

RECONSIDERING THE DATE OF RIFFA TYPE BURIAL MOUNDS IN THE EARLY DILMUN PERIOD: NEW RADIOCARBON DATA FROM WADI AL-SAIL, BAHRAIN

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Abstract

The aim of this paper is to reconsider the date of Riffa type burial mounds of the Early Dilmun period by introducing new radiocarbon data from Wadi al-Sail in Bahrain.

Wadi al-Sail is a *wadi* on the inland plateau of Bahrain. Hundreds of Riffa type burial mounds are scattered along the *wadi*. The authors have been excavating Wadi al-Sail since 2015.

Previous studies suggest that construction of Riffa type burial mounds began around 2200 or 2250 BCE. In our excavations, nine twig charcoal samples were collected and radiocarbon dated. The new data suggest that the beginning of construction of Riffa type burial mounds at Wadi al-Sail could date back to around 2300 BCE or much earlier. The new data are very important not only for dating burial mounds in Bahrain but also for the study of Dilmun's history.

1. Introduction

The fourth millennium BCE saw the rise of urban societies in southern Iraq (southern Mesopotamia). However, being a vast alluvial plain created by the Tigris and Euphrates, southern Mesopotamia lacked important resources necessary for sustaining urban life, such as metals, woods, precious stones, and so on. This made it important to acquire these resources from neighboring regions [e. g. Algaze 1993, 2008].

This is where Dilmun merchants played an important role. They dominated the maritime trade, linking Mesopotamia, Oman and Indus from 2000 to 1700 BCE. They transported a variety of goods, including copper from Oman, gold, ivories, carnelian and woods from Indus, lapis lazuli from Afghanistan, and pearls, tortoise shells, and corals from Dilmun to Mesopotamia. The island of modern Bahrain is identified with Dilmun (Figure 1) [Crawford 1998; Laursen and Steinkeller 2017; Magee 2014; Potts 2009; Rice 1983].

Innumerable burial mounds in Bahrain reflect the flourish of Dilmun (Figure 5). Bahrain has the largest and densest burial mound fields in the world. While there are several hypotheses regarding the total number of burial mounds, recent studies by S. T. Laursen show that approximately 75,000 burial mounds were constructed in Bahrain in the Early Dilmun period (2250 BCE~1700 BCE) [Laursen 2017; Laursen and Steinkeller 2017].

Early Dilmun burial mounds can be divided into two types: Riffa type and Barbar type [Lowe 1986]. Unlike Barbar type burial mounds, very little information is available on Riffa type burial mounds. As for the radiocarbon dating, only one radiocarbon dating was undertaken on Riffa type burial mounds as discussed below. This paper introduces new radiocarbon data from Wadi al-Sail in Bahrain and reconsiders the date of Riffa type burial mounds.

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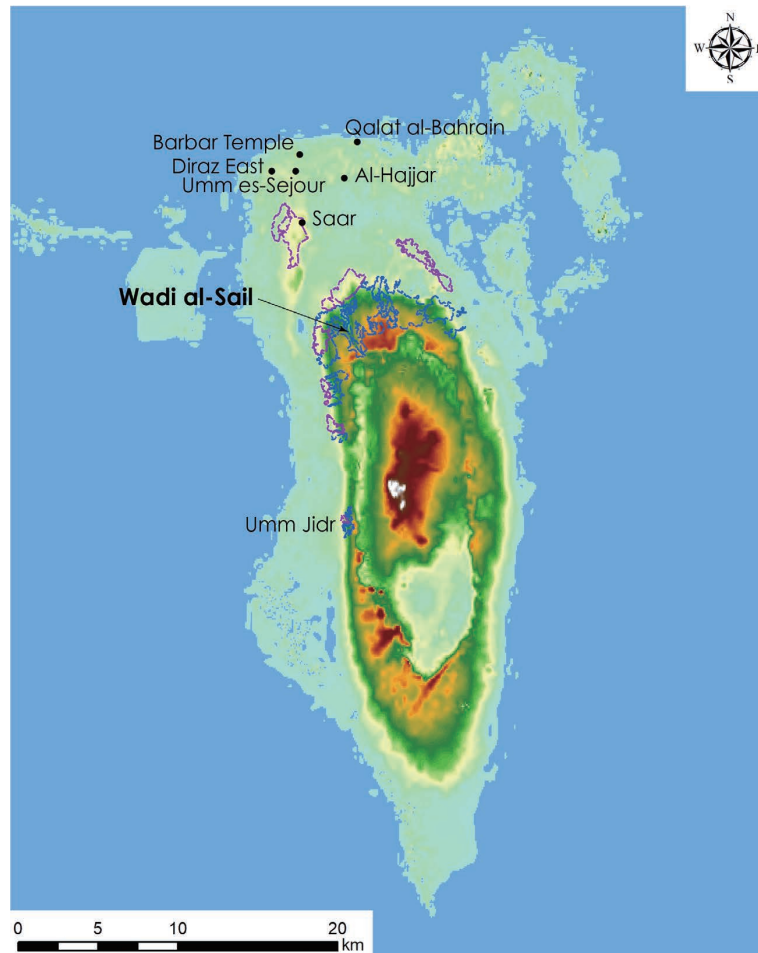


Fig. 1 Dilmun-related sites in Bahrain (Pink lines show the distribution of Barbar type burial mounds and blue lines show the distribution of Riffa type burial mounds)

2. Riffa type and Barbar type burial mounds

In the 1940s, P. B. Cornwall already pointed out that Early Dilmun burial mounds can be divided into two types: cairns and earthen mounds [Cornwall 1943]. In 1986, A. Lowe named the former, “Riffa type” and the latter, “Barbar type” [Lowe 1986]. In the same year, B. Frohlich named the former, “the Early type” and the latter, “the Late type” because he thought the cairns were older than the earthen mounds [Frohlich 1986].

This paper uses Lowe’s terms instead of Frohlich’s because the publication by Lowe is earlier. The differences between Riffa and Barbar type burial mounds are as follows.

Riffa type burial mounds are cairns built of stones (Figure 2). First, a rectangular or oval stone chamber and an outer wall were constructed. Then the space between them was filled with cobbles. These mounds are usually low. Even the biggest one is less than a metre tall. Their diameter is from five to seven metres on an average. The stone chamber has no cap stones [Cornwall 1943; Larsen 1983; Lowe 1986; Frohlich 1986; Højlund 2007; Laursen 2017; Laursen and Steinkeller 2017].

In contrast, Barbar type burial mounds are earthen mounds rather than cairns (Figure 3). After constructing a stone chamber and outer wall, an earthen mound was created. These mounds are much taller than Riffa type burial mounds: from two to three metres on an average. However, their average diameter is from five to eight metres, not hugely different from Riffa type burial mounds.



Fig. 2 Riffa type burial mound (WS06, Wadi al-Sail)



Fig. 3 Barbar type burial mound (Janabiyah)



Fig. 4 Riffa type burial mounds showing low density (Wadi al-Sail)



Fig. 5 Barbar type burial mounds showing high density (Karzakan)

The stone chamber is usually covered with cap stones [Cornwall 1943, Larsen 1983, Lowe 1986, Frohlich 1986, Højlund 2007; Laursen 2017; Laursen and Steinkeller 2017].

Riffa and Barbar type burial mounds are also different in density and location. The former are thinly scattered while the latter have a high density (Figures 4 and 5). The former are located on the inland plateau in Bahrain while the latter on the edge of the inland plateau (Figure 1). Their dates are also different. The previous studies revealed that Riffa type burial mounds are older than Barbar type burial mounds and correspond to City I period of Qal'at al Bahrain, while Barbar type burial mounds correspond to City II period [Cornwall 1943, Larsen 1983, Lowe 1986, Frohlich 1986, Højlund 2007; Laursen 2017; Laursen and Steinkeller 2017].

Recently Laursen counted the number of burial mounds in Bahrain using aerial photos taken in the 1950s by the British air force. According to him, there were 28,045 Riffa type burial mounds and 47,824 Barbar type burial mounds in Bahrain in the 1950s [Laursen 2017; Laursen and Steinkeller 2017].

3. Previous dating of Riffa type burial mounds

The dating of burial mounds in Bahrain was mainly undertaken by two Danish archaeologists, F. Højlund and Laursen. They dated Riffa type burial mounds based on Mesopotamian and Umm an-Nar pottery excavated from these burial mounds and a radiocarbon date from a burial mound at Wadi al-Sail [Højlund 2007; Højlund *et al.* 2008; Laursen 2008, 2009, 2011, 2017; Laursen and

Steinkeller 2017].

Mesopotamian jars with distinctive shapes were excavated from Riffa type burial mounds (Figure 6). It is argued that they originally contained perfumed oil. Similar jars were excavated from several Mesopotamian sites, such as Nippur, Kish, Uruk, Ur, Eshununna, Girsu and so on. In Mesopotamia, the jars are usually excavated from late Akkadian and Ur III layers and are dated back to the period between 2200 and 2000 BCE [Laursen 2011].

Moreover Riffa type burial mounds also yield Umm an-Nar jars imported from Oman (Figure 6). The jars excavated from Riffa type burial mounds are mostly late Umm an-Nar pottery, dating back to the period between 2200 and 2000 BCE [Laursen 2009].

Based on these Mesopotamian and Umm an-Nar jars, Højlund and Laursen initially dated Riffa type burial mounds between 2200 and 2050 BCE¹⁾. They dated the end of construction of Riffa type burial mounds to around 2050 BCE, rather than 2000 BCE. This is because these mounds never yielded Gulf type stamp seals. Such seals appeared around 2050 BCE in the Gulf [Højlund 2007; Højlund *et al.* 2008; Laursen 2008, 2009, 2011, 2017; Laursen and Steinkeller 2017].

They initially dated the beginning of construction of Riffa type burial mounds to around 2200 BCE. However, after 2009, they changed this to around 2250 BCE (Table 1). The reasons are not clearly mentioned in their papers, but this is probably because of a radiocarbon date from Wadi al-Sail. In 2007, they excavated two burial mounds at Wadi al-Sail and a charcoal sample from one of the mounds (BBM20907) was dated to 2234–2110 cal BC (2σ : 62.0%). This date signifies the

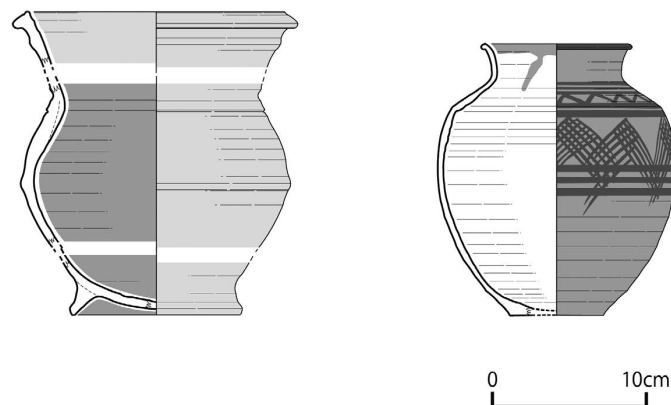


Fig. 6 Mesopotamian and Umm an-Nar jars excavated from Riffa type burial mounds (Left: Mesopotamian jar, Right: Umm an-Nar jar)

Table 1 Dating of Riffa and Barbar type burial mounds by Højlund and Laursen (Blue shows the date of Riffa type burial mounds, while green shows the date of Barbar type burial mounds)

	2200BCE	2100BCE	2000BCE	1900BCE	1800BCE	1700BCE
Højlund 2007						
Højlund et al. 2008						
Laursen 2008						
Laursen 2009, 2011						
Laursen 2017						

1) They date Barbar type burial mounds to the period between 2050 and 1700 BCE (Table 1).

possibility of the burial mound dating back to 2250 BCE (Table 1). Probably owing to this, they currently date Riffa type burial mounds to the period between 2250 to 2050 BCE [Højlund 2007; Højlund *et al.* 2008; Laursen 2008, 2009, 2011, 2017; Laursen and Steinkeller 2017].

4. New radiocarbon data from Wadi as Sail

Since 2015, the authors have been excavating the burial mound field of Wadi al-Sail [Gotoh *et al.* 2020], which is a four kilometre long *wadi* running from southeast to northwest on the inland plateau of Bahrain. Along three kilometres upper stream of the *wadi*, hundreds of Riffa type burial mounds are scattered on both slopes of the wadi (Figures 1 and 7). Although Riffa type burial mounds were originally scattered extensively on the inland plateau around Riffa in Bahrain, most of them were lost due to urban developments. Currently, Riffa type burial mounds remain only around Wadi al-Sail.

Through our excavations, we noticed some problems in the previous dating of Riffa type burial mounds. Though they were dated mainly based on the Mesopotamian and Umm an-Nar jars excavated from the mounds, they rarely yield these jars. Some of the burial mounds do not contain any artefacts at all. Our excavations also imply the possibility that burial goods were not placed in older burial mounds; Mesopotamian and Umm an-Nar jars were placed only in newer burial mounds at Wadi al-Sail. Therefore if Riffa type burial mounds are dated only based on the pottery, the beginning of construction of Riffa type burial mounds might have been misdated.

In the 1980s, over 1000 Riffa type burial mounds in Bahrain were excavated by Bahraini teams due to large-scale urban developments [Laursen 2017; Laursen and Steinkeller 2017]. Despite

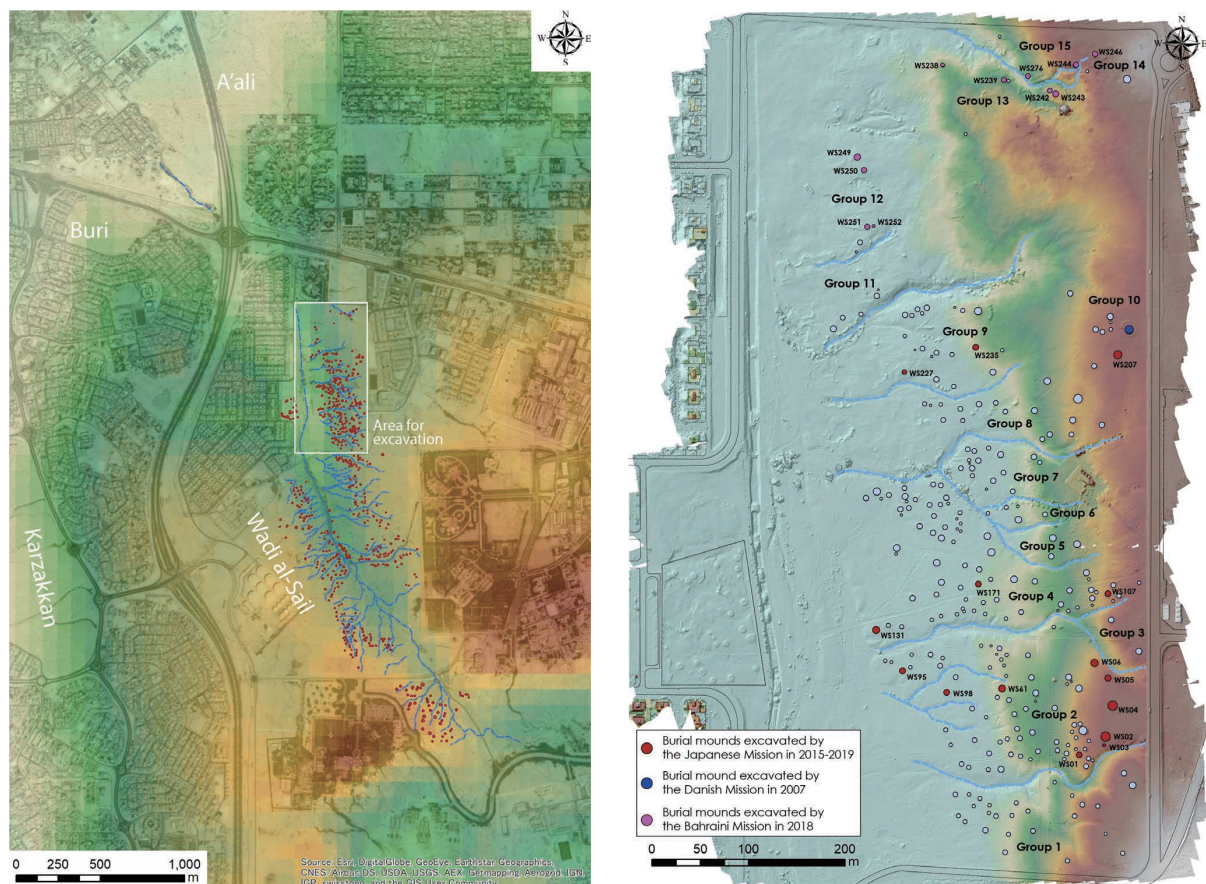


Fig. 7 The burial mound field of Wadi al-Sail

excavating such a large number of mounds, only one radiocarbon dating was undertaken on Riffa type burial mounds as aforementioned [Højlund *et al.* 2008].

However, this does not mean that Riffa type burial mounds rarely yield charcoals. Our excavations show that most of these yield small amounts of twig charcoals. At Wadi al-Sail, sheep/goat's bones are usually discovered with human bones inside the chamber (Figures 8 and 9) and are usually sooted. This strongly suggests grilled sheep/goat's meat was placed in the chamber. During the burial ceremony, sheep/goats were probably grilled and placed in the burial mound. Twig charcoals are usually scattered around the sheep/goat's bones. The twig charcoals discovered in the chamber were probably used as fuel to grill the meat, were attached to it, and accidentally placed into the chamber along with it (Figure 10). Although the human bones are badly preserved at Wadi al-Sail, probably unsuitable for radiocarbon dating, the twig charcoals serve as good material to date the burial mounds.

Since the burial mound field of Wadi al-Sail is vast and three kilometres long, our research focuses on its northeastern part (Figure 7). In this research area, a total of 15 burial mounds were excavated from 2015 to 2019. From nine burial mounds, nine twig charcoal samples were collected and radiocarbon dated (Table 2).

However, as for the charcoal sample from WS131 burial mound, its value of $\delta^{13}\text{C}$ was heavier than the other samples (Table 2). This is probably due to isotope fractionation during the sample preparation. The radiocarbon date from WS131 is probably erroneous and this paper does not use this date.



Fig. 8 Human and animal bones excavated from a Riffa type burial mound (WS207, Wadi al Sail)



Fig. 9 Sheep/goat bones excavated from a Riffa type burial mound (WS207, Wadi al-Sail)



Fig. 10 Twig charcoals excavated from a Riffa type burial mound (WS01, Wadi al-Sail)

Table 2 Results of radiocarbon dating

Sample	$\delta^{13}\text{C}$ (‰)	Conventional Radiocarbon Age (not rounded) (yrBP $\pm 1\sigma$)	Conventional Radiocarbon Age (Rounded) (yrBP $\pm 1\sigma$)	Calibrated Dates	
				1 σ	2 σ
PLD-38125 WS131	-18.13 \pm 0.22	3326 \pm 22	3325 \pm 20	1642–1607 cal BC (41.5%) 1583–1558 cal BC (22.2%) 1553–1546 cal BC (4.6%)	1682–1676 cal BC (1.1%) 1666–1530 cal BC (94.3%)
PLD-37611 WS107	-23.29 \pm 0.22	3602 \pm 19	3600 \pm 20	2011–2000 cal BC (10.6%) 1978–1927 cal BC (57.6%)	2023–1900 cal BC (95.4%)
PLD-37609 WS06	-21.76 \pm 0.25	3722 \pm 19	3720 \pm 20	2192–2179 cal BC (11.1%) 2143–2128 cal BC (14.3%) 2089–2047 cal BC (42.8%)	2199–2163 cal BC (20.0%) 2152–2112 cal BC (23.6%) 2103–2037 cal BC (51.8%)
PLD-37608 WS04	-21.97 \pm 0.22	3736 \pm 20	3735 \pm 20	2198–2166 cal BC (33.8%) 2150–2133 cal BC (16.8%) 2082–2060 cal BC (17.7%)	2203–2121 cal BC (64.9%) 2094–2041 cal BC (30.5%)
PLD-37610 WS61	-21.31 \pm 0.22	3760 \pm 19	3760 \pm 20	2202–2189 cal BC (15.1%) 2182–2142 cal BC (53.1%)	2278–2252 cal BC (7.3%) 2229–2223 cal BC (0.8%) 2211–2132 cal BC (83.5%) 2082–2060 cal BC (3.8%)
PLD-37665 WS95	-24.21 \pm 0.35	3760 \pm 22	3760 \pm 20	2202–2141 cal BC (68.2%)	2280–2249 cal BC (9.5%) 2231–2219 cal BC (2.0%) 2213–2131 cal BC (78.0%) 2085–2057 cal BC (6.0%)
PLD-37612 WS207	-21.03 \pm 0.21	3783 \pm 19	3785 \pm 20	2277–2252 cal BC (24.1%) 2228–2223 cal BC (4.1%) 2210–2196 cal BC (15.1%) 2171–2146 cal BC (25.0%)	2286–2189 cal BC (63.0%) 2182–2141 cal BC (32.4%)
PLD-29457 WS01	-23.86 \pm 0.14	3813 \pm 23	3815 \pm 25	2287–2270 cal BC (16.5%) 2260–2206 cal BC (51.7%)	2340–2196 cal BC (91.1%) 2171–2148 cal BC (4.3%)
PLD-38124 WS171	-23.15 \pm 0.21	3822 \pm 24	3820 \pm 25	2294–2267 cal BC (21.2%) 2261–2206 cal BC (47.0%)	2400–2384 cal BC (1.7%) 2348–2197 cal BC (91.9%) 2166–2151 cal BC (1.9%)

Figure 11 shows the other eight radiocarbon data. These data are calibrated using the OxCal v4.3.2 calibration programme for the northern hemisphere. This table indicates the possibility that the beginning of construction of Riffa type burial mounds could be earlier (currently thought to be 2200 or 2250 BCE), and dating back to 2300 BCE.

However there are several points to note. The first is the old wood effect. However, since the analysed charcoal samples were derived from twigs, the old wood effect does not pose a problem.

The second is the geographical location of Bahrain. The C^{14} concentration in the air in the northern hemisphere is different from that in the southern hemisphere. Hence, the calibration programme for the southern hemisphere is also developed. Since Bahrain is located in the south of the Near East, the air mass seasonally flows to Bahrain from the southern hemisphere. This affects dating. If we simply use the calibration programme for the northern hemisphere, the calibrated date would be a little older than the real one.

Therefore, we also calibrated the data using the calibration programme for the southern hemisphere (Figure 12). The grey portions indicate the data calibrated by calibration programme for the northern hemisphere, while the green portions indicate the data calibrated by calibration programme for the southern hemisphere. The former shows the oldest estimated date and the latter the newest estimated date. The real date would be between these two.

Even if we note only the calibrated date using the calibration programme for the southern hemisphere, it shows the possibility of the beginning of construction of Riffa type burial mounds

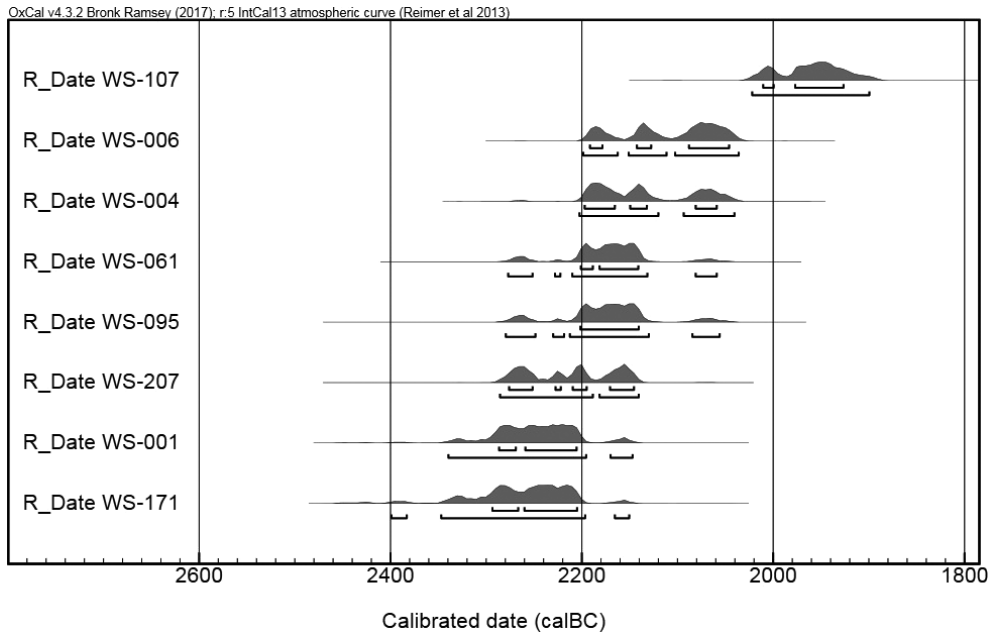


Fig. 11 Calibrated date using the calibration programme for the northern hemisphere

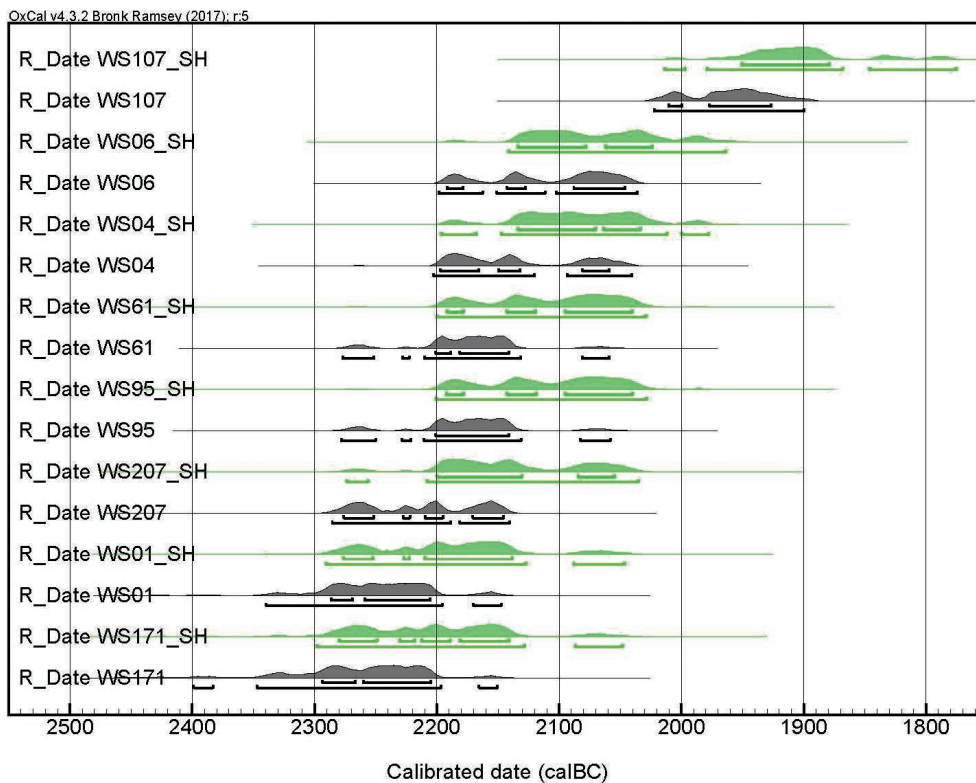


Fig. 12 Calibrated date using calibration programme for the northern and southern hemispheres

dating back to around 2300 BCE.

Thus, the new radiocarbon data from our excavations at Wadi al-Sail suggest that the beginning of construction of Riffa type burial mounds are probably earlier than previously suggested (2200 BCE or 2250 BCE), possibly dating back to 2300 BCE.

Some archaeological evidence also support this. Umm an-Nar pottery, dated back to the period

between 2400 BCE and 2200 BCE were also excavated from Riffa type burial mounds although they are not common [Laurson 2009].

Further, our research area is located in the northeastern part of Wadi al-Sail (Figure 7). A number of burial mounds are scattered in the area to the south of our research area. It is argued that the southern burial mounds are older than the northern ones at Wadi al-Sail. Hence, there is the possibility that burial mounds in the area to the south of our research area are much older than 2300 BCE. There is a modern royal place at the southern end of Wadi al-Sail. Therefore, it is difficult to excavate and know the date of the oldest burial mounds at Wadi al-Sail.

The date from WS107 is also noteworthy (Figure 11). The date is much later than other samples and shows the possibility that Riffa type burial mounds were still constructed in the 20th century BCE. The date does not fit the chronological scheme proposed by the Danish team. But the sample might have been contaminated. More radiocarbon dating is needed to access this date.

5. Significance of the new radiocarbon data from Wadi al-Sail

The new radiocarbon data from Wadi al-Sail suggest that the beginning of construction of Riffa type burial mounds could date back to approximately 2300 BCE or even earlier.

This is very important not only for dating burial mounds in Bahrain but also for the history of Dilmun.

Before Riffa type burial mounds were constructed in Bahrain, there was little evidence of human occupation in Bahrain. Therefore, it was suggested that a large-scale immigration into Bahrain took place around 2200 BCE, immigrants started constructing burial mounds, and this immigration was probably caused by the 4.2 ka event that was a pan-global abrupt cooling and drying event occurred between 2200 and 1900 BCE [Laurson 2013, 2017; Laurson and Steinkeller 2017; Olijdam 2016]. However, the new radiocarbon data from Wadi al-Sail suggest that this immigration into Bahrain occurred much earlier than the 4.2 ka event and was unrelated to the event.

Additionally, Sargon boasted that ships from Dilmun, Magan and Melluha moored at his city. If we suppose that construction of Riffa type burial mounds began around 2200 BCE, it implies that Bahrain was uninhabited during Sargon's era. Hence, the location of Dilmun during Sargon's era has been debated. Our new data suggest that Bahrain could have already been inhabited during Sargon's era and that the ships were sent from Bahrain.

6. Conclusions

Previous studies suggest that construction of Riffa type burial mounds began around 2200 or 2250 BCE. This time, nine twig charcoal samples collected from Wadi al-Sail were radiocarbon dated. The new data suggest that the beginning of construction of Riffa type burial mounds at Wadi al-Sail could date back to around 2300 BCE or much earlier. This is very significant for the history of Dilmun. We are continuing excavating Wadi al-Sail and plan to undertake more radiocarbon dating in the near future.

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