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^{14}C-dating of wooden buildings in Flanders (Belgium). A problem of reliability?

Guy DE MULDER, Mathieu BOUDIN, Ewoud DESCHEPPER, Gerben VERBRUGGE, Mark VAN STRYDONCK, Giacomo CAPUZZO & Wim DE CLERCQ

Abstract

From the Prehistory until the Late Middle Ages wood was the most important construction material for buildings in Flanders. With the exception of wet contexts, the wooden posts of the structures are not preserved anymore. Because of this, these buildings are difficult to date. Charcoal or charred grains preserved in these postholes are a dating option, although the origin of these materials is not always clear.

To tackle this problem of reliability, a strategy is to date several samples from the postholes of the same structure. A pattern of contemporaneous ^{14}C-data will give us insight in the age of these structures and outliers can be eliminated. To verify the results of the ^{14}C-dating a comparison is made with the fragments of material culture recorded in the infill of the postholes. This method has resulted in the recognition and dating of buildings types during Protohistory and in the Roman period in Flanders and the adjoining regions.

Keywords*: Charcoal, reliable dates, wooden structures, Neolithic - Mediaeval period.*

Resumé

De la Préhistoire à la fin du Moyen Âge, le bois a été le matériau de construction le plus important pour les bâtiments en Flandres. Excepté en des contextes humides, les poteaux en bois des structures ne sont plus conservés. De ce fait, ces bâtiments sont difficiles à dater. Le charbon de bois ou les graines carbonisées conservées dans ces trous de poteau sont une option de datation, bien que l'origine de ces matériaux ne soit pas toujours claire.

Pour résoudre ce problème de fiabilité, une stratégie consiste à dater plusieurs échantillons des trous de poteaux d'une même structure. Un ensemble de données ^{14}C contemporaines nous donnera un aperçu de l'âge de ces structures et les valeurs aberrantes pourront être éliminées. Pour vérifier les résultats de la datation au ^{14}C, une comparaison est faite avec les éléments de la culture matérielle provenant du remplissage des trous de poteau. Cette méthode a permis de reconnaître et de dater des types de bâtiments de la Protohistoire et de l'époque romaine en Flandres et dans les régions limitrophes.

Mots-clés : Charbon de bois, datations fiables, maisons en bois, Néolithique - époque médiéval.

1. Introduction

From Prehistory until the Late Middle Ages wood was the most important construction material for buildings in Belgium and the adjoining regions, with the exception for some areas were stone was available and has been used as a building material during the Roman period and the High and Late Middle Ages. Throughout this long period, timber buildings were mainly constructed with post-built frames: rows of posts planted in equal distances in the soil to support the weight of the roof and walls of the structures. Due to long-term preservation problems in the sandy and loess soils, the posts of these structures are not preserved. The only exceptions are waterlogged areas where wood is preserved in the wet anoxic conditions. Among the best-documented examples of preservation in wet contexts are the Swiss lake sites of the Neolithic period and the Late Bronze Age (Magny *et al*,. 2008; Arnold, 2012). In the Dutch river area in the center of the Netherlands ideal conditions are also present for the pres-

ervation of wooden structures (KNIPPENBERG, 2008; THERKORN, 2008). Another example for wood preservation in waterlogged areas are the so-called crannogs in Scotland (ARMIT, 2016: 32-35). Outside these waterlogged environments, the only remains of buildings that are ascertained in Flanders during excavation are the discolorations left in the soil where once the wooden posts have been erected.

2. OBJECTIVES

The dating of these structures was traditionally based on finds of material culture in postholes, which through typological dating helps to determine their age. In practice, we have to take into account that in many cases only a few sherds, the remnants of human occupation on the site, are detected during the research, although for some periods, as for example the Mid-Roman era, the chance of encountering ceramic finds in postholes is significantly higher.

Charcoal, charred grains or other datable material preserved in these postholes offer a valuable dating alternative, although the origin of these materials is often not clear in relation to the lifespan of these structures. They can have been deposited in the postholes in different ways and at different periods during the lifespan of the building. Furthermore, this can be complicated by intrusion of other datable material during the construction of the posthole and eventually the removal of posts and filling in of these pits. Thus, archaeologists are confronted by the question of the reliability of the charcoal to be dated in relation to the phase of use of the building,as well as other small materials. The reliability of the sample is an important matter in the dating of the excavated structures in academic studies but also in the framework of heritage management and developer-led archaeology in Flanders, but also in other regions. However, in many cases this charred organic matter is the only material available to provide an absolute date for the studied structures, albeit the results obtained can only be used as a *terminus postquem* (ANNAERT, 2006: 55-56; ARNOLDUSSEN, 2008: 174).

In this contribution, we want to prove the reliability of ^{14}C-dating postholes to determine the age of the excavated buildings taking into account the potential problems. Our aim is to collect the available ^{14}C-data and compare these with the archaeological chronological information and the expectations of the excavators to test the reliability of the results.

3. THE DATASET

Based on an intensive screening of academic papers and excavation reports 250 radiocarbon dates have been gathered, realized on 150 excavated houses or other buildings of various periods from the Neolithic until the Mediaeval period, excavated at 47 different sites in Flanders. The first ^{14}C-dates were taken in the 1990's. With the introduction of commercial archaeology in Flanders from 2005 onwards, the amount of available data has risen gradually. One important factor, the dating policy differs from site to site depending on the choices made by the excavators. This has impact on the number of obtained ^{14}C-dates and the discussion of reliability of the obtained results. In most cases, the dating program of each excavation was limited to one sample for each structure. For example at the site of Brecht/Ringlaan 38 buildings have been subjected to ^{14}C-dating, but only one date has been realized on each structure (BRACKE *et al.*, 2017). For other structures multiple samples were selected, mostly two samples but at some sites, as much as six dates were executed per house. For example, at Zele/Zuidelijke Omleiding and Aalter/Langevoorde a structure on each site has been dated six times (DE CLERCQ *et al.*, 2003; DE CLERCQ & MORTIER, 2001).

The majority of these dates has been processed by the radiocarbon laboratory at The Royal Institute for Cultural Heritage in Brussels. The sample preparation was done in the Brussels laboratory according to the standard AAA-treatment, since most of the samples are realized on charcoal samples (VAN STRYDONCK & VAN DER BORG, 1991; see infra). A few old dates were done in Brussels according the oscillation method (IRPA-series). The majority of the measurements has been performed in the AMS facilities of Utrecht (UtC-series; VAN DER BORG *et al.*, 1984, 1987) and Kiel (KIA-series; NADEAU *et al.*, 1998) and

more recently in Brussels with the MICADAS installation (RICH-series; BOUDIN *et al.*, 2015). A few other dates were realized in the laboratories of Poznan (Poz-series) Glasgow (SUERC-series) and Uppsala (Ua-series) and ICA Incorporation in Florida (ICA-series). The high output of the present AMS-dates by Brussels (RICH-series) represent the intensity of the commercial archaeology in Flanders (Fig. 1)

the postholes, they were less used for dating because they occur so little in the infill.

Evidently, the problems of residuality and intrusion are at stake. To tackle this problem of reliability, a first and basic strategy is to date several samples from the postholes of the same structure. A pattern of contemporaneous ^{14}C-data will result into a more reliable

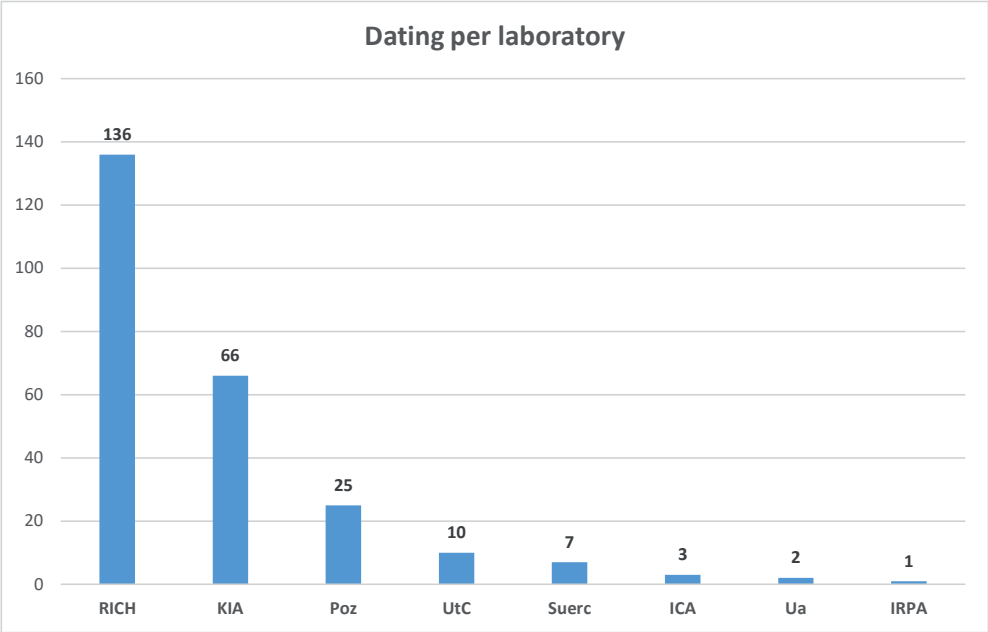


Fig. 1 - The total amount of radiocarbon dates by laboratory.
Except for one IRPA date all the other results have been measured by AMS.

4. ANALYSIS

4.1. Nature and contextual reliability of the samples

Preferably, short-lived samples are used for dating (ASHMORE, 1999). Due to preservation conditions, archaeologists have to work with the available sample material in the postholes. Charcoal is the material that is most frequently encountered in these features: 92 % of the results obtained, have been realized on this material. Other organic material categories were seeds, charred grain, soot, wood, food crust, charred acorn and two fragmented bones of which one was incinerated (Fig. 2). Due to their low occurrence of the last-mentioned organic material in insight in the age of these structures, and potential outliers can be eliminated. Three to four ^{14}C-dates per building seem to be recommended to obtain a reliable statistical population. To provide increased confidence in the results of the ^{14}C-dating, a comparison should be made with the fragments of material culture, mostly ceramics that were recorded in the infill of the postholes. If possible, the dated structure is also compared with previously studied, typologically related and well-dated buildings to establish a chronological framework. This complementary, comparative method has resulted in the identification and dating of buildings types from Protohistory until the Mediaeval period in Belgium and the adjoining regions (see further in this paper).

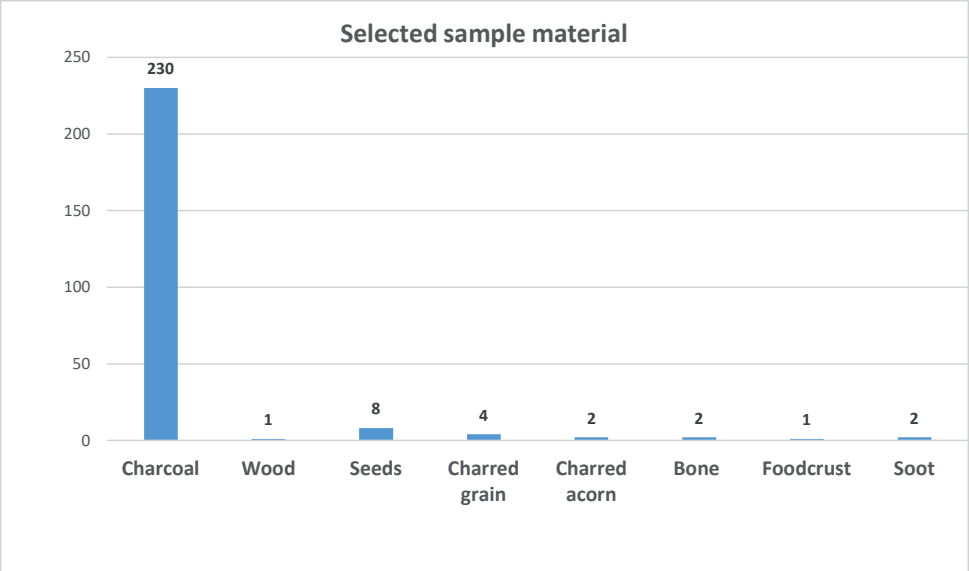


Fig. 2 - Overview of the different sample materials used to dating the wooden structures.

4.2. Chronological reliability

4.2.1. General results

The 250 dates cover a chronological range from the Neolithic period until the Middle Ages, but are unequally distributed over the periods involved (Fig. 3, Tab. 1). The differences in the number of available ^{14}C-results depend on different factors. The largest number of ^{14}C-dates has been realized on Iron Age sites. Most of these were obtained from a few sites such as Brecht/

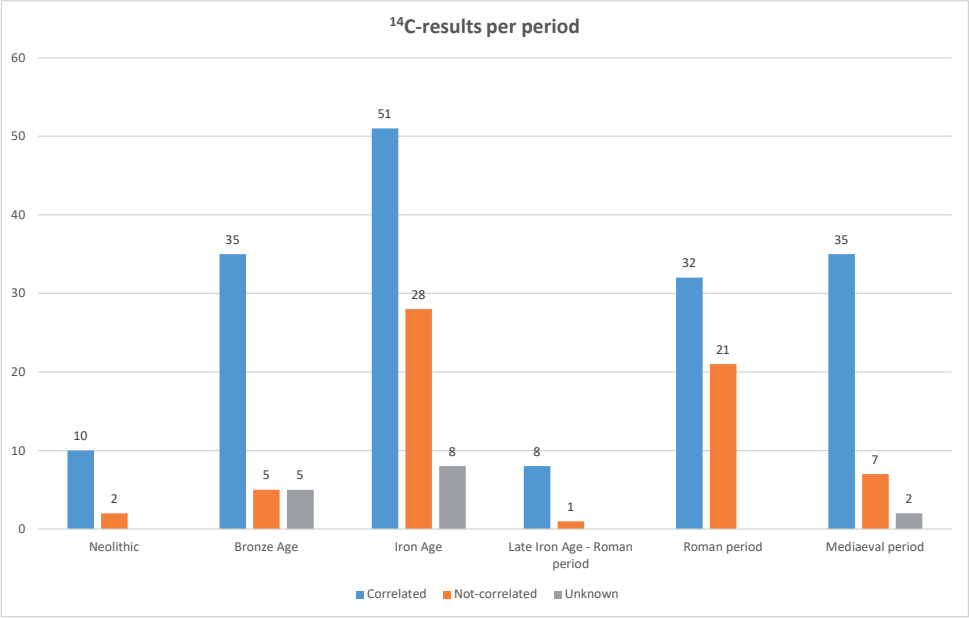


Fig. 3 - Total distribution of correlated, not-correlated and unknown radiocarbon results on dating wooden structures by chronological period. The correlated ^{14}C-dates are consistent evidence (as finds and house typology), the uncorrelated dates are not confirmed by finds and/or house typology. The category uncertain consists of dated structures with conflicting ^{14}C-dates without other archaeological information.

Period	*Correlated*	*Uncorrelated*	*Uncertain*	*Total*
Neolithic	10	2	-	12
Bronze Age	35	6	4	45
Iron Age	51	28	8	87
Late Iron Age-Early Roman	8	1	-	9
Roman period	32	21	-	53
Middle Ages	35	7	2	44
Total	*171*	*65*	*14*	*250*

Tab. 1 - Results of the ^{14}C-dates by period showing the numbers of dates per period. The correlated ^{14}C-dates are consistent evidence (as finds and house typology), the uncorrelated dates are not confirmed by finds and/or house typology. The category uncertain consists of dated structures with conflicting ^{14}C-dates without other archaeological information.

Ringlaan (BRACKE *et al.*, 2017) and Zele/Zuidelijke Omleiding (DE CLERCQ *et al.*, 2003) as well as in a series of excavations in the Campine region (DELARUELLE *et al.*, 2013). The other chronological periods, discussed in this paper, are about equally present in numbers of obtained ^{14}C-dates with exception from the Neolithic. This period is represented by only three sites (DEMEYERE *et al.*, 2006; HAZEN, 2018; VERBRUGGE *et al.*, 2019). Until recently, the low number of ^{14}C-dates on Bronze Age houses was simply due to the limited number of excavated house plans available for this period. Recent excavations delivered new information on Middle Bronze Age houses, although Late Bronze Age houses are still underrepresented in the available record. Another important factor is the choices made by the archaeologists themselves whether they decide to use ^{14}C-dating to obtain chronological information or not. For the Roman period for instance, they rely more on the more numerous numbers of easily datable material culture (coins, pottery, brooches) that are found in the postholes, rather than spending the scarce funding for post-excavation analysis on radiocarbon dates.

The combination of several radiocarbon dates realized on the post-holes of a single house, confronted with the material remains found in the same structure, delivered in 68 % of the cases a positive correlation, confirming the expected chronological framework for the buildings (Fig. 4). It demonstrates that obtaining several dates on one specific structure is a useful method to date decayed wooden houses. In 65 cases, (26 %) there was no match between the expected date by the archaeologists and the radiocarbon results. At 14 examples (6 %) build-

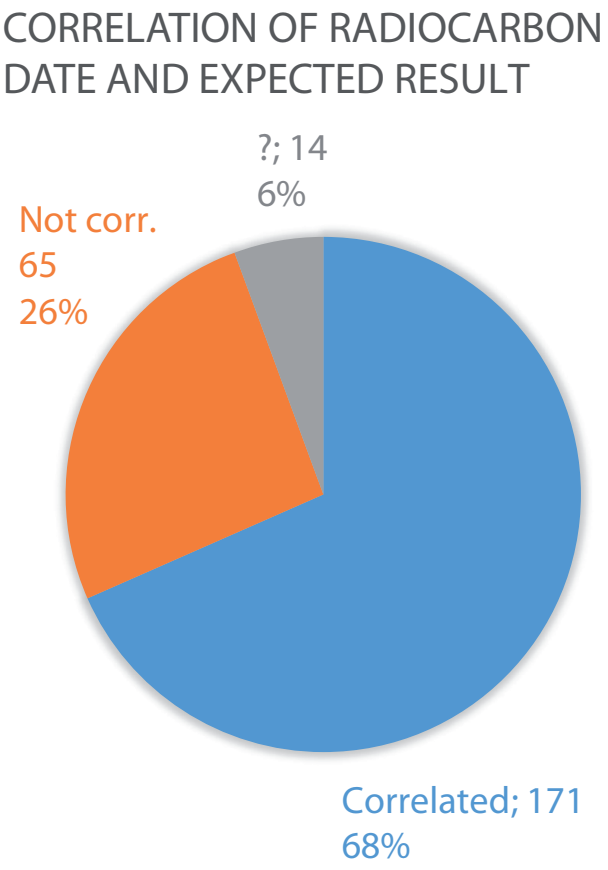


Fig. 4 - Percentage distribution of correlated, not-correlated and unknown radiocarbon results.

ings have been dated without a chronological frame of reference because these types were until now not recognized among known building traditions or the remnants of material culture in the postholes were difficult to date. Bronze and Iron Age pottery in particular is difficult to date precisely in a specific period, if no chronologically diagnostic rims or decorations are ascertained among the finds associated with the building.

Uncorrelated negative radiocarbon results that did not match with the archaeological assumptions were mostly obtained on a single radiocarbon dating from a posthole of the structure. The result of the radiocarbon date did not match the expected age of the structure based on material finds and/or house typology. At the site of Brecht/Ringlaan the option to date 38 buildings, using one date per structure was chosen. This resulted in 14 negative results (BRACKE *et al.*, 2017). With 36 % of uncorrelated dates, this is much higher than the general result for the documented sites in Flanders.

As table 2 shows the reliable results are obtained on multiple dating from different features. Some of the multiple dated structures can also show a certain degree of aberrant results but this can be explained as intrusive material, which does not correspond with the other ^{14}C-results and the chronological expectations.

Dating projects on different structures show further the complexity of the topic when all types of buildings are being dated and not only the living houses. For example, at the site of Eine/Heurnestraat two houses with a known architectural framework and a group of small one aisled structures without any other chronological marker (neither architecture or material) have been dated using different ^{14}C samples. The two dwellings were dated and fitted within the expected typo-chronological framework for these buildings. More difficult to interpret were the results on the group of small structures. One building seems to be according the ^{14}C-results Early Roman period (nr. 3). Another showed different Iron Age results (nr. 4). Finally two other structures could be Iron Age or mediaeval (nrs. 5-6; HAZEN, 2018; Fig. 5).

Since the majority of the ^{14}C-dates (92 %) has been realized on charcoal a comparison with the other used material categories to control which material could be preferable would not be statistically meaningfull. The four results on charred grain for the site of Gent/Zeilschipstraat (SWAELENS & BAEYENS, 2017) and Lier/Duwijck (CRYNS & LALOO, 2014) delivered an expected age. On the other hand, only two out of four samples of seeds correlated at the site of Kampenhout (HAZEN, 2013). At one of the Neolithic buildings at Eine the results on seeds was in correspondence with the charcoal, but there was a difference in age at the Iron Age building 4 (HAZEN, 2018). A difference between the two charcoal dates and charred seeds was also ascertained at Geel/Dornik (TICHELMAN *et al.*, 2019).

4.2.2. Neolithic period

Until now, four structures of the Neolithic period has been dated in the western part of

Number of ^{14}C-dates	*Number of dated sites*	*Correlated*	*Not-correlated*	*Unknown*	*Total number of ^{14}C-dates*
1	81	53	23	5	*81*
2	52	80	18	6	*104*
3	9	13	14	-	*27*
4.	4	10	3	3	*16*
5	2	*7*	3	-	*10*
6	2	8	4	-	*12*

Tab. 2 - Overview of the number of dates by site and the relation between correlated and non-correlated results.

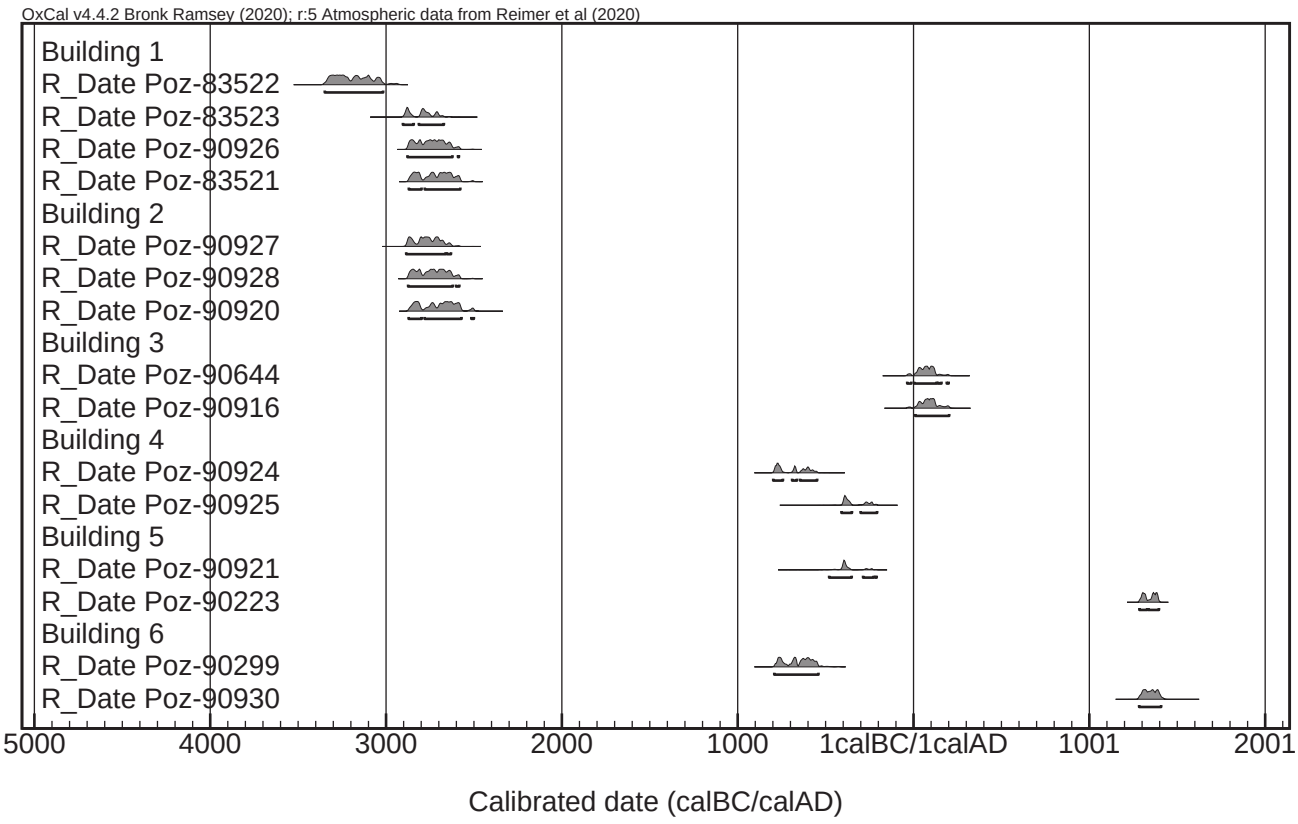
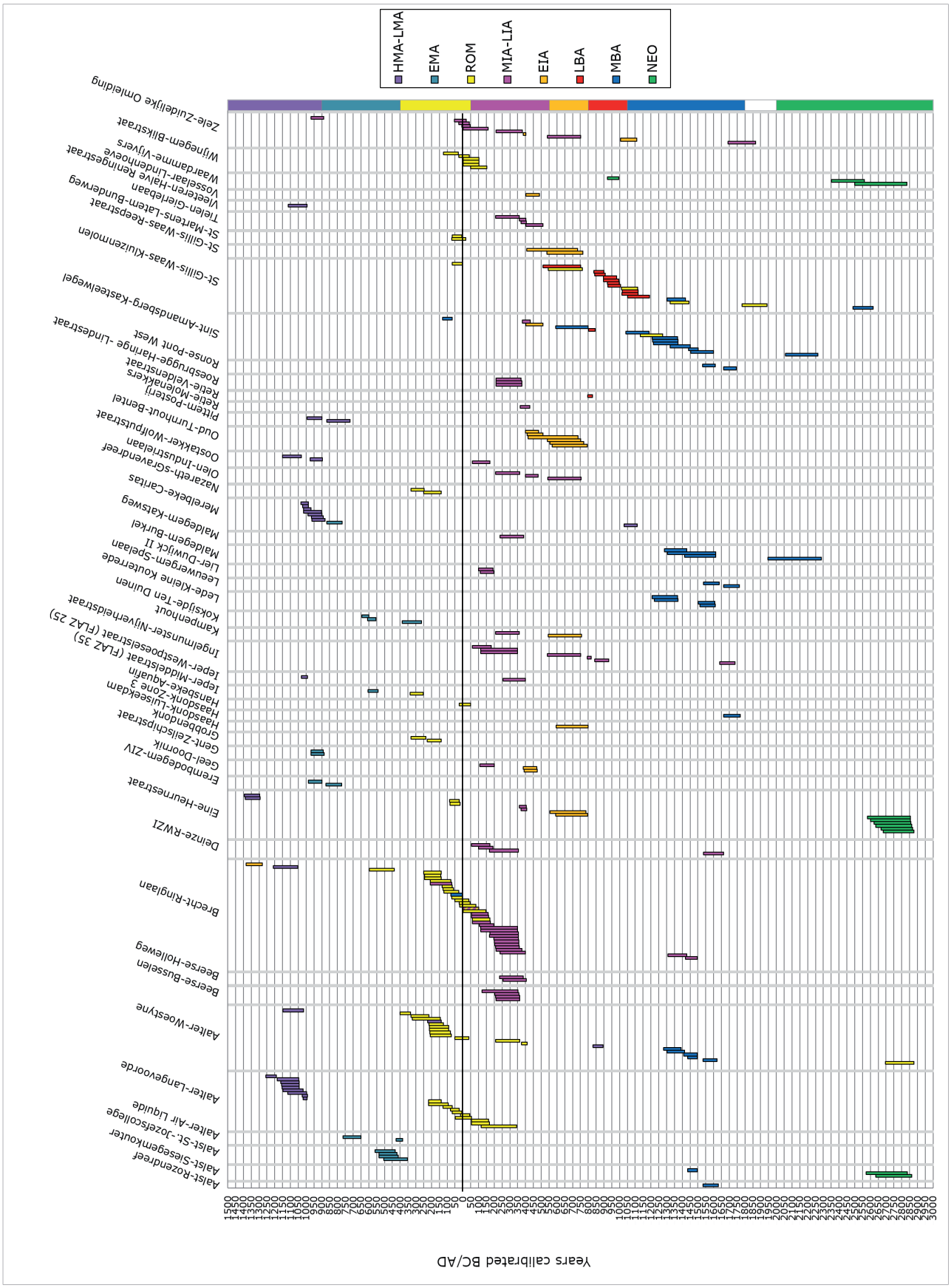


Fig. 5 - The radiocarbon dates of the different structures at Eine/Heurnestraat.

Flanders (Fig. 6). At the site of Waardamme, one date was younger, Late Bronze Age, than the expected Late Neolithic period. The material finds, flint and ceramics correspond with the assumed date (DEMEYERE *et al.*, 2006). Both buildings (1 and 2) at Eine fall within the same chronological period with only one date being a bit older (HAZEN 2018; see also Fig. 5). The badly preserved house at Aalst/Siesegemkouter is in agreement with the other dated structures (VERBRUGGE *et al.*, 2019). The architectural traditions of these dated houses are all belonging to the group Deûle-Escaut.

4.2.3. Bronze Age

Houses from the Early Bronze Age are still missing in the archaeological record, but the Middle Bronze Age (33 ^{14}C-dates) and Late Bronze Age (12 ^{14}C-dates) are well presented (DE MULDER, 2019). Six ^{14}C-dates could not be correlated with the dated structure and four unexpected results belonged to this period. The ^{14}C-dates also delivered unexpected new insights in the Bronze Age building traditions. Stable houses with a length of 15 m and more are typical for the Middle Bronze Age in northern Europe (BRADLEY *et al.*, 2016: 175-180). In the Late Bronze Age, there is an evolution to smaller types of buildings (FOKKENS, 2003: 28-29). ^{14}C-dates from two sites showed regional differences in Flanders. A series of ^{14}C-dates pointed to the continuity of this type until the Late Bronze Age at Sint-Gillis-Waas/Kluizenhofwijk (LAUWERS & VAN STRYDONCK, 2018; Fig. 7). Parallels for the continuity of long stable houses are also discovered in the northern Netherlands where the Elp house dates to the Middle and Late Bronze Age (VAN DER VELDE, 2014: 99-100). This is supported by a few ^{14}C-dates on this region (LANTING & VAN DER PLICHT, 2001/2002: 203). At the site of Sint-Amandsberg four identical structures were excavated. They were three-aisled with rounded short sides. Their dimensions varied between 9-14m in length and about 5-6m width. Although


HMA-LMA
EMA
ROM
MIA-LIA
EIA
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NEO
Aalst-Rozendreef
Aalst-Sleseggemkouter
Aalst-St.-Jozefscollege
Aalter-Air Liquide
Aalter-Langevoorde
Aalter-Woestyne
Beerse-Busselen
Beerse-Hollewegg
Brecht-Ringlaan
Deinze-RWZI
Eine-Heurnestraat
Erembodegem-ZIV
Geel-Doornik
Gent-Zellschipstraat
Grobbendonk
Haasdonk-Luiseekdam
Haasdonk-Zone 3
Hansbeke-Aquafin
Ieper-Middelstraat (FLAZ 25)
Ieper-Westposeselstraat (FLAZ 35)
Ingelmunster-Nijverheidstraat
Kampenhout
Koksijde-Ten Duinen
Lede-Kleine Kouterrede
Leeuwergem-Speelaan
Ler-Duwijck II
Maldegem-Burkel
Maldegem-Katsweg
Mereibeke-Cartias
Nazareth-Sgravendreef
Oien-Industrielaan
Oostakker-Wolfputstraat
Oud-Turnhout-Bentel
Pitem-Posterij
Retie-Molenakkers
Retie-Veldenstraat
Roesbrugge-Haringe -Lindestraat
Ronse-Pont West
Sint-Amandsberg-Kasteelwegel
St-Gillis-Waas-Kluizenmolen
St-Gillis-Waas-Reepstraat
St-Martens-Latem-Bunderweg
Tielen-Gierlebaan
Vleteren-Halve Reningestraat
Vosselaar-Lindenhoeve
Waardamme-Vijvers
Wijnegem-Blikstraat
Zele-Zuidelijke Omleiding
-1500 -1450 -1400 -1350 -1300 -1250 -1200 -1150 -1100 -1050 -1000 -950 -900 -850 -800 -750 -700 -650 -600 -550 -500 -450 -400 -350 -300 -250 -200 -150 -100 -50 0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000 2050 2100 2150 2200 2250 2300 2350 2400 2450 2500 2550 2600 2650 2700 2750 2800 2850 2900 2950 3000
Years calibrated BC/AD

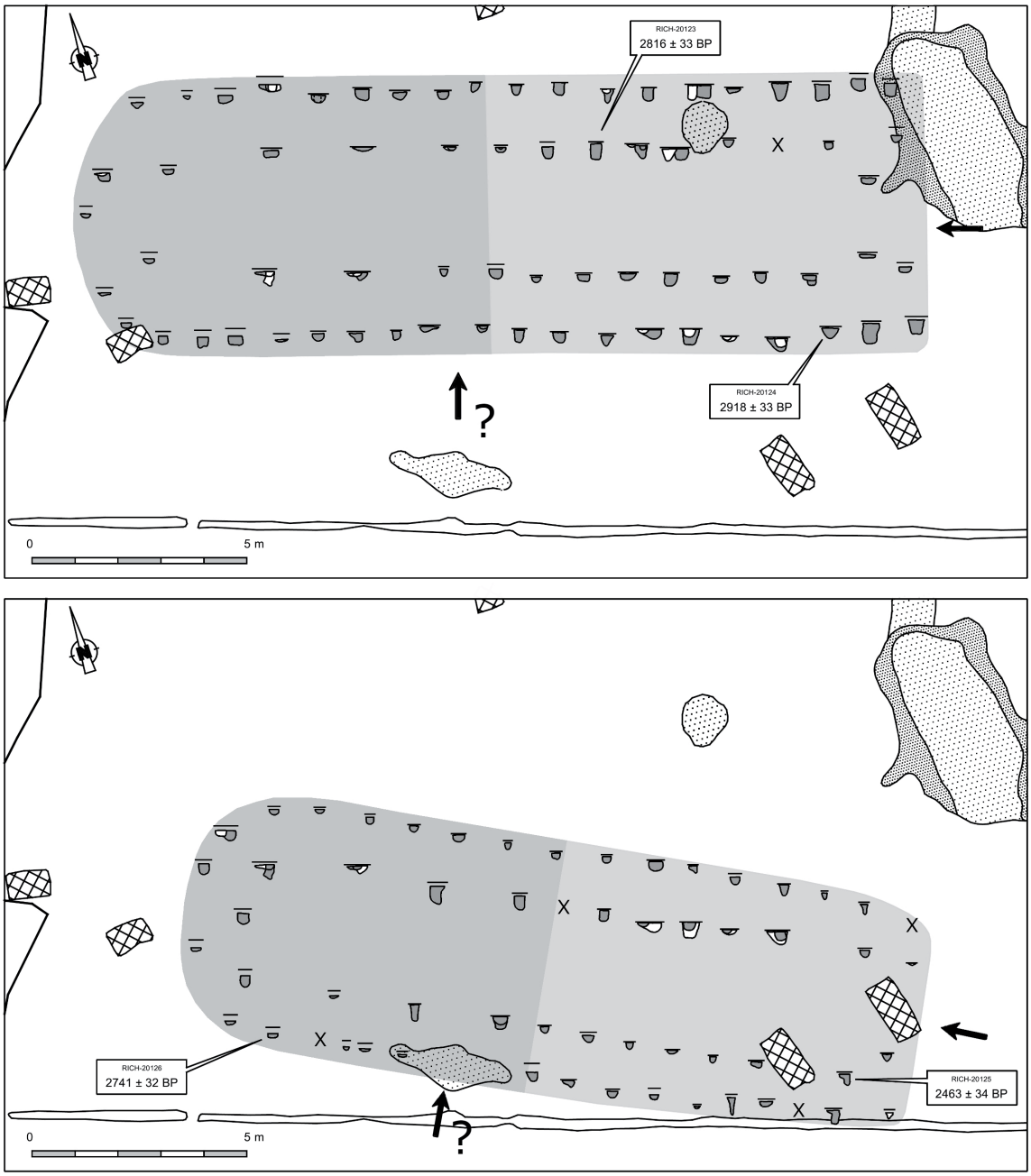

Fig. 7 - Example of two long stable houses from Sint-Gillis-Waas/Kluizenmolen (LAUWERS & VAN STRYDONCK, 2018).

Fig. 6 - (opposite) 1σ calibrated ^{14}C dates for wooden buildings from the Neolithic to the Late Middle Ages located in Flanders (Belgium). Each colored bar represents one date; the colors indicate the chronological phases as reported in the references. The conventional chronological framework is shown on the right. The abbreviations correspond to: Neolithic (NEO), Middle Bronze Age (MBA), Late Bronze Age (LBA), Early Iron Age (EIA), Middle-Late Iron Age (MIA-LIA), Roman period (ROM), Early Middle Ages (EMA) and High-Late Middle Ages (HMA-LMA).

some ^{14}C-dates did not correspond, there was a clear indication that these structures were dated to the Middle Bronze Age (VANHOLME *et al.*, 2016; Fig. 8).

4.2.4. Iron Age

The Iron Age sites have a high number of uncorrelated ^{14}C-dates (see Fig. 6). This can be explained by the choice of the excavators to date the buildings on the basis of a single ^{14}C-date. We also note that there is a high number of uncorrelated ^{14}C-dates for some Late Iron Age sites with 20 positive results versus 15 uncorrelated ^{14}C-dates. At the site of Ingelmunster/ Nijverheidstraat several ^{14}C-dates on structures dated to the Late Iron Age on the basis of the pottery fragments were contaminated according the excavator by the presence of older material on the site resulting in an older age for the dated postholes (BRUYNINCKX, 2017). The quality of preservation and the identifiability of the

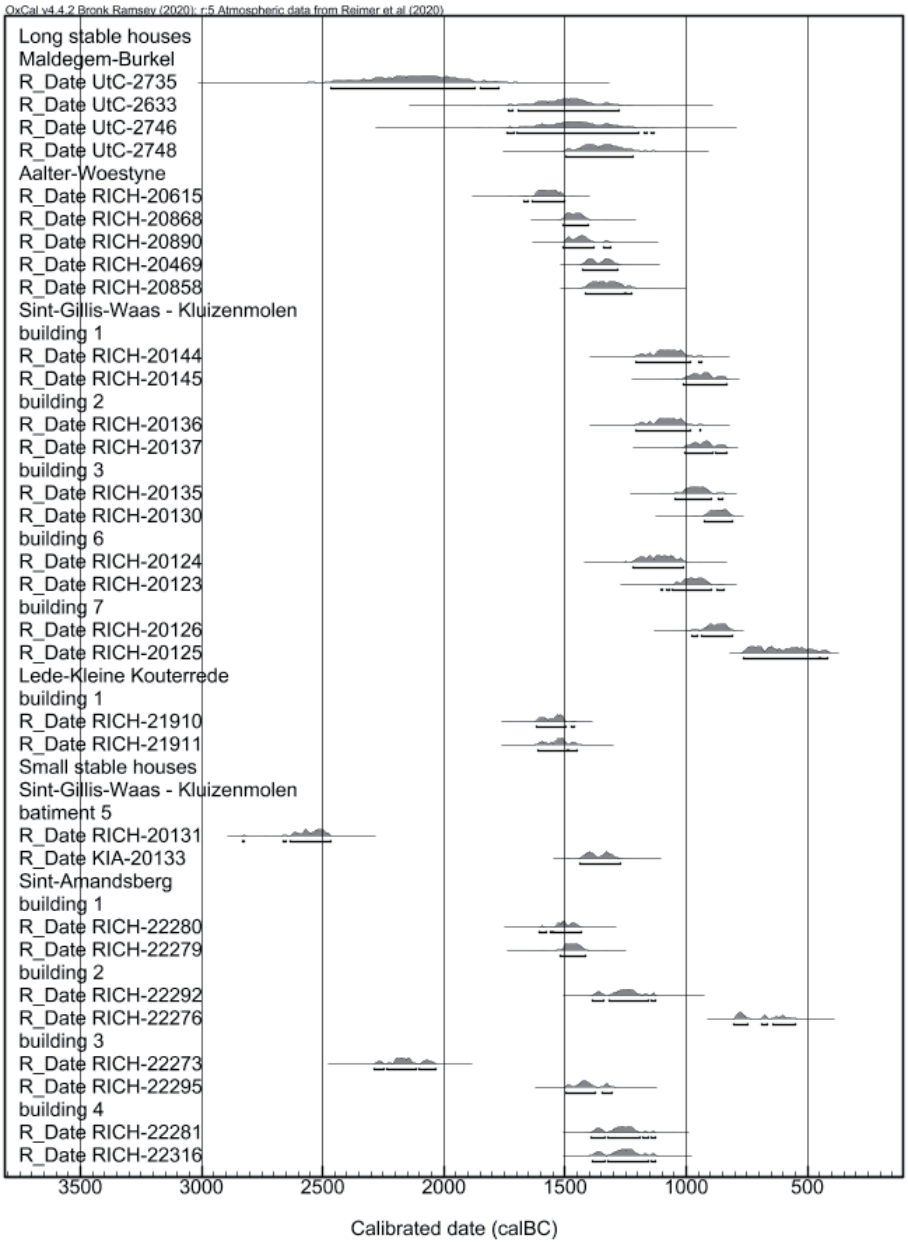

Fig. 8 - ^{14}C-results from the Bronze Age buildings in Flanders (Belgium). The ^{14}C-dates show that the traditional perception from long to small stable house is more complicated, next to the problem of outliers.

pottery fragments in the archaeological features plays also a role in the attribution to this period. Therefore, six ^{14}C dates suggested an Iron Age date for structures that could not be precisely dated on ceramic typochronology and typology of the buildings.

Chronological accuracy for the Early Iron Age is hampered by the so-called Hallstatt plateau in the calibration curve (2500-2400 BP). This covers the period of the Early Iron Age and a part of the Middle Iron Age/beginning of the Late Iron Age. This seems to be the main reason that less Early Iron Age ^{14}C-dates are available compared with the Middle/Late Iron Age since archaeologists expecting a 2500-2400 BP date based on the finds or typology of the house itself, are not taking the risk to invest in a ^{14}C date that will only result in a very broad dating range. The calibrated ^{14}C-result will span a larger chronological range in calendar years than the assumed archaeological dating of the structure. The few results are confirming the chronological attribution of a typical three-aisled building with foundation ditch to the Early Iron Age, which was first discovered at Sint-Gillis-Waas / Reepstraat (BOURGEOIS & VAN STRYDONCK, 1995) and is confirmed by information from Zele/ Zuidelijke Omleiding (DE CLERCQ *et al.*, 2003; Fig. 9) and Haasdonk/Luiseekdam (DYSELINCK & HERTOGHS, 2017). The identical building at Sint-Amandsberg suggests, despite the Hallstatt plateau, an age around 500 cal BC (VANHOLME *et al.*, 2016).

The Middle Iron Age-Late Iron Age period (ca. 2200-2100BP) is also well documented with a series of correlated ^{14}C-dates on the so-called house type Haps and its variants (DELARUELLE *et al.*, 2013; SCHELTJENS *et al.*, 2015).

4.2.5. Roman Period

Compared to other periods, material culture from the Roman period has the advantage of its abundance and its sharp dating potential, especially for the Middle-Roman period. Coins, imported pottery and metal finds found in the principal roof-bearing postholes of the structure, in most cases provide a *terminus post/ante quem* for the construction date (or the destruction) of the house. While Roman-period pottery can be dated with a precision of 25 years for certain categories (e.g. Samian ware), coins can provide in an even more precise date. From this one can understand why relatively few ^{14}C-dates (60) have been realized on Roman houses which generally occur in large numbers during excavations (DE CLERCQ, 2011). Moreover, only 40 dates (64 %) fall within the expected dating range; 22 (36 %) do not. When taking the expected ages into account, it appears that the majority of the samples from the first group originates from structures expected to date to the earlier (ca. 2000 BP: 20 dates) or the later (ca. 1800 BP: 24 dates) phases of Roman occupation. Only 12 dates were obtained from houses thought to be Middle-Roman (ca. 1900 BP). Six results were obtained on houses which based on the archaeo-

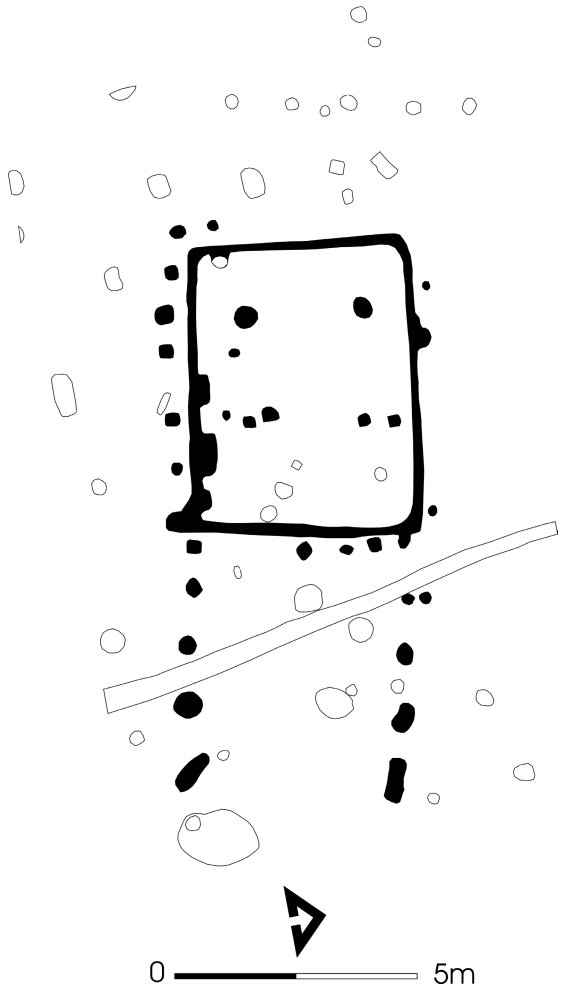

Fig. 9 - The Early Iron Age building at Zele/Zuidelijke Omleiding (DE CLERCQ *et al.* 2003).

logical information seemed difficult to date. This observation confirms the bias of selection highlighted earlier. In these early and later phases of Roman occupation, imported and easily datable material culture is much less frequently encountered in comparison with contexts dating to the Middle-Roman period. So it seems that archaeologists working on the Roman period preferably apply radiocarbon dating when no or only few datable material culture is encountered, notwithstanding the dating potential e.g. for the 2000 BP moment. A rare exception can be found at the Roman site of Aalter/Langevoorde where the sharp dating potential of the radiocarbon method for the Early Roman period (2000 BP) was tested to the sharp dating potential of some rare imported, well datable pottery finds, showing a similar dating potential (DE CLERCQ & VANSTRYDONCK, 2007).

Finally, within the group of the 20 non-correlated dates, an equal distribution of expected dates among the three phases of the Roman period appears. In several of these cases, the results are deviating from the expected age because of the intrusive or residual nature of the material dated; most dates are even older or younger than the Roman period.

4.2.6. Mediaeval period

For the Middle Ages a quite similar policy of selection of samples for ^{14}C appears as applied for houses of the Roman period. Only 44 dates have been realized; seven of these do not correlate with the expected age at all. Two dates were done on one-aisled structures that were considered as Iron Age. In both cases a ^{14}C result in the Iron Age and the Mediaeval period was obtained. In these particular cases, there is no evidence demonstrating the result of the ^{14}C-dating corresponding with the historical age since the residual or intrusive nature of the material dated can easily be demonstrated. As for the remaining 35 correlated dates, 13 date to the Early (5th - 9th centuries AD) – Middle (10th - 12th centuries AD) Ages, and 22 to the High Middle Ages (13th - 15th centuries AD). As Early Mediaeval houses occur in lower frequencies than their younger counterparts

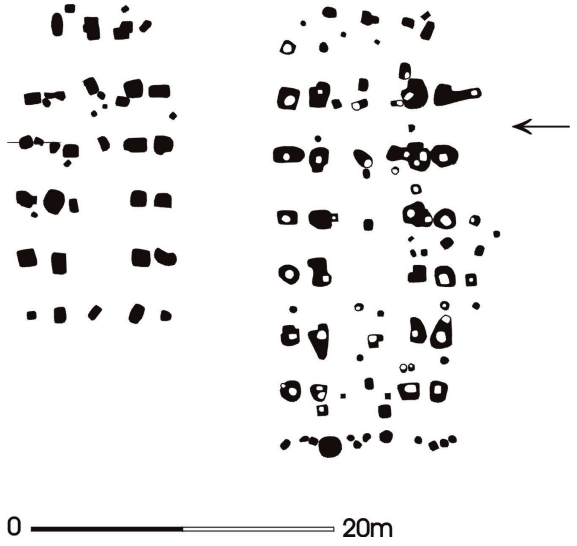

Fig. 10 - Two mediaeval buildings at Aalter (DE CLERCQ, 2001).

(DE CLERCQ, 2018), it seems logical to have few ^{14}C-dates pointing to these earlier phases of the Middle Ages. For the High Mediaeval period, it seems archaeologists prefer to use the rather large dating potential of ceramics found in the post-holes to date the excavated structures. Since generally few finds of precisely datable material culture occur on these High Mediaeval sites, a rather broad dating (1000-1200 AD) is indicated in the excavation reports, without or with only few attempts to explore the dating potential of the house by applying other dating methods such as ^{14}C-dating. This is a pity indeed, as for the period around 1000 BP, precise dates can be obtained, as demonstrated on the site of Aalter/Langevoorde where several ^{14}C-dates have been realized on two buildings (Fig. 10), which belong to the same building tradition (Fig. 11). For the first house (nr 8), one date (IRPA-1319) has been realized on wood from the lowest parts of a roof-supporting beam that was preserved in the deepest layers of the post-holes. The other dates were realized on charcoal from the higher parts and infills of the post-holes. The results are similar and suggest a neat dating ca. 1000 AD. The calibrated dates of the second house (nr 9) span a wider period because of the plateau in the calibration curve. There is also one date younger than the other results. Based on the pottery

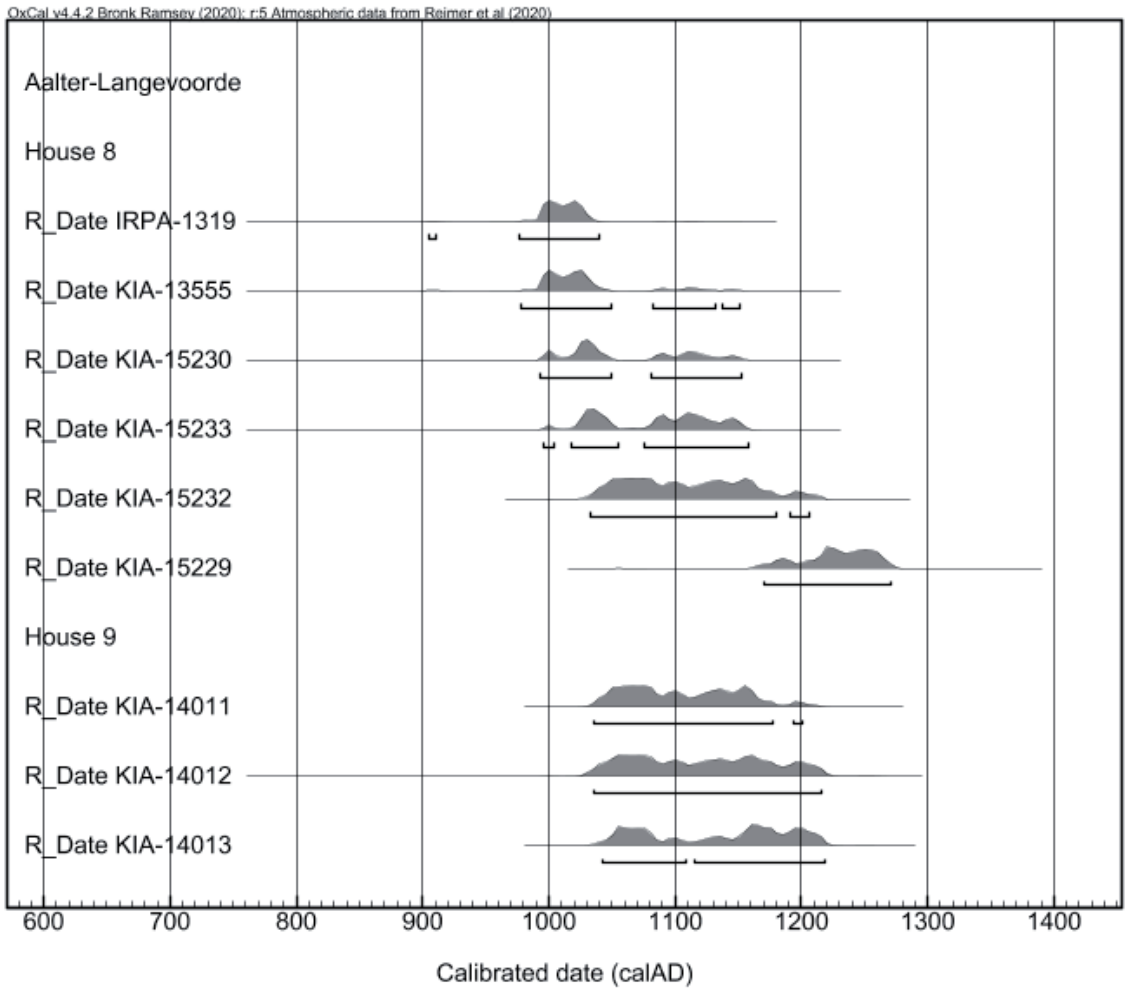

Fig. 11 - ^{14}C-date series on two High Mediaeval houses excavated in Aalter (Belgium).

finds in the postholes, both houses can only be broadly situated in the High Mediaeval period (10th – 12th centuries AD), but it appears that nr 9 succeeds nr 8 when the ^{14}C-method is applied, hinting at the under-explored potential of dating by radiocarbon for the High Mediaeval period and for refining its chronology in particular.

5. CONCLUSIONS

At first sight, ^{14}C-dating of decayed wooden buildings is problematic if there is no wood preserved from the construction as is the case in waterlogged areas. The origin of the charcoal, which is the most used dating material present in the postholes, is not always clear and can belong to older material or intrusive younger fragments. However, an analysis from more than 250 ^{14}C-dates realized on the post-holes of timber-framed houses in Flanders shows that in 71 % of the studied cases, the results were reliable and corresponded with the archaeological expectations based on other material remains and building typology. Furthermore, we suggest that to obtain a reliable dating frame for post-built houses several ^{14}C-dates must be realized on each structure for eliminating potential contamination of the results by older or younger material in the sampled features. Based on the results for Flanders and taking into account the financing problems in commercial archaeology three ^{14}C-dates per structure are preferable.

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Authors addresses:

Guy DE MULDER
Ewoud DESCHEPPER
Gerben VERBRUGGE
Wim De CLERCQ
Department of Archaeology
Ghent University
35, Sint-Pietersnieuwstraat
9000 Ghent, Belgium
guy.demulder@ugent.be

Mathieu BOUDIN
Mark VAN STRYDONCK
Radiocarbon Laboratory
Royal Institute for Cultural Heritage
1, Jubelpark
1000 Brussels, Belgium
Mathieu.Boudin@kikirpa.be

Giacomo CAPUZZO
Laboratory of Anthropology and Human Genetics
Faculty of Science
Université Libre de Bruxelles,CP 192
50, avenue F.D. Roosevelt 50
1050 Brussels, Belgium
Giacomo.capuzzo@ulb.ac.be