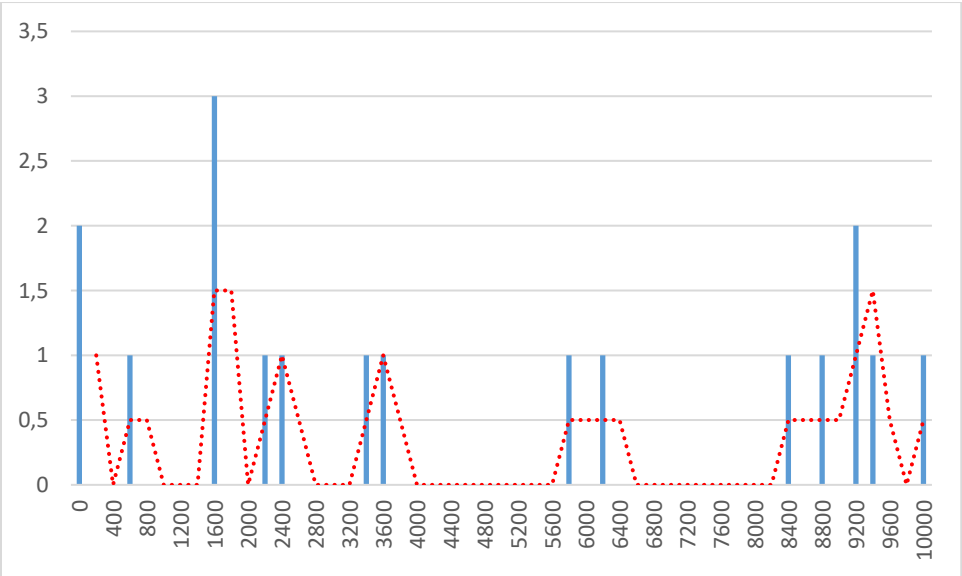

Figure 51: Holocene dates from Gombe (n=15 ^{14}C + 3 TL).

3 – Iyonda: The 48 dates are grouped into four peaks (Figure 52). The oldest period involves Imbonga group pottery users, *c.* 2240-1860 cal BP. This important settlement will be followed during the LIA by at least two activity periods, at *c.* 1330-1280 with Bokuma/Bokele pottery and *c.* 600-500 with Nkile pottery. An important series extends the occupations to the modern times, *c.* 100-40 with Botendo/Ikenge pottery.

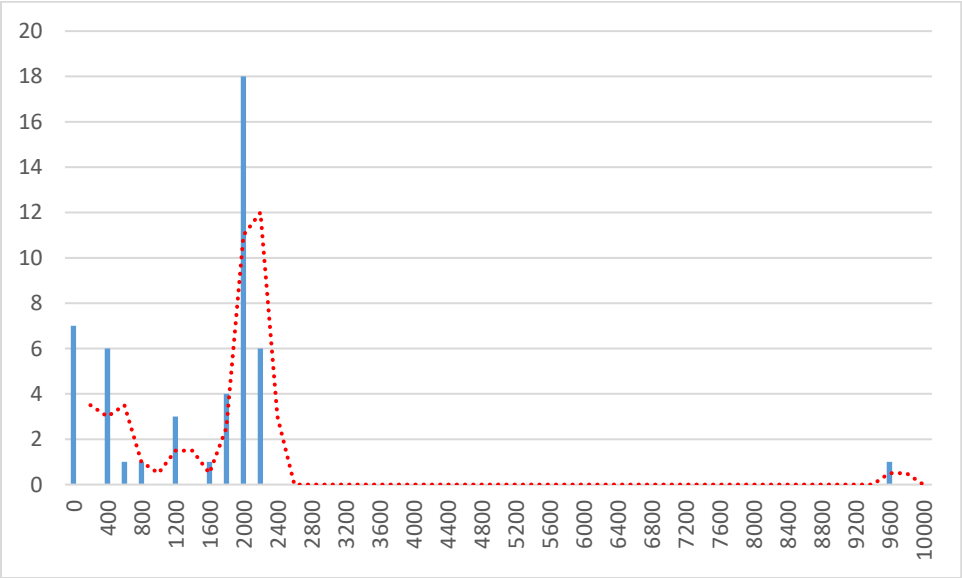

Figure 52: Radiocarbon dates from Iyonda (n=48).

4 – Kindoki: The Kindoki site is typical of excavations carried out to resolve a specific question and period, here about the LIA and the Kongo kingdom (Clist *et al.* 2018). Ancient texts and traditions made it the capital of the Nsundi province of the Kongo kingdom. Possible Stone Age levels were not to be looked for, as the strategy was to open units limited to -1 meter where the archaeologist knew all the Iron Age features could be found. In 2012, a unit opened to collect soil samples down to -3 meters encountered large stone flakes below 2 meters depth (MSA?). Later work discovered between -90 and -130 cm in some units, grey chert artefacts probably of the LSA, some could be refitted (Cornelissen 2018: 38). The distribution of the dates isolates an early pottery-using settlement – the 'Kindoki Group' between c. 500-700 cal BP (2 ^{14}C dates) – from a Kongo kingdom one, the town of Mbanza Nsundi, from c. 400 to 150 (16 ^{14}C dates) (Figure 53). Overall, 2 Stone Age and 2 LIA periods of occupation have been identified. It is possible the LIA settlements on this hilltop materializes a continuous settlement through over 600 years. Associated to the dated artefacts imported from Europe (e.g., Portuguese majolica and Venitian glass beads), the radiocarbon dates provide a solid chronology.

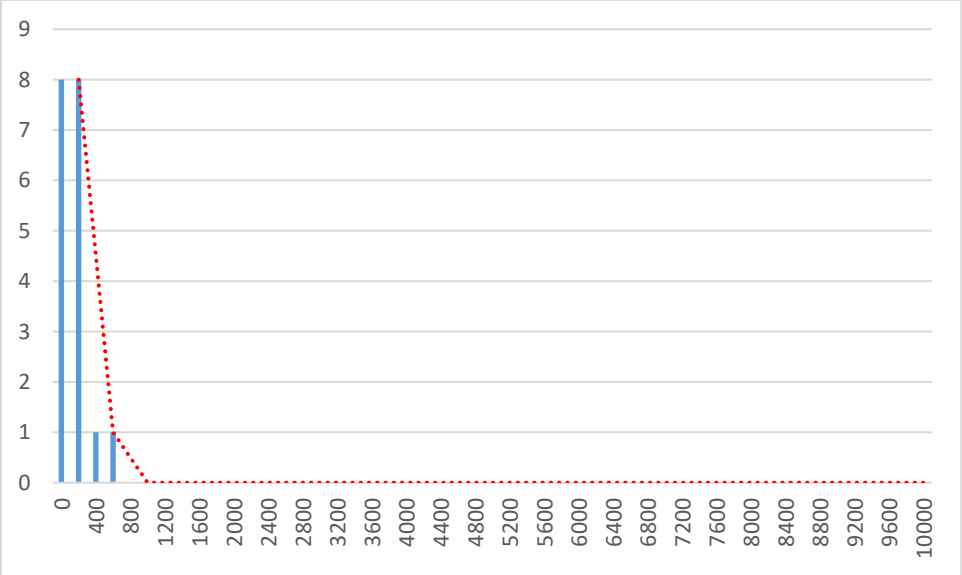

Figure 53: Radiocarbon dates from Kindoki (n=18).

5 - Mbandaka: The Mbandaka site has two neat occupations, one EIA c. 2100-1500 cal BP, the other LIA *c.* 750-250 with a long 700 years abandonment period between the two (Figure 54).

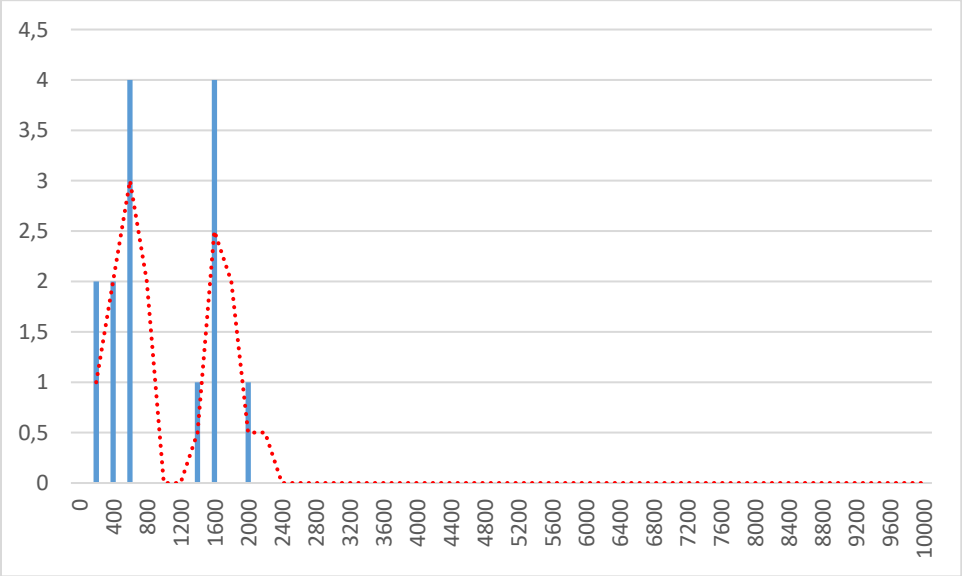

Figure 54: Radiocarbon dates from Mbandaka (n=14).

6 – Ngongo Mbata: Ngongo Mbata is similar to Kindoki. It was studied because it was known from ancient texts to have been the major town of the Mbata province, part of the Kongo kingdom (Clist *et al.* 2018). Here, in some units, distinct LSA levels of the Early Holocene were encountered and dated twice to c. 10,000 and 11,000 cal BP. The lithics are made from quartz or grey chert (Cornelissen 2018: 33-36). Apart from a single date *c.* 2000, which is not associated to EIA pottery, the 17 remaining radiocarbon assays are between c. 100 and 400 (Figure 55). Together with the study of well dated imported artefacts (e.g., Portuguese majolica and Venitian glass beads), they provide a robust chronology. Excavations thus situates the development of the town c. 380 years ago or probably in the mid-16th century.

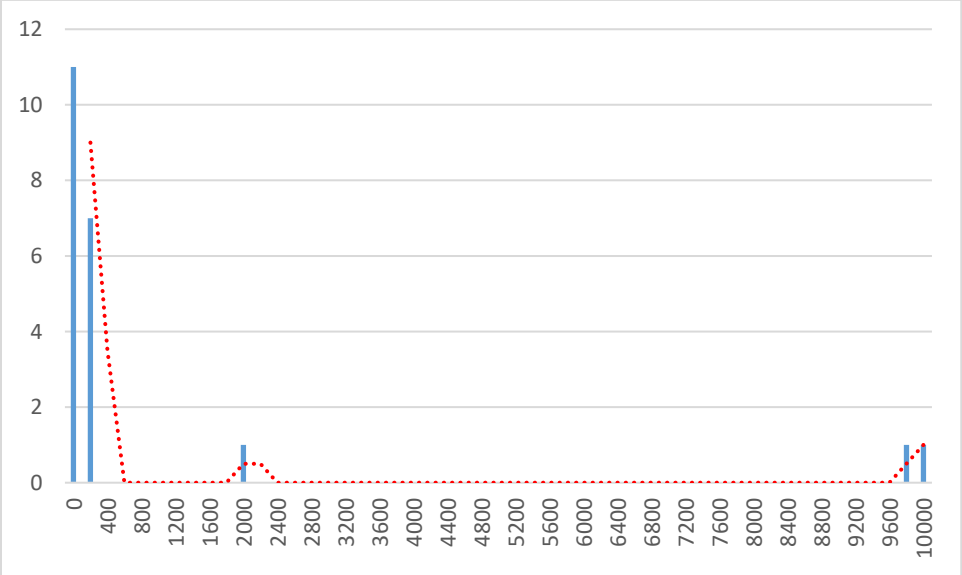

Figure 55: Radiocarbon dates from Ngongo Mbata (n=21).

7 – Sakuzi: The site lies in a heavily eroded area, the central part of Bas-Congo. This means all the Stone Age artefacts either lie on the surface of the hilltops or on their slopes. The majority of the hills is littered by the various types of stone tools of the MSA and LSA. Without context, no radiocarbon dates before 4000 cal BP were processed for Sakuzi. The single date at c.3700 is associated to pottery similar to Ngovo Group material (pit n°43, dated to c. 2120) and can thus be considered unreliable. The other 10 dates are either related to the Neolithic Ngovo Group between c.2300 and 2000 (4 dates) or to the Early Iron Age Kay Ladio Group between c.1500 and 1800 (6 dates) (Figure 56). There exists a gap between the two different communities.

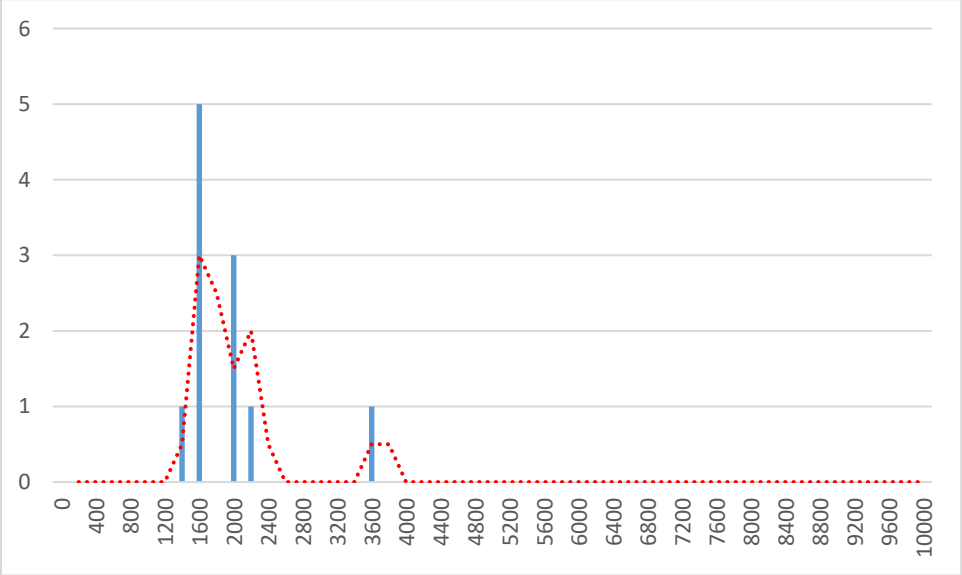

Figure 56: Radiocarbon dates from Sakuzi (n=11).

8 – Tovo: It is a well-known cave for its Kongo kingdom times rock art (Heimlich 2017). This means the radiocarbon series was aimed to date the rock art, probably entirely from the Kongo kingdom times. The results fully confirmed this. A close cluster of 11 dates lies between c. 100 and 400, i.e., from post-contact times. A single isolated date at c. 1200

suggests earlier styles exist related to pre-contact with the Portuguese, and before the development of Christian practices and thoughts around Tovo (Figure 57).

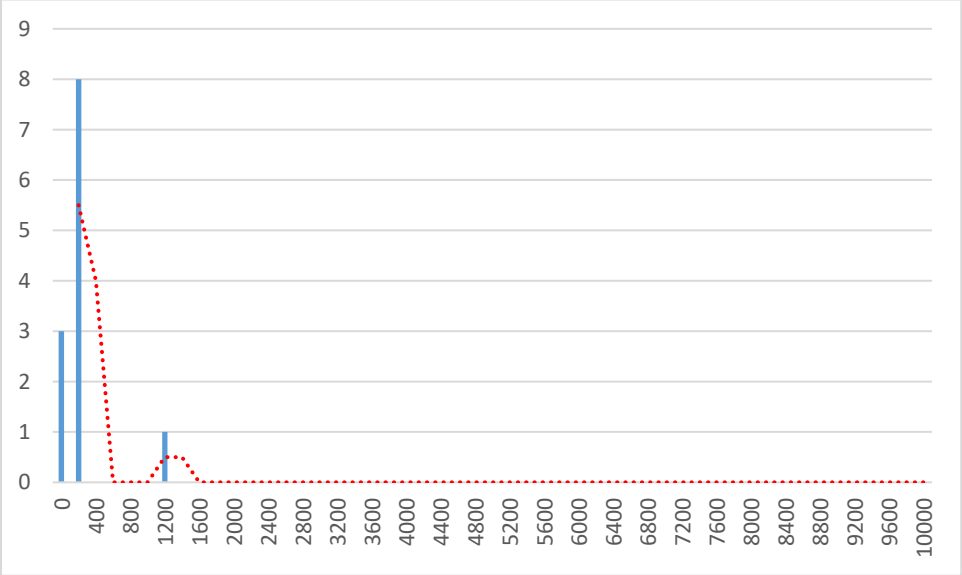

Figure 57: Radiocarbon dates from Tovo (n=12).

9 – Bamanya: From the 10 samples processed from Bamanya, 7 were done at the Hannover laboratory, whose quality has been doubted for some time (Eggert 1987). Most of the pottery excavated from Bamanya are of the Bondongo Style (Seidensticker 2017: 293-294). This pottery production has been estimated to be post-1,000 cal BP (Seidensticker 2017: 292). From Figure 58, we see there exists 5 clear separate periods of occupation; the issue of the Hannover dates must be addressed considering the new understanding we have of the agreed quality of the lab process.

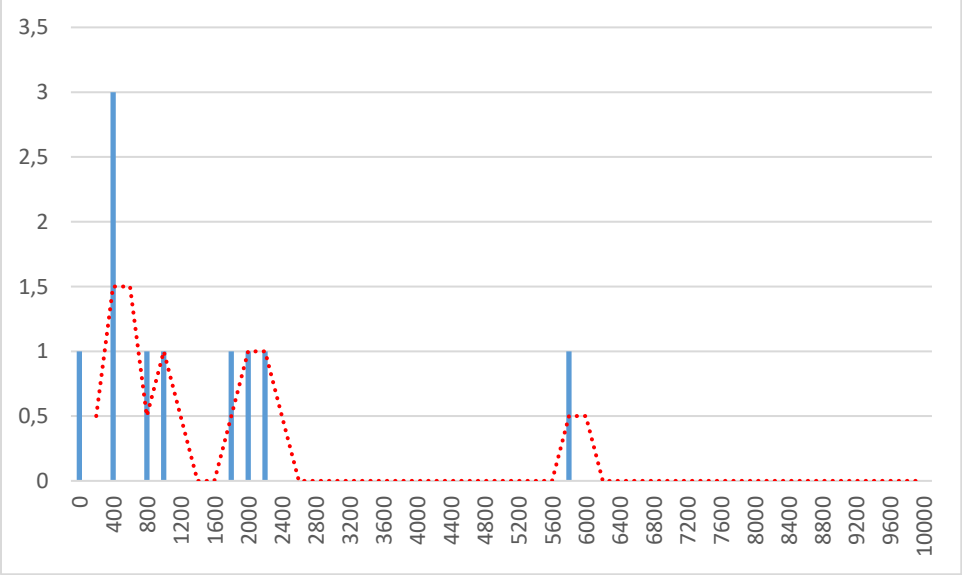

Figure 58: Radiocarbon dates from Bamanya (n=10).

10 – Matupi: Only 2 dates are Holocene, the 9 others are Pleistocene. The latter chrono-locate Stone Age intermittent occupations of the cave c. 14,000, 17,000, 18,000, 25,000-26,000, and 37,000 cal BP. The two Holocene dates are isolated, c. 670 and 2760 cal BP (Figure 59).

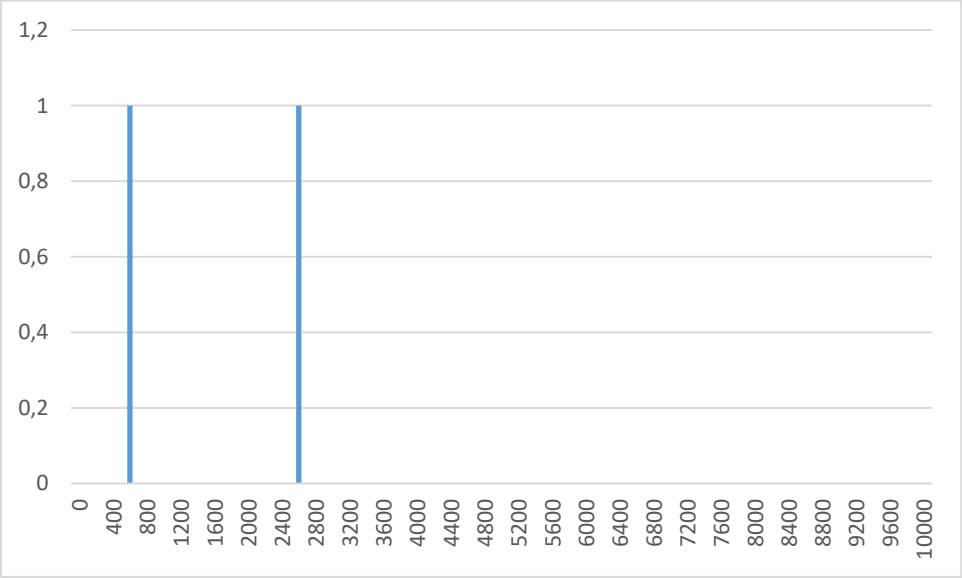

Figure 59: Radiocarbon dates from Matupi (the 2 Holocene assays).

11 – Kamoa: Though Kamoa is well known for its Acheulean industry, nothing is radiocarbon dated until the Late Stone Age. Then, we have 6 separate and probably short term LSA occupations (*c.* 6800, 4600, 4000, 3800, 2700, 2300, and 1700 cal BP). Another 4 dates are LIA: 2 samples came from the same pit (450 and 310 cal BP), 2 others from charcoals collected in the sediment (604 and 1018 cal BP) (Cahen 1975: 364-366).

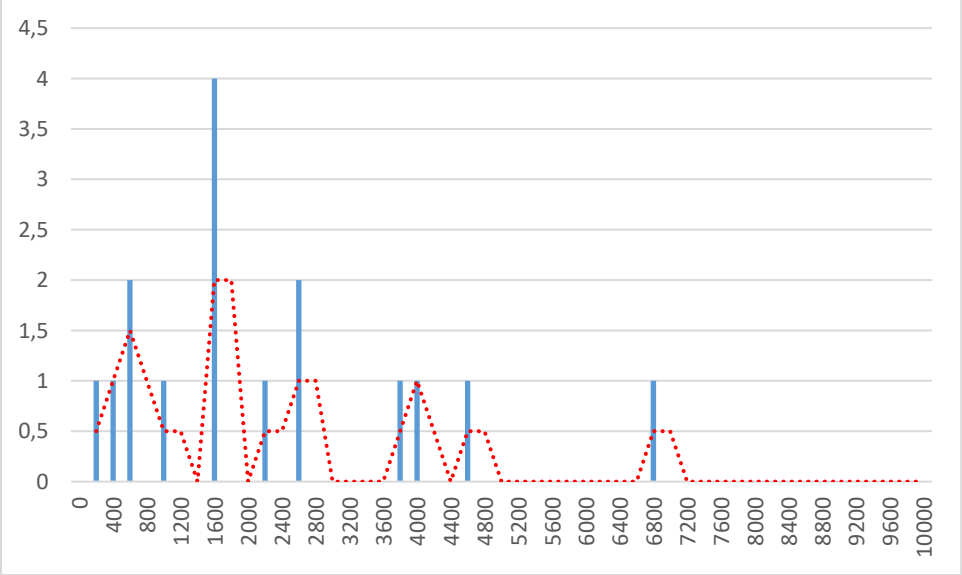

Figure 60: Radiocarbon dates from Kamoa (n=16).

12 – Malemba-Nkulu: The Iron Age cemetery of Malemba-Nkulu was radiocarbon dated 14 times. It contained tombs of the Kisalian (7 dates) and Kabambian (7 dates) cultures (de Maret 1992). As in Sanga (see case no.13 below), the two cultures at Malemba-Nkulu show a continuous use of the burial ground, with the ^{14}C dates clustering between c. 1300-300 cal BP, spanning the late EIA and the LIA.

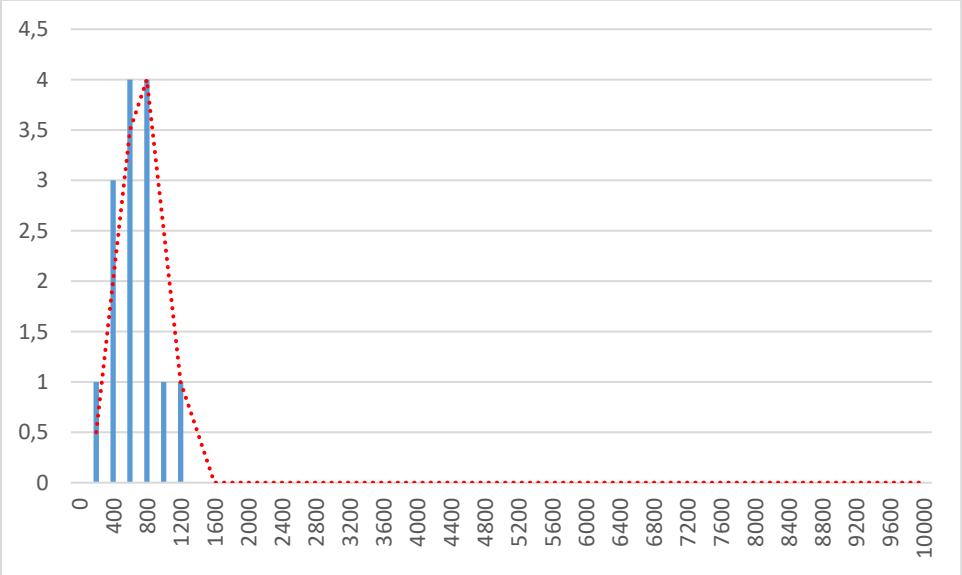

Figure 61: Radiocarbon dates from Malemba Nkulu (n=14).

13 – Sanga: The Iron Age cemetery of Sanga had tombs of both the Kisalian and Kabambian periods. Nine radiocarbon dates are associated to the Kisalian and 2 to the Kabambian (c. 705 and 478 cal BP). Due to the continuity between these two Iron Age cultures, the 11 dates from Sanga cluster between c. 1100-400 cal BP (de Maret 1985).

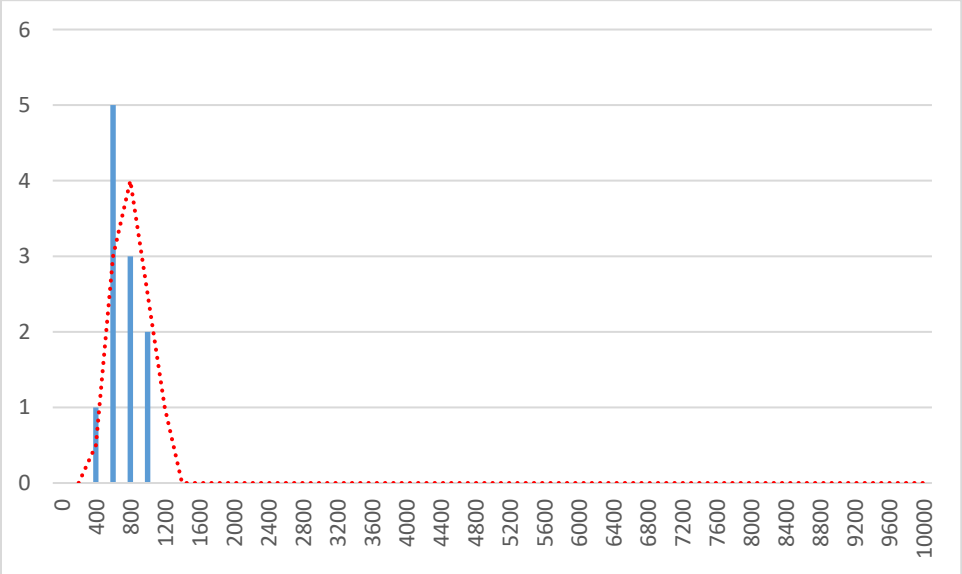

Figure 62: Radiocarbon dates from Sanga (n=11).

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