Part IV

Developments on the islands of the eastern periphery
The Beginning of Stoneware in the Japanese Archipelago

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Abstract: The appearance of kilns in the Japanese archipelago dates from the end of the fourth century to the beginning of the fifth century. The author analyzes early Korean Sue ware and soft earthenware from the Uji City site during this period. The Uji City site is a regional site, and the Suemura kilns are a group of kilns controlled by the central government. The early Sue ware from Uji City site is compared with Suemura Sue ware and Gaya stoneware. As a result, it is found that the early Sue ware from the Uji City site was produced by Korean people using the soil around the site. It was also found that earthenware was produced. If we assume that kiln-fired stoneware was produced by men and field-fired pottery by women, we can understand that a small group of men and women came from the Gaya region of the Korean Peninsula. This is very different from the Suemura kiln, where a group of male artisans came from the Korean peninsula and produced Sue ware.

Keywords: Uji City site, early Sue ware, Korean low-fired earthenware, Gaya stoneware, Suemura kilns

15.1. Introduction

Stoneware kilns were introduced to the Japanese archipelago from the Korean peninsula at the end of the fourth century. In contrast to the kilns managed and operated by the central administration, the local kilns were run by a regional chief. Sakai suggest that the spread of kilns from the Korean peninsula to the Japanese archipelago took place multiple times, not only from the Gaya region of the Korean peninsula, but also from the Yeongsan River basin in Baekje and Mahan. The specific circumstances of the introduction of kilns have gradually become clearer. However, while these studies focus on kilns and kiln-fired stoneware and examine immigrants who brought kiln techniques to new lands, they do not take into account their relationship to potters who made the Korean Yeonjil (soft fired) earthenware during the same period. Another problem was the fact that the influence of technique by immigrants has been discussed without clarifying the form of pottery production on the Korean peninsula. In this chapter, therefore, I will discuss the migratory forms in the introduction of the kiln, considering the potters who made Korean Yeonjil earthenware. To this end, I will first point out that some of the Korean Yeonjil earthenware was fired openly, and then show that there are multiple forms of pottery production on the Korean peninsula. Not only early stoneware but also Korean Yeonjil earthenware excavated from the Uji City site was analyzed and archeologically examined, and it was shown that these wares were produced by potters who migrated from the Korean peninsula to the area around the site. I will show the background of two different forms of pottery production by primal kilns and local kilns during the introduction of kiln technique.

15.2. Historical background and past research on the introduction of kilns

15.2.1. The historical background of the introduction of kilns in the Japanese archipelago

On the Japanese archipelago, rice farming began in earnest around the Yayoi period (ninth century BC), and as it became established, large settlements where people gathered together developed. The regional differences in graves, such as the use of jarred coffin tombs in northern Kyushu, protruding four-cornered tombs in the Sea of Japan region and square-shaped circumscribed tombs in the Kinki region, prove that different funeral rituals were carried out in each region. In the first century, settlements were reorganized and large settlements were dismantled, but around the second century, much larger settlements appeared. The largest tombs, about 80 m in length, were built for the chiefs in each area. However, the shapes of the large tombs in different parts of the country during this period were diverse and still regional in nature. In the middle of the third century, a huge keyhole-shaped tumulus over 200 m in length called the Hashihaka Tumulus was constructed in the Nara Basin. After this time, tumulus of the same shape began to be built in other areas, and regional differences in the shape of the mounds disappeared. The funeral rituals were unified as well. The construction of a
large-scale mound required the labor of many people, and since many valuable objects such as Chinese mirrors were buried in the mounds, it is thought that the Great King and the wealthy families connected to him were buried in the large keyhole-shaped tumuli. The largest of these tumuli was being constructed continuously in the Nara Basin in the Kinki region throughout the fourth century. The gradual spread of keyhole-shaped tumuli to the Setouchi, Kyushu, Tokai and Hokuriku regions suggests that the relationship between the central and local regions was formed over a wide area. The period in which these huge keyhole-shaped tumuli were constructed is called the Kofun period.

According to Sangokushi (The Chronicles of the Three Kingdoms), in 239, Queen Himiko sent a messenger to Wei with slaves and various tributes, and was given the seal of the King of Wei. There is no mention of Wa (ancient Japan) in Chinese history until the fifth century, when the five kings of Wa sent messengers and supplied tribute to China in an effort to obtain titles. Archeological evidence shows that Wa not only sent emissaries to China, but also interacted with the Korean peninsula and imported various goods and the following advanced techniques. The king and chiefs introduced horse-breeding and armor-making techniques to strengthen their military power, and gilding techniques to show off their authority with magnificent prestige goods. The kiln for Sue-ware ceramics was one of the continental techniques introduced at this time. Kiln-fired, leak-proof stoneware containers allowed for the long-term storage of liquids, and the hard, gray stoneware tableware became indispensable for feasting in the continental style during negotiations and trade.

15.2.2. Past research on kilns and stoneware

It is known that the Suekura kilns, the largest group of kilns in the Japanese archipelago, have been in continuous operation for more than 300 years, with more than 800 kilns in operation. Since it was initially believed that the kiln TK (Takakura area) 73 of the Suekura kilns was one of the oldest kilns in the Japanese archipelago, it was understood that the techniques for firing Sue ware spread to the other parts of the Japanese archipelago from the Suekura kilns, which themselves were developed with techniques from the Korean peninsula (Tanabe 1966). However, since then, even older kilns such as Yamakuma No. 1 in Fukuoka, Mitani-Saburodani Seigan kiln in Kagawa and Okugatani kiln in Okayama, have been discovered. In addition, kilns TG (Toga) 232 and 231, which are older than TK73, were discovered among the Suekura kilns (Okado 1995, 1996). The Deai kiln in Hyogo Prefecture, which predates TG232 and other kilns, was found in 1981 (Ueno 1998, Kameda 2008).

The discovery of these earlier kilns (Fig. 15.1), mainly along the Seto Inland Sea coast, has led to the mainstream understanding that kiln technique was introduced to the Japanese archipelago in a pluralistic manner (Hashiguchi 1982, Fujiwara 1992, Takesue 1993). Excavations revealed that the early local kilns were isolated and abandoned after a short time, while the Suekura kilns were continuously operated for a long time, and there was large number of them. In addition, the transmission of techniques from the Suekura group to early local kilns has been pointed out, because some of the early Sue ware in each region bears the characteristics of that made in the Suekura kilns. Therefore, the importance of the Suekura kilns has been re-evaluated (Ueno 2002). It has also been pointed out that the kilns previously recognized as early local kilns did not appear at the same time, but rather were constructed during three separate periods (Nakatsuji 2013). In recent years, a study of the distribution of early Sue ware supplied by the Suekura and Ichisuka No. 2 kiln as well as the Suita kiln has been examined using fluorescent X-ray analysis of clay (Shiraishi and Tanaka 2016).

In the Korean peninsula, not only kiln-fired white and gray hard stoneware but also red earthenware is used as cookware. This is called Korean Yeonjil earthenware. A pioneering study that analyzed the distribution and types of Korean Yeonjil earthenware excavated from the Japanese archipelago noted the presence of immigrants (Imazu 1987, 1994), followed by a comprehensive collection of Korean Yeonjil earthenware found in the Kinki region (Nakano 2007, Society of Ancient Studies 2012). It has been shown that the changes in the shape of the Japanese Haji ware (low-fired stoneware) were caused by the influence of Korean Yeonjil earthenware (Kyoshima 1994). This influence has been observed at the Kyushuji-Nagahara site, as well as in the northern part of Kawachi and the western part of Settsu, prior to the other sites (Kyoshima 1994), even within the confines of the Kinai region, which has strong royal control (Nakakubo 2009, Nakano 2017). It was noted that there were varying degrees of impact on the local pottery manufacture depending on the site and region. Furthermore, steamer, which was introduced to the Japanese archipelago from the Korean peninsula along with a new cooking method, have been studied to determine their place of origin on the Korean peninsula, because there are clear localities (Sugii 1994, Sakai 1998, et al.).

A series of kilns have been discovered on the Korean peninsula, and a collection of kiln data is being compiled (Kang 2005, Ueno 2009, 2013, 2015). Researchers from the Honam (Lee 2008, Park 2001, Jeong 2008), Hoso (Choi 2010) and Yongnam regions (Kim 2004, Kim 2007, Park 2001) have examined the kilns in their respective localities. In the Honam region, two distinct types were found: regular kilns used for production of everyday ceramics, and a more specialized type used for firing large jar-shaped coffins (Choi et al. 2004, Jeong 2012). An analysis of ceramic-making techniques has been carried out to study the production system (Lee 2005, 2011), and the distribution area of ceramic has been examined based on the analysis of ceramic samples (Cho 2008). In order to better understand production techniques, archeologists examined stoneware and
Figure 15.1. Korean kilns in fourth and fifth centuries and early Japanese kilns.
kilns without Yeonjil earthenware that was fired openly (Kim 1988, Park 2003, Tsuchida 2016, Cho 2016). So far, while the provenance of early Sue ware with a distinctive regional color in the Korean peninsula has been investigated, the Yeonjil earthenware with a general regional color has been studied as evidence for the process of establishment of the Korean people who came to the Japanese archipelago with their tools of daily use. Thus, although both early Sue ware and Yeonjil earthenware originated from the Korean peninsula, they have been discussed for different purposes, separately, which is a problem. A comprehensive examination of early Sue ware and Yeonjil earthenware would provide clues to the patterns of visiting groups of people with pottery-making techniques. For this purpose, it is necessary to examine the pottery production system of the Korean peninsula by way of analyzing how the productions of ceramics and Yeonjil earthenware were combined.

15.3. Pottery production in the Korean peninsula

It was during the first century BC that kilns were introduced to the Korean peninsula. The first low-temperature flat kilns were introduced to the Korean peninsula from northern China, and later, under the influence of the long-bodied kilns in southern China, long, sloped kilns were constructed, which were used to fire pieces at high temperatures (Chapter 1, Section 1). High-temperature kilns were being operated in the southern part of the Korean peninsula when kilns spread from the Korean peninsula to the Japanese archipelago during the fourth and fifth centuries. Focusing on the fourth and fifth centuries, we will examine the production pattern of stoneware and earthenware in the Korean peninsula in view of the location of the kilns and the number of kilns that formed a group.

There are four types of groups of kilns in Baekje. The first is a large group of kilns consisting of more than seven, such as the Samryongri/Sansuri sites in Jinchon and Naseongri site in Yeongi. The second is a small group of kilns. Both of these types are located far away from the settlement they serve. The third consists of a few kilns in the settlement itself. Last are special kilns for large jar coffins, like the one at the Oryangdong site in Naju.

In Silla, there are large groups of more than 40 kilns, such as the Seongokdongsong in Gyeongju and the Ukseodong site in Daejeon. The other pattern is a relatively smaller group with up to six kilns. There is no settlement around these kilns. In some cases, these are kilns at the iron-making site.

In contrast to Baekje and Silla, in Gaya there are only small groups with one to four kilns. However, because of the large number of stoneware buried in the tumuli at Silla and Gaya, it is expected that large group of kilns will be found in Gaya in the future.

Failed stoneware was unearthed in a discarded kiln. Along with this, a small number of Yeonjil earthenware pieces were also discovered within the same kiln. It was assumed that both the stoneware and the Yeonjil earthenware were fired in the same kiln (Lee 2005, Tsuchida 2016). However, the number of Yeonjil earthenware pieces is very small compared to the amount of stoneware excavated from the kiln. Since rice was cooked in each house in the settlement, cooking utensils were required in large quantities. It is difficult to imagine that all of the rice-cooking utensils, which are oxidation-fired potteries, could be supplied based on the amount detected in the kiln remains. Observations of long pots excavated from settlements (Singyeom sites in Gwangju and Taenokri sites in Gwangju) showed distinctive black spots (see Fig. 15.6). These are traces of carbon from the fuel that was placed under and covered the earthenware to seal it, when it was fired openly. This cannot occur in kiln firing, where the fuel does not come in contact with the stoneware. However, some steamers were burned in the kiln; most cooking utensils are burned openly. Since open-fired earthenware has strong fire resistance, it is plausible that these cooking utensils were fired openly (Lee 2006). Therefore, it is necessary to distinguish these differences when we discuss pottery production, namely which are controlled by king and loyal people. On the other hand, the coexistence of kiln firing and open firing is common in the pottery production systems of Baekje, Silla and Gaya.

How can we recognize the remains of open-fired pottery production? Because of the use of anvils for forming earthenware into a mushroom shape, we can identify the places where these are found as pottery-making sites. Therefore, it is assumed that only open-fired earthenware was produced in settlements where anvils were found but no kilns have been located in the surrounding area.

An analysis of the kilns and the settlements where the anvils were found reveals the following types of pottery production in the Korean peninsula: Type 1 production was only concerned with producing stoneware. No pottery was produced here. A group of kilns was built far from the settlement, including a large group of kilns (Type 1A) and a small group of kilns (Type 1B). Another type of stoneware production is concerned with pottery production. A small number of kilns operated in a settlement in which anvils were found has been categorized as Type 2. Type 3 is the
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Table 15.1. Pottery production in Korean Peninsula

<table>
<thead>
<tr>
<th>Production system</th>
<th>Archaeological site</th>
<th>Stoneware production</th>
<th>Earthenware production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specialising in stone wares</td>
<td>Large group of kilns away from the settlement</td>
<td>●</td>
<td>×</td>
</tr>
<tr>
<td></td>
<td>Small group of kilns away from the settlement</td>
<td>●</td>
<td>×</td>
</tr>
<tr>
<td>Production of both stone wares and earthenware</td>
<td>One or two kilns in the settlement</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Production of earthenware only</td>
<td>Settlement without kilns but with tools for pottery making</td>
<td>×</td>
<td>●</td>
</tr>
</tbody>
</table>

case of a settlement in which anvils were found, but no kilns were discovered in the area. According to the author’s previous analysis of the distribution of kiln clusters and anvil sites in the Hosó area (Nagatomo 2008, fig. 4-26), at least six sites are classified as open-fired pottery production settlements. Since anvils were not found in all settlements, it is understood that some settlements did not produce stoneware. Thus, three types of production existed (Table 15.1): stoneware production, which includes both a large and a small kiln group; stoneware and Yeonjil earthenware (cooking utensils) production; and only Yeonjil earthenware (cooking utensils) production. Large groups of kilns with only stoneware would have been directly controlled by the central government in some cases.

15.4. The introduction of kilns in the Japanese archipelago

The following is an examination of the group of people who transmitted kiln technique to the Japanese archipelago, with the patterns of stoneware production in the Korean peninsula in mind.

15.4.1. Primal kiln: Suemura Obadera kiln TG232 in Osaka

The Suemura kilns, located in the southern part of Osaka, are the largest groups of kilns from the Kofun period. The Izumi Mountains stretch from north to south on the east of the Osaka Plain, and gently sloping terraces rise up from the plain to the hills, derived from the mountains, and then to Osaka Bay in the west. A number of rivers flow from the mountain range, forming valleys on the hills and terraces. The Suemura group of kilns lies on a terrace spreading out from the bottom of the hill, while the TG232 kiln, the earliest kiln in this group, is located close to the plain. In the vicinity of the Obadera site, where the TG232 kiln is located, is the Fushio site, which is a settlement inhabited by the manager of the kiln complex, with an accompanying large, special house in which managers lived and a warehouse. It is also worth noting that the Daisen Tumulus of the Great King, the largest of the Mozu Tumuli Group, is located about 6 km north of the Obadera site.

More than 800 kilns have been detected in the Suemura group, and it is estimated that there were more than 1000 kilns in the area at the time. The kilns were continuously operated for more than 300 years, from the end of the fourth century, when they were first introduced to the Japanese archipelago, to the end of the 7th century. The Suemura kilns are located next to the tumulus of the Great King, and the number of kilns in operation is far greater than that seen in other groups of kilns in the Japanese archipelago, so it is understood that the Suemura group of kilns was directly operated by the Great King.

Early Sue ware. The amount of Sue ware unearthed from the TG232 kiln dump is very large, approximately 1400 containers (Okado 2005). A count of vessel types by the number of pieces at the mouth rim show that it includes 51 percent large jars, 16.5 percent pots, 10 percent vessel stands, 10 percent tall cups, 8 percent small and short-necked jars, 2 percent lids, 2 percent bowls with handle and small jars with covered legs, and 0.5 percent cups and bowls. We know that storage tools and tableware were burned in kiln TG232. In addition, kiln furniture was also excavated. Most of the Sue-ware pieces are very similar in design and form to Korean stoneware and were most likely made by craftsmen who came from the Korean peninsula. It is believed to be one of the earliest kilns in the Japanese archipelago because its form and design resemble Korean stoneware of the late fourth or early fifth century, and it has no original characteristics of Sue ware made in the Japanese archipelago. The vessel stand has characteristics of the Nakdong River area in the southeastern part of the Korean peninsula, and the bowl with handles has characteristics of the areas west of the Nakdong River, such as Haman and Masan (Okado 2005). There are numerous types of tall cups. Small wide-mouth pots and small jars with hole were produced in Honam in the southwestern part of the Korean peninsula. It is thought that craftsmen from several regions were invited to make the Sue ware, which has the characteristics of several areas: the border area between Gaya and Silla (Nakdong River area), Gaya (Haman and Masan) and Mahan (Honam).

A small amount of Korean Yeonjil earthenware and Haji pottery was found at the kiln dump. The reporter believes that the Korean Yeonjil earthenware was burned in the kiln and the Haji pottery was not, but instead were brought in (Okado 2005: 113). This will be discussed below.

15.4.2. Local pottery production: a case study of pottery from the Uji City site in Kyoto

The amount of failed stoneware unearthed from the central Suemura kiln TG232 is enormous, indicating that the potter
produced large quantities of Sue ware from the time of kiln introduction onward. On the other hand, it is assumed that the production volume by local kilns was lower, because the number of failed potteries discarded in the local kilns was less than that of the central Suemura kiln. A small-scale kiln is difficult to find. Therefore, if there are no kilns around where early Sue ware was excavated, it is not easy to determine where it was made. Another problem is that the relationship between the craftsmen of stoneware and potters of Yeonjil earthenware cannot be determined by analyzing only artifacts from the kiln, because Yeonjil earthenware was rarely found at kiln sites. Therefore, we analyzed early Sue ware and Korean Yeonjil earthenware from the Uji City site in Kyoto that was found in a ditch. Alongside the Sue ware, pieces of wooden tools were excavated, and later dated by dendrochronology to AD 389.

The Uji City site is located in the eastern part of the Kinki region, which was a central area in the Kofun period, and is about 60 km away from the Suemura kilns. The Uji River from the east, the Kizu River from the south and the Kamo River from the north flowed into Ogura Pond, and the Yodo River flowed from this pond into Osaka Bay. The Uji City site is situated near the confluence of the Uji River and Ogura Pond, which is a key point of interchange on the route to the east. Early Sue ware, Yeonjil earthenware and Haji ware were excavated from the ditch of the Uji City site.

Early Sue ware. In terms of the composition of the pottery excavated from the Uji City site, early Sue ware was estimated to account for 12 percent, Yeonjil earthenware for 30 percent, and Haji ware for 58 percent, so the ratio of early Sue ware and Yeonjil earthenware to the total was extremely high at 42 percent (Hamanaka and Tanaka 2006). Early Sue ware consisted of tableware such as tall cups and bowls, and storage tools such as jars, while Yeonjil earthenware consisted of cooking tools such as flat-bottomed pots, steamers and boilers. Since early Sue ware has been described in detail by Ha Seungcheol (Ha 2006), I will simply summarize the results here. Yeonjil earthenware was reported by Hamanaka Kunihiro and Tanaka Motohiro (Hamanaka and Tanaka 2006, 2008), and the results of the author’s observations are also presented.

The covered tall cup (Fig. 15.2: 4–6) is similar to stoneware from the Gime region, which is considered to be the Gimhae Gaya. The uncovered tall cup (Fig. 15.2: 8) and the cup (Fig. 15.2: 2) are similar to ones from the Sacheon, Jinju and Goseong, which are considered to be Small Gaya. The cylindrical vessel stand (Fig. 15.2: 3) and the cup-shaped vessel stand (Fig. 15.2: 9–11) are also similar to Gaya ware. While the small jar with hole was a common shape in Mahan, the round-bottomed one, as shown in Fig. 15.2: 1, is similar to the type in the Kaya region.1 Sue ware from the Uji City site has a strong affinity with Gaya stonewares. Among them, the tall cup shown in Fig. 15.2: 8 is similar to one found in Gaya from the late fourth century, when the stoneware regionalism became apparent.2 It is consistent with the fact that the felling date is coterminous with the wood tools of AD 389.

Yeonjil earthenware. Steamers and flat-bottomed pots accounted for 96 percent of the total of Yeonjil earthenware (Hamanaka and Tanaka 2006), and many of them were found to be cooking utensils. The outer surface of the flat-bottomed pots (Fig. 15.2: 12) were beaten and have variety patterns on the surface, such as lattice-grained, rope, parallel-grained and ungrained. Most Yeonjil earthenware has a weak lateral stroking technique on the inside, where traces of the anvil are visible, but other pieces have a strong lateral stroking technique. The area around the bottom of the inner surface is adjusted with a finger nudge. A characteristic feature is a trace cut by the lateral spatula on the lower part of the body (Fig. 5.2: 12). This is a production technique that spread from the Lelang commandery in the northern part of the Korean peninsula to the southern part of the peninsula. It is assumed that the pots were made by people who came from the Korean peninsula. With the exception of one, the flat-bottomed pots are covered with soot and scorch marks, indicating that they were used and discarded. Fragments of the bottom and the rim of a long-bodied boiler were found. The bottom piece was adjusted by beating with a rope-pattern paddle. There are multiple mouth-rim fragments, with both lattice and rope strikes identified. Several steamers were identified, and the bottom of the steamer, reconstructed to perfect form (Fig. 15.2: 13), consists of a large central hole and a number of smaller holes around it. This bottom is the same as that of the steamers in western Kaya (Small Kaya) and westward (Cho 2016). However, its mouth rim is bent outward, which is a characteristic of the steamers from the eastern part of Gaya to the Silla region. Therefore, the origin of the steamer from Uji City site is the middle of eastern and western part of Gaya (Anra Kya). It can thus be stated with confidence that both early Sue ware and Yeonjil earthenware are strongly related to the Gaya region.

15.4.3. Results of scientific analysis

If the stoneware and earthenware excavated in the Japanese archipelago were made by Korean potters, the form and design of the pottery would be the same as Korean stoneware and earthenware. As a result, the form and pattern of the stoneware and earthenware can help estimate the place of origin of the potter, but

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1 However, the Gaya small jars with hole are supposed to be from the fifth century onwards (Ha 2008). There is also a view that the

2 Suggestion were made by Mr. Ha Seungcheol.

Japanese archipelago is the place of origin (Nakakubo 2017). The double mouthparts are gently bent, short and thick from the neck to the mouthparts without steps, which makes it one of the earliest examples of the small jar with hole in the Japanese archipelago.
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it is not possible to determine where the pottery was made. Therefore, we analyzed the clay of the pottery and estimated its area of production. First, Kim Gyuho conducted X-ray fluorescence analysis of early Sue ware of the Uji City site (Nagatomo, Nakamura and Kim 2016). Then, Mitsuji Toshikazu conducted X-ray fluorescence analysis and X-ray diffraction, focusing on six elements, to compare Yeonjil earthenware and Haji ware (Arakawa, Mitsuji, and Nagatomo 2016).

Early Sue ware. An analysis of the early Sue ware from the Uji City site is shown in Fig. 15.3. Fig. 15.3: 1 shows a graph comparing clay used in stoneware from the following sites: kiln TG 232, the Uji City site and Hayagari kiln (kiln No. 1 and No. 2), which is located near the Uji City site and dates to the seventh century. So, we can recognize the local stoneware data as stoneware from these kilns. The principal analysis revealed that the early Sue ware of the Uji City site showed no overlap of the principal component distribution with that of kiln TG-232, and is closer in this regard to that of Hayagari kiln No. 2. Fig. 15.3: 2 is a graph comparing stoneware excavated from Korean peninsula, such as from Daseongdong tumulus and Mangdeok site in Gimhae and Dandeokri tumulus in Jinju, with early Sue ware excavated from Japanese archipelago, such as from the Uji City site, kiln TG232 and the Hayagari kiln. The early Sue ware excavated from the Uji City site differs greatly from the Gaya stoneware from the Korean peninsula, so it is difficult to believe that this Sue ware was brought from Gaya. Therefore, it is most likely that the early Sue ware from the Uji City site was produced in the vicinity of the site.

Figure 15.2. Early Sue ware (1–11), oxidation-fired pottery (12, 13) and Haji ware (14–19) from Uji City site (Hamanaka and Tanaka, 2006, Ha 2008).
Yeonjil earthenware. The results of the analysis of Yeonjil earthenware and Haji ware are shown in graphs in Fig. 15.4. Fig. 15.4: 1.2, 5 and 6 are graphs of Haji ware, and Fig. 15.5: 3.4, 7 and 8 are graphs of Yeonjil earthenware. Each graph shows the relationship between the two elements in Haji ware and Yeonjil earthenware. Fig. 15.4: 1 (correlation between potassium and calcium) and 2 (correlation between rubidium and strontium) show that the Haji ware shows a certain degree of unity with the exception of references 15 and 20. Therefore, the concentration of these dots shows us where Haji ware made locally, and the results were compared with Yeonjil earthenware (Fig. 15.4: 3 and 4). The Yeonjil earthenware was confined to the area of local ware with the exception of Samples 4 and 12, indicating that the Yeonjil earthenware was similar to the clay of the Haji ware. Furthermore, the correlations between potassium and rubidium (Fig. 15.4: 5 and 7), and calcium and strontium (Fig. 15.4: 6 and 8), were examined. In these results, the values of Yeonjil earthenware and Haji ware show close correlation. However, since the distribution area is somewhat displaced, it is presumed that the clay was not collected at the exact same site, but rather at locations close to each other.

The results of the scientific analysis of the early Sue ware and Yeonjil earthenware excavated from the Uji City site can be summarized as follows: (1) Although the kilns still have not been detected, the early Sue ware from the Uji City site was produced in the vicinity of the site. (2) Archeological investigations have shown that the Yeonjil earthenware was produced by people from the Korean peninsula, as it has not been integrated with the techniques of the Haji ware. Therefore, it can be concluded that both the early Sue ware and the Yeonjil earthenware were made in the vicinity of the Uji City site by people from the Korean peninsula.5,6,7

5 In the kiln with separate combustion and firing sections, black spots do not form due to carbon deposits from fuel. However, in the case of large jar coffins excavated from the Oryangdong site in the Korean peninsula, there were cases of black spots on the coffins fired in the kiln. This is thought to be due to the fact that the bottoms of the coffins were covered with fuel to stabilize them.
6 Short-necked pots appearing in the Proto-Three Kingdoms period may be either open-fired or kiln-fired in the period of their appearance.
7 Another aspect of the parallels between Yeonjil earthenware and early Sue ware excavated from sedimentary layers and houses in the valley...
15.5. Conclusion

The extent of stoneware production can be assumed based on the size and continuity of the kiln and the number of discarded failed pieces. As mentioned above, looking at the number of failed pieces discarded in the kilns, a large amount of Sue ware was found in the central Suemura kiln, and a small amount in the local kilns, indicating a difference in production volume between the central and local kilns. From the differences in the amount of stoneware production by each kiln, it may be possible to infer differences in the scale of the number of potters who came to the Japanese archipelago.

On the other hand, what about the oxidation potters who came to the Japanese archipelago? Long-bodied boilers of Korean descent, along with early Sue ware, have been excavated from the valley around the TG232 kiln in Obadera site (Fig. 15.5: 2). These long-bodied boilers are covered with black spots, indicating that they were burned openly. Very interestingly, they show numerous lines that are not usually found on boilers. Several boilers with these characteristics have been excavated. Since the multi-stranded line design is usually found on short-necked pots fired in kilns (Fig. 15.6: 1), it is possible that the kiln-firing craftsmen may have made these cooking utensils as well. The other boilers were burned by the kilns, as evidenced by their hard, gray texture. After arriving in the Japanese archipelago, it was the stoneware specialists who made the cooking utensils for boiling rice. Therefore, it is understood that the people who transmitted their skills to the Suemura kilns were mainly stoneware specialists, not including the Yeonjil earthenware makers.

On the other hand, there is no evidence for the stoneware technique in the Yeonjil earthenware from the Uji City site, but rather for a Korean technique for Yeonjil earthenware. This is also the case in other regions. Since most of the early Sue wares and oxidation fired potteries at the Uji City site have been found in Gaya, it is assumed that the group of immigrants included oxidation potters and stoneware specialists from Gaya.

In other words, the craftsmen who were invited to the Suemura kilns were a specialized group engaged in the production of stoneware in the Korean peninsula, while the group that came to the Uji City site was a composite group of stoneware potters with kiln technique and oxidation-fire potters who burned cooking utensils openly. Some sites in the Kinki region are known to have contained almost no early Sue ware, just Yeonjil earthenware. Interestingly, some of these sites include migrant groups with horse-herding techniques or ironware specialists. In that case, it is likely that the Yeonjil earthenware makers accompanied a group of people with skills other than pottery to the Japanese archipelago. As mentioned above, there are three types of pottery production on the Korean peninsula: Type I, in which only stoneware is produced; Type II, in which both stoneware and Yeonjil earthenware are produced together; and Type III, in which only Yeonjil earthenware is produced (Fig. 15.7). If we understand the above, we can see that the pattern of migratory groups to the Japanese archipelago is strongly influenced by the diversity of production systems on the Korean peninsula. Concretely, it is suggested that a Type I group migrated to the Suemura kiln, a Type II group to the Uji City site, and a Type III group of oxidation-fire potters who migrated with non-pottery technique.

In considering the gender of the potters, Tsude Hiroshi has an interesting suggestion. He presented a graph of the gender of people engaged in different types of occupations, based on the ethnographic statistics examined by Murdoch (Tsude 1989). The results showed that a high percentage of women were engaged in pottery production for the main purpose of self-consumption. Specifically, 13 of the 106 cases had a male main role, 2 cases where the male was in the main role and the female was in a supporting role, 6 cases where both men and women were involved, 8 cases where the female was in the main role, and 77 cases where only women were in the main role. The total number of

topography adjacent to the kiln TG232 kiln suggests that the Sue ware craftsmen made the Yeonjil earthenware (Ôsubo 2010).
Figure 15.5. Long-bodied boiler with black spots.

Figure 15.6. Short-necked pot from kiln TG232 (1) and long-bodied boilers from the valley around kiln TG232 (2–4) (Okado eds. 1995, 1996).
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Figure 15.7. Model of pottery production system.
cases of predominantly female and female-only cases are 85, indicating an 80 percent female majority. He also pointed out that according to ancient Japanese literature, women were the makers of Haji ware, and men were charged with heavy labor, such as digging, carrying and pounding earth, fetching firewood, preparing and carrying straw. Women shared the responsibility for making Haji ware, which was used at the shrines, and men made Sue ware.

Early Sue ware excavated from Suemura kiln TG 232 includes some tall cups that have elements in common with Haji ware (Okado 1995: 276, 277). Therefore, in the beginning of stoneware production, women skilled in making Haji ware assisted in forming Sue ware. Basically, however, the techniques of Haji ware and Sue ware did not merge. Haji ware was rather strongly influenced by Korean Yeonjil earthenware. Haji-ware pots were influenced by long-bodied Korean earthenwares, in turn becoming longer.

The production patterns are very interesting to consider, including the division of roles between men and women. We can assume a division of roles and production patterns: Type 1 is a group of women-only specialists. Type 2 is a group of both stoneware-making men and open-fired-earthenware-making women, and Type 3 is a group of men with no pottery skills and women with pottery-making skills. The king and wealthy families of the Japanese archipelago invited and hired a group of stoneware specialists and formed the Suemura primal kilns. On the other hand, it is thought that some families migrated to the Japanese archipelago from a community of men who made stoneware and women who made open-field earthenware, and this was an example of an immigrant group of local kilns. The local chiefs of the Japanese archipelago invited them to produce Sue ware, and at the same time, they adopted a new cooking style that require Yeonjil earthenware.

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Structure of Sue-Ware Tunnel Kilns on the Japanese Archipelago

Masaaki Kidachi

Abstract: The author examines the structure of anagama kilns (long-chamber kilns) introduced to the Japanese archipelago, as follows. During the early period in the Japanese archipelago, anagama kilns could be divided into the sunken kiln and the semi-sunken kiln. The choice of sunken or semi-sunken kiln depended on the topography and geology in which the kiln was constructed. Sunken kilns are not easy to heat up, but have the characteristic of being difficult to cool. On the other hand, semi-sunken and surface kilns are more efficient at raising temperatures, but have the feature that the temperature in the firing chamber rises and falls remarkably due to the small heat-storage capacity of the kiln itself. In the second half

Keywords: Sue-ware tunnel kilns, sunken kilns, semi-sunken kilns, surface kilns, S-F angle

16.1. Introduction

Bernard Leach recognizes that tunnel kilns were a technological development unique to the East, while bottle oven kilns developed in the West (Leach 2020 [1939]: 285). However, Hirotsugu Sekiguchi states that “unroofed kilns,” an archetype of bottle oven kilns, have had a longer history in China than in West Asia and Europe (Sekiguchi 1983). Yoshiki Fukasawa concludes that unroofed kilns originated in northern China in prehistoric times (Fukasawa 2011) and then spread to southern China. This suggests that tunnel kilns originated in southern China later than unroofed kilns and developed in parallel with the latter. The two different kiln traditions originated in different areas but coexisted in East Asia for a long time. It should also be remembered that, as Leach points out, while unroofed kilns developed under the influence of pottery in mainland China and the Korean peninsula, pottery on the Japanese archipelago has developed under the strong influence of pottery in mainland China and the Korean peninsula. However, since the tradition of kilns deriving from unroofed kilns has not been thoroughly examined in the historical context of pottery on the Japanese archipelago. In China, many remains of unroofed kilns built on the ground have been found in Beijing’s Longquanwu kiln site, which dates back to the tenth to twelfth centuries (Beijing Municipal Institute of Cultural Relics 2002: 54–80), and an increasing number of unroofed kilns have thus been surveyed. Meanwhile, unroofed kilns after the development of tunnel kilns have not been fully examined. The relationship between the historical development of unroofed kilns and that of tunnel kilns in mainland China is a crucial subject for academic exploration. Furthermore, that relationship in mainland China is thought to have had a major impact on the development of kilns in the Korean peninsula and the Japanese archipelago.

This article introduces the results of examinations from the perspectives of folkloric archeology and experimental archeology of the structure of tunnel kilns on the Japanese archipelago, with the main focus placed on the fourth to eleventh centuries (Fig. 16.1b).

16.2. Structure of Sue-ware tunnel kilns on the Japanese archipelago

The Japanese archipelago saw the development of Sue ware after the introduction of ceramics from the Korean peninsula in the fourth and fifth centuries. Sue ware is a kind of stoneware that is thought to have been spread in a political manner in parallel with the formation of the ancient Japanese state. It was produced within the ancient state based politically in present-day Nara Prefecture roughly between the fifth and eleventh centuries. Since the firing process of Sue ware involved reduction cooling, Sue ware ceramics are generally in gray or bluish gray. The firing temperature is thought to have peaked at 1150°C. While the way of finishing the firing process varied over time, recent findings in experimental archeology suggest that Sue ware was in fact often fired at lower temperatures than 1150°C. Due to the structure of tunnel kilns, temperature differences between various spots in them cannot be avoided. Therefore, a certain fluctuation in firing temperatures was inevitable (see Chapter 1, Section 1.3.3).
Since tunnel kilns are generally built using mountain or hill slopes, their firing chambers have sloped floors. There are rare examples of tunnel kilns built on flat land. However, even this kind of kiln has a pit dug in the ground and a sloped firing chamber dug from the bottom of the pit.

There are also very few tunnel kilns with almost flat firing-chamber floors, which are sometimes called “flat kilns.” However, as explained below, flat kilns have a large height difference between the stokehole and the flue hole, and rely on that difference to draw the fire deep inside. This means that flat kilns have a similar mechanism to sloped tunnel kilns.

16.2.1. Kiln types by construction method: sunken kilns and artificially roofed kilns

In the Japanese archipelago, Sue-ware kilns used to be categorized in terms of structure into sunken kilns and semi-sunken kilns (e.g. Tanabe 1966: 30). However, recent studies have revealed the realities of surface kilns, resulting in growing awareness of three types of kilns categorized by construction method: sunken kilns (Fig. 16.2a), semi-sunken kilns (Fig. 16.2b) and surface kilns (Fig. 16.2c) (Moriuchi 2010).

The key point in kiln construction methods is whether a kiln is dug out to be roofed with the natural ground surface or has an artificial ceiling. From this point of view, there is a radical difference between sunken kilns roofed with the natural ground surface and semi-sunken kilns, which have artificial frames for their ceilings upon the ground. Meanwhile, semi-sunken kilns and surface kilns share the same structure of artificial ceilings. Since the difference between semi-sunken kilns and surface kilns is relatively small, excavators often face difficulty categorizing the kilns they are excavating into semi-sunken kilns or surface kilns. For this reason, this article categorizes Sue-ware kilns into the two types of sunken kilns and artificially roofed kilns (including both semi-sunken kilns and surface kilns), instead of using the two terms semi-sunken kilns and surface kilns as different categories. Although it is sometimes difficult to distinguish between sunken kilns and artificially roofed kilns at excavation sites, a layer of earth outside the side walls and a trace of earth applied for protective purposes to the exterior of the kiln are clues to judging that a kiln was used as an artificially roofed kiln. Basically, no protective layer of earth can or needs to be applied to the exterior of sunken kilns.

Even if the roofs of sunken kilns collapse, a trace of the collapse can often be found without the need for excavation, in the form of trenches in the ground. Meanwhile, artificially roofed kilns generally do not leave any trench-like trace, even if their roofs collapse. In the case of a kiln built by digging the surrounding area to create a seemingly elevated area and constructing a roof/ceiling above the elevated area, the elevated area sometimes remains even if the roof/ceiling collapses. Therefore, a pre-excavation observation of micro-landforms sometimes helps judgment on whether a kiln is a sunken kiln or an artificially roofed kiln.

On the Japanese archipelago, sunken kilns and artificially roofed kilns have coexisted since the origination of Sue ware. Meanwhile, it has been confirmed that both sunken kilns and artificially roofed kilns already existed on the Korean peninsula in the third or fourth century, prior to their introduction to the Japanese archipelago (Han 2005: 90). It can be inferred that these two different types of kilns were used for different purposes according to the need. Exploring the relationship between product types and firing finishes is a challenge to be tackled henceforth.

16.2.2. Selection of kiln location: relationship between geographic and geological features and kiln structure

The selection of a kiln location depends on the kiln construction method. The construction of a sunken kiln requires easy-to-dig but collapse-resistant soil as a crucial condition. In hard bedrock that cannot be easily hollowed, or overly weak ground, sunken kilns cannot be built, but artificially roofed kilns can be constructed. Weathered granitic soil, which is easy to dig and heat-resistant despite entailing the risk of collapse, is a favorable ground condition for constructing sunken kilns. In areas without...
favorable geological conditions and with hard-to-dig bedrock, such as the Harima area and the Tanba area, kilns cannot be dug in the ground, so artificially roofed kilns are the main type of kilns found.

The question of whether a kiln is dug out with the natural ground surface preserved as the kiln roof or has an artificial ceiling frame is related to the question of what geographical features are used to build the kiln. The kiln location affects the angle of the sloped floor and the length of the flue, as well as whether or not the kiln has a flue. Artificially roofed kilns are often built using a natural slope for their floor, because kilns of this type need a sloped floor in place of a long flue, which they cannot have for structural reasons. While steep cliffs on the skirts of mountains can be used as they are to build kilns, the construction of sunken kilns on gentle mountain slopes must be begun by digging the slopes to create vertical surfaces. In such a case, the earth removed to dig out a kiln is disposed of in front of the kiln, and sometimes accumulated to create a flat area beneath the kiln. The flat area, called the “forecourt,” is thought to have been used as a workspace during kiln construction. However, if a kiln is dug out on the boundary between a mild slope and a steep cliff, the removed earth falls under the cliff, leaving no trace. In some areas, such geological conditions were preferred for kiln construction.

A thorough analysis is necessary to determine whether kilns that matched local geological or geographic conditions were constructed or particular geological or geographic conditions were selected to construct kilns of particular structural types.

16.2.3. Functional differences between sunken kilns and artificially roofed kilns

Features of sunken kilns

A sunken kiln has a firebox and a firing chamber deep underground, so raising the kiln temperature requires heating the overall surface of the ground. Since the overall ground surface and the whole kiln must be heated for a long time, instead of being heated rapidly, the sunken kiln needs a much longer time for firing and cooling and consequently a larger amount of firewood than the artificially roofed kiln.

One Japanese potter said that a tip for kilning is “firing the kiln before firing stonewares” (Furutani 1994: 48). Stonewares alone cannot be fired without firing the kiln. A raised temperature over the whole kiln helps to successfully fire works in the kiln. Compared with modern tunnel kilns, most of which are artificially roofed, ancient sunken kilns probably required a longer time to heat the whole kiln.

Despite needing a large amount of fuel and being difficult to heat rapidly, sunken kilns can retain heat very well and hardly cause temperature differences between various points in the kilns or sudden temperature changes. Even putting firewood into a sunken kiln at a slow speed does not cause a rapid temperature decline in the kiln. The temperature of this type of kiln drops slowly, causing little damage to fired stonewares. When fired in kilns other than sunken kilns, thick or large stoneware vessels are very likely to break when rapidly cooled down, due to the large temperature difference between their inner and outer surfaces or between their upper and lower parts. Meanwhile, small or thin vessels seldom break because they are characterized by only a small temperature difference between the two surfaces. By contrast, the temperature in sunken kilns changes slowly both during and after firing, so kilns of this type are very favorable for firing thick or large stoneware works.

Potters today say that it takes as many days as needed for firing works to cool the fired works before they can take them out of their kiln. If the firing process needs 3 to 7 days, it takes 6 to 14 days for the potters to complete the entire process, beginning from starting firing and ending with the removal of the fired works from the kilns. However, given that most modern tunnel kilns are artificially roofed, it can be inferred that ancient sunken kilns needed a longer time for the entire process than modern kilns. This would have meant a long cycle of firing, leaving sunken kilns at a disadvantage in terms of meeting the need to fire stonewares quickly and take them out in a short time.

Features of artificially roofed kilns: semi-sunken and surface kilns

The above-quoted Japanese potter also said, “With low thermal conductivity, air per se is an excellent thermal...
insulator” (Furutani 1994: 34). Compared with sunken kilns, artificially roofed kilns, elevated on the ground, have a smaller proportion underground and have a larger surface exposed to the air. One can stand next to an artificially roofed kiln even when its internal temperature exceeds 1200°C, because the air insulates the heat.

It can be inferred that, unlike in a sunken kiln, the heat generated by burning firewood in an artificially roofed kiln is little absorbed into the ground, and is able to rapidly increase the internal temperature of the kiln. A thinner roof/ceiling would have further enhanced the thermal efficiency of the kiln, despite its weaker structure. Meanwhile, a thicker roof/ceiling would have required greater calorific power to heat the thicker walls of the kiln, despite its stronger structure.

Since the thermal storage capacity of an artificially roofed kiln is small, the internal temperature drops immediately when firewood is not supplied. This type of kiln thus features drastic sudden temperature changes. It is inferred that thick or large stoneware works fired in artificially roofed kilns were very likely to cool down rapidly and get cracked.

It is also inferred that, when the internal temperature of this type of kiln was raised rapidly, the temperature difference increased between the kiln’s upper part near the ceiling and its lower part near the ground. It is thought that preventing such a temperature difference required using certain special techniques, including the technique of firing stonewares while maintaining the same temperature, known as nerashi shosei, and tomedaki technique. Tomedaki is the technique of closing a kiln after its temperature reaches a certain level and firing the kiln again the next day. While in the general kilning process the kiln temperature is gradually raised, preventing a sudden temperature rise, the tomedaki technique helps increase the kiln temperature in one go to the same level as the previous day. This technique is effective in reducing the temperature difference in the entire kiln by increasing the volume of heat stored on the floor and reducing the temperature difference between the ceiling and the floor. As described above, it is inferred that the structural disadvantages of artificially roofed kilns could be offset to some extent by using special firing techniques.

However, a remaining problem for us to address is that excavations alone cannot easily reveal what special firing techniques were used. This problem needs to be addressed through repeated archeological experiments and in-depth examination based on excavations.

16.3. Inclination of Sue-ware tunnel kilns

16.3.1. Two types of sloped floors

Shozo Tanabe (Tanabe 1966) points out that there are two types of floors of Sue ware kilns: a curved floor, whose angle of inclination varies across the kiln in such a manner that the floor steeply rises toward the depth of the kiln (Fig. 16.3a); and a sloped flat floor, whose angle of inclination is uniform from the stokehole to the other end of the kiln (Fig. 16.3b). Tanabe calls the angle of inclination of the line between the floor surface at the stokehole and the top of the flue hole the “S-F angle” (see Chapter 1, Section 1.3.4, Fig. 1.2). Although previous studies on the structure of Sue-ware kilns have placed importance on the angles of the sloped kiln floors, the key to greater power...
to draw the fire deep into the kilns is S-F angle. Both types of Sue-ware kiln floors are thought to have been designed based on calculation of the S-F angle.

A careful observation of floor inclination and the overall shapes of kilns reveals that many kilns with curved floors narrow toward their maximum depths. The overall shape of a kiln of this type resembles a candle flame. The above-quoted modern Japanese potter explains that kilns of this shape can easily allow fire to spread across their internal space (Furutani 1981: 102). This well-designed type of kiln features high fuel efficiency. By contrast, many kilns with sloped flat floors are almost rectangular in overall shape. Although it seems that these kilns were designed to use the S-F angle to increase the power to draw the fire deep into the depths of the kiln, their rectangular shapes hardly facilitated the smooth flow of fire, resulting in the need for large amounts of fuel. Detailed consideration of the flame shapes and the flow of fire suggests the high likelihood of an insufficient spread of fire at the maximum depths of kilns with sloped flat floors. It is supposed that this type of kiln needed accurate calculation of a good balance between the S-F angle and the sizes of the stokehole and the flue hole.

Kilns with curved floors are thought to have accommodated few works other than small ones near their maximum depths due to their steeply sloped, narrow floors. Meanwhile, kilns with sloped flat floors are thought to have accommodated stoneware works of any size even at their maximum depths. However, it seems unlikely that the latter type of kiln, with an insufficient spread of fire, was designed with high importance placed on the quality of products.

As seen above, it can be concluded that selection between the two types of sloped kiln floors was made considering the types of stoneware products to be fired in the kilns and the firing efficiency.

16.3.2. Changes in S-F angle

It has been pointed out that, while Sue-ware kilns dating back to the early seventh century generally have steeply sloped floors, kilns constructed after the origination of kilns with upright flues in the late seventh century have more gently sloped floors (Mochizuki 1993). This is also the case with tile kilns. Both Sue-ware kilns and tile kilns dating back to the early seventh century mostly feature curved floors that rise up toward their depths, and boundaries between floors with the different angles of inclination. It is thought that kilns in the early seventh century had a flue hole cut directly in the ceiling above their maximum depth, instead of having a long flue. Many of those kilns had a large, flat firebox. As a natural consequence, their S-F angle was smaller than the angle of the sloped floor. Therefore, compared with early seventh-century kilns, kilns with upright flues constructed in the late seventh century have a larger ratio of the height gap between the stokehole and the flue hole to the entire length of the kiln body, resulting in greater power to draw the fire deep into the kiln despite the slight angle of their sloped floor. Gently sloped floors require less effort to put works in the kiln. In addition, it is supposed that this newer type of kiln had much greater power to draw the fire toward its depth than older types, leading to a shorter time needed to increase the temperature of the kiln. However, it is thought that these kilns in turn were more susceptible to leaking heat and were less fuel-efficient. These disadvantages may have been overcome to some extent by adjusting the sizes of the stokehole and flue hole. Nevertheless, the early seventh-century type of kiln structure was used even in the late seventh century in some areas and for some kilns. Comparison between areas where the new type of kiln was introduced and those where it was not will require further analysis from a wide range of perspectives, including the quality of the stoneware works fired in those kilns and the production systems.

16.4. Conclusion

Surveys of the remains of Sue-ware kiln clusters have revealed that, while some clusters continued to use sunken kilns over time, others shifted from sunken kilns to artificially roofed kilns (Mochizuki and Kashima 2010: 639). It is inferred that the way of selecting kiln types differed according to the cluster due to the natural environment and the conditions of the local community. Some remains of kiln clusters suggest that both sunken kilns and artificially roofed kilns coexisted and were used for different purposes in the same cluster. The complex structure of tunnel kilns on the Japanese archipelago differed according to the area, and changed over time in a diverse, complex manner. Nevertheless, the two types of kiln structures continued to coexist and were handed down to medieval Japanese society.

When tunnel kilns were introduced from the Korean peninsula, the Japanese archipelago did not have kilns of any kind. Instead, people fired pottery covered with fuel on the ground. It is thought that the Japanese method of firing ceramics under a cover on the ground lasted until long after the introduction of tunnel kilns, and was gradually replaced by unroofed kilns from the tenth century on (see Kiln Research Society 1997). On the Japanese archipelago, the introduction of tunnel kilns was followed by that of unroofed kilns, probably in reverse order to that in mainland China. While regional differences in unroofed kilns need further examination, regional differences and historical changes in tunnel kilns have been examined in detail from the perspectives of both ware and kiln structure (Kiln Research Society 2010). Kiln structure will be an important research topic not only as evidence of the genealogy of ancient kiln engineers but also as an indicator of changes in demand.

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Nakadake Sanroku: The Southernmost Sue-Ware Kiln Site Center in Ancient Japan

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Abstract: The Nakadake Sanroku Kiln Site Center was installed by the ancient Japanese state at the beginning of the ninth century AD in its southern border region. Unlike other Sue kiln site centers, Nakadake Sanroku is geographically separated from sites related to the ancient province administration, and the area around the site had been the center of a local group of indigenous people until a few decades earlier and a hub for trade with the southern islands over the centuries. After subjugation by the Japanese state, state administration was weak and the need for Sue ware for state administration as well as Buddhist temples was low, but Sue ware from Nakadake is found on the southern islands, outside the realm of the state. The chapter introduces the background of the kiln site center and recent research in a large international and interdisciplinary project.

Keywords: Nakadake Sanroku Kiln Site Center, Sue-ware production center, periphery of the Ancient Japanese state, South Kyūshū, Ryūkyū archipelago, long-distance trade, economic strategy

17.1. Introduction

The Nakadake Sanroku kiln site center – which will be called “Nakadake Sanroku” for convenience in this chapter – was installed around or shortly after 800 AD by the ancient Japanese state as one of the last Sue production centers and is the southernmost kiln site center of its kind.

Nakadake Sanroku is located at the foot of Mt. Nakadake (hence its name), on the western coast of the Satsuma peninsula in Kagoshima prefecture (Fig. 17.1). The site extends from the mountain towards the estuary of the Manose River (Fig. 17.2). This area was a hub of trade with the Ryūkyū islands from prehistoric times, and later its trade routes extended as far as Song Dynasty China and South East Asia, and this southern trade route paved the way for the Western world’s contact with Japan from the sixteenth century onwards.

Nakadake Sanroku is unique and fascinating in the Japanese context for several reasons:

- It was set up in a region that is related to the Hayato, the indigenous people who inhabited southern Kyūshū and who had been subjugated by the Japanese state only a few decades earlier. The kilns that should have served the provincial government in the north of the province were instead set up further south, in the former center of that powerful local group.
- Its geographical location and the archeological evidence suggest that the region had been a hub of exchange between the north and south of the Japanese archipelago from prehistoric times down to the Middle Ages. Thus, the location of the production center – which should have been a purely administrative site in the context of the ancient Japanese state – adds another aspect to its interpretation.
- Distribution of Sue ware from this site can be traced as far south as Tokunoshima, which later became home to the Kamuiyaki kiln site center that will be introduced in the next chapter. Although there is no evidence of a direct relation between the two, Nakadake Sanroku and the distribution of its pottery illustrate the beginnings of resurgent exchange with the south that led to vibrant trade in the Middle Ages.
- From the discovery of the first kiln sites in 1984, and as a result of recent prospections, the overall size has been estimated to exceed the norm expected from Satsuma Province – a poor, small province in the periphery of the ancient state.
- International and interdisciplinary research on this site was funded in two large research projects by the JSPS KAKENHI Grant Number 25580170 and 15H01902 starting in 2013, adding new methods and ideas to the well-established toolbox for research on Sue kiln site centers.

This chapter gives an overview of this background and introduces the interdisciplinary research of recent years;
a comprehensive report is being prepared, and as of 2022, updates on new developments can be found on our website at https://nakadake-kilns.netlify.app.

The site is of particular interest because of its geographical and historical setting between “Japan” and the “Ryūkyū islands,” between state administration and trade activities, and between the central state and indigenous local powers.

17.2. Historical and geographical background

17.2.1. Kyūshū: between the Korean peninsula and Honshū

Mt. Nakadake is located near the southwestern coast of Kyūshū, one of the largest islands in the Japanese archipelago (Fig. 17.1). The northwestern part of this
island is close to the Korean peninsula, and therefore was the main contact point for exchange with the continent and China from prehistoric times. Wet-field rice agriculture entered the archipelago via northwestern Kyūshū from the ninth century BC (Miymoto 2019: 206), bronze and iron tools from China and the Korean peninsula can be found in elite burials from of the third century BC (Fukuoka City Museum 2015: 17), and from the Yayoi period to the sixth century, most of the iron resources in Japan came from the Korean peninsula (e.g. Murakami 2017: 9).

From the third century on, the Yamato administration, which was a coalition of chiefs based in the Kinki region of Honshū, began to spread its influence over the Japanese archipelago. By the seventh century, it had become the core of the ancient Japanese state. The Yamato administration was actively engaged in diplomacy with the Korean peninsula in order to acquire the newest technologies, such as those used in the production of metal crafts and the hard fired ceramics that later came to be called Sue ware in Japan (Tsude 2010: 109), which were later produced in Nakadake Sanroku.

Developing from the Yamato administration, a centralized state was formed in the seventh century, and subsequently provinces were established in each region of the Japanese islands. There were three tiers of local administration: provincial, district and township. A provincial governor was deployed from the capital to each province, a local magistrate appointed in each district and a township head set up in each village. In the latter half of the seventh century, Dazaifu was established in Chikuzen Province in northwest Kyūshū as an administrative and judiciary organ of the government in Kyūshū, as well as for diplomacy with and defense against the Korean peninsula (Satō 2019: 198). Like other administrative centers of that time, kilns for production of hard fired Sue ware were located close to Dazaifu, which formed the largest kiln cluster on the island of Kyūshū and one of the largest Sue kiln site clusters in Japan. The area around Nakadake was not part of these developments for centuries, and to understand the case of Nakadake Sanroku, it is essential to know that the production of Sue ware was closely related to the ancient state and that the South of Kyūshū was late in being incorporated into the ancient state.

17.2.2. Southern Kyūshū and the Ryūkyū islands

There are two peninsulas in southern Kyūshū, separated to the north of Kyūshū and the territory of the ancient state by a central mountain ridge: Satsuma in the west and Ōsumi in the east. The Ryūkyū archipelago stretches to the south.

The small-scale plains and volcanic soils of southern Kyūshū are not suitable for paddy-field rice cultivation, the main occupation in Japan from the Yayoi period onward and subject to taxation in the ancient state. According to the tax records of Satsuma Province written in the early eighth century just shortly after its installation, this province had significantly lower storage of rice than other provinces (Nakamura A. 2006: 545–46).

Despite that, southern Kyūshū was an active hub of trade, which included shell trade with the Ryūkyū islands. Large shells, gathered in the central part of the Ryūkyū islands, were processed as bracelets and horse accessories during the preceding Yayoi and Kofun periods (e.g. Kinoshita 1996) and traded as prestige goods to the elite in other areas of Kyūshū and to Honshū.

During the Yayoi period, a trade route existed along the western coast of Kyūshū (Kinoshita 1996: 188). Not far from where Nakadake Sanroku was to be built, along the lower reaches of the Manose River, several sites show the importance of this region as a trading hub. The Takahashi site revealed large shells and Nakabaru-type potteries from the Ryūkyū islands, as well as Itazuke-type potteries from the northwestern part of Kyūshū (Kawaguchi 1963). At the Shimoshōji site, a jar-coffin was unearthed, which is a type of burial commonly found in northwestern Kyūshū (Kawaguchi et al. 1976). The corpse also wore shell bracelets that were typical of the style found in northwestern Kyūshū, and so it is suggested that the buried person was a local chief who had been active in trading (e.g. Nakazono 2004: 308). Sherds of pottery produced in southern Kyūshū have been found in sites in the central Ryūkyū islands, suggesting active trade during the middle Yayoi period (Shinzato T. 1999: 101, Nakazono 2004: 533). A new route along the east coast of Kyūshū was added during the Kofun period. There are several large tumuli from the fourth and fifth centuries along the eastern coast of the Ōsumi peninsula, and the elite buried in these tumuli may have obtained power through trade activities with the Ryūkyū islands (Hashimoto 2012: 23).

As the discussion of the kiln site center in Nakadake Sanroku will show, trade along the West coast of Satsuma to the southern islands started to flourish again in the eighth century, and later in medieval times the lower reaches of the Manose River evolved into a flourishing center for domestic trade and a hub between China and all of Japan (Yanagihara 2007: 71, Miyashita 1998, Shinzato A. in this volume).

17.2.3. Process of incorporation into the ancient Japanese state

17.2.3.1. State administration and the Hayato

The incorporation of southern Kyūshū into the ancient Japanese state started with the establishment of Hyūga Province in southeast Kyūshū in the middle of the seventh century. Satsuma Province was separated from Hyūga Province in 702. Ancient records show that the districts of Satsuma Province were smaller than those in other provinces (Nakamura A. 2006: 541), one of the many peculiarities in this small and poor province. The former capital of the province was located in what is now Satsuma Sendai City in the north (Kagoshima Prefecture

Board of Education 1975). The site of the accompanying provincial temple complex revealed that the buildings were constructed in the latter half of the eighth century and that they were relatively small compared to those in other provinces (Sendai City Board of Education 1981, Obara 2005: 277).

Ōsumi Province on the Ōsumi peninsula was established in 713. The site of the capital and the provincial temple is thought to have been located in what is now Kirishima City, but details such as the size of the buildings are not known (Fukano 2019: 204).

The indigenous people of southern Kyūshū were known as the “Hayato” before they were incorporated into the ancient Japanese state. They were described in the first historical documents, written in the seventh century, as barbarians with a different ethnic identity who paid tribute to the Yamato imperial court. Often mentioned in a similar context is a population from northern Honshū called the “Emishi.” Like the Hayato, they were under the control of the Yamato imperial court as a separate ethnic group. For the Yamato court, the existence of distant, tribute-paying barbarians had political effect and indicated the extent of Imperial power (e.g. Nakamura A. 2006, Nagayama 2009).

The Hayato rose up against the Yamato imperial court in 701 and 713, and in 720 they carried out the largest uprising, which lasted several years until it was ruthlessly crushed. The efforts of the central state to control the south are exemplified by the relocation of people from other regions of Kyūshū to the Hayato domain, as told in the written sources (Nakamura A. 2006: 540, Nagayama 2009: 78) and the archeological record (e.g. Miyata & Hirakoba 2005). Participation in a large uprising in North Kyūshū in 740 on both the government’s side and on the rebellious side (Nagayama 2009: 80–95) shows that the insecure situation in South Kyūshū continued long after the establishment of the provinces.

Archeological remains in southern Kyūshū from the latter half of the eighth century indicate that the use of the local type of pottery had declined rapidly. At that time, the lifestyle of the locals had begun to conform to that of the general Japanese population. Archeological findings from the ninth century show an increase in the number of industrial remains such as Sue kilns and those from iron production, suggesting that new and intensive technologies had been introduced (Ikehata & Kawaguchi 2006: 611).

In AD 800, later than in other provinces, the handen shāju law of periodic reallocation of rice land was implemented in southern Kyūshū, and the tribute paid by the Hayato was halted. “Hayato” as the name of the people of southern Kyūshū disappeared (Nagayama 2009: 145). It is during these years, at the beginning of the ninth century, that Sue production in Nakadake Sanroku was established.

17.2.3.2. Ata in Satsuma

Mt. Nakadake is located in the Ata District of Satsuma Province. Because the Hayato population on the Satsuma peninsula were called “Ata Hayato,” it is thought that Ata had been the seat of local power in Satsuma until the eighth century (Yanagihara 2007: 151). According to the Wamyō Ruijūsho from the tenth century, there were four townships in Ata District, which is estimated to have been the most populous district in Satsuma Province.

At the Konakabaru site, 1.5 km from Nakadake Sanroku, a piece of Haji ware engraved with the Chinese characters for Ata (阿多) was found (Ushinohama ed. 1991: 177). The Ata district dates back to before the establishment of Satsuma Province, and the Konakabaru site is probably the location of the former district office.

17.2.3.3. The Ryūkyūs: part of state territory and beyond

The islands of Tanegashima and Yakushima south of the Ōsumi peninsula form the main part of the northern region of the Ryūkyū archipelago. Tane Province was established in 702, but by 824, it was incorporated into Ōsumi Province. Historical and archeological data show that these islands were home to an agrarian society (Tora 2006: 4). The central and southern Ryūkyū islands were home to hunter-gatherer societies, each with their own distinctive culture, and were outside the territory of the ancient Japanese state. The border of the territory of Japan was between the northern and central parts of the Ryūkyū islands.

However, from the ninth to the twelfth century, the relationship of the Ryūkyū islands with the ancient Japanese nation became closer, as seen in the trade of the great green turban shell, the raw material for mother-of-pearl inlay work. The Gusuku site cluster on Kikai Island in the central Ryūkyū region, which dates from the ninth to the fifteenth century, has revealed evidence of widespread trade. Artifacts found in the site cluster include ceramics made at the Yuezhou kilns in southeastern China, celadon and unglazed ceramics produced on the Korean peninsula, and Haji and Sue ware. Some large buildings with eaves found in the site group show a style of architecture that was used in the ancient Japanese state (Matsubara et al. 2015: 77–78). Kikai Island thus differs significantly from other islands of the central and southern Ryūkyū islands, where local potteries were dominant. Part of the Gusuku site cluster is presumed to have been the residence of a local leader’s family that was connected with southern Kyūshū society (Kōmoto 2015: 58). As we will see below, Sue ware from Nakadake can be found in this site cluster as well, and it is distributed further to the south.

From the eleventh century on, under the influence of the Song Dynasty and a policy that encouraged trade and interaction, commerce at sea flourished for many centuries (Shinzato A. 2018: 159). During the medieval period, the central and southern Ryūkyū islands became important
hubs along the trade routes to and from South China and South East Asia. The first Westerners also came to Japan via this very route in 1543, then again in the middle of the nineteenth century, when Japan opened to the West after centuries of self-isolation.

17.2.4. Sue production in the ancient Japanese state and Kyūshū

17.2.4.1. The transition of Sue ware in Japan

The technology of Sue production was introduced to Japan from several regions on the Korean peninsula by the end of the fourth century. Sue ware was first produced for use as ceremonial vessels for the elite, but came into daily use by the sixth century. Under the Ritsuryō system of the emerging centralized state during the seventh century, Sue kilns were established in most provinces. Sue ware was supplied to government offices and temples in the form of storage containers for water or alcoholic drinks and as tableware for officials and Buddhist monks. It is thought that the production and distribution of Sue ware were controlled by the provincial or district offices. By the eighth century, Sue ware was being produced in Kyūshū, Shikoku and Honshū, an area that encompassed the entirety of the ancient Japanese state, but in the last half of the century, the popularity of Sue ware declined in and around the capital due to the nobles’ demand for Chinese ceramics, green-glazed ware and Haji ware, a type of tableware fired in an oxidizing atmosphere with firing temperatures significantly below that of Sue ware. As a result, traditionally gray Sue ware diversified and kilns that produced green-glazed ware appeared (Kitano 2007: 267).

17.2.4.2 Main Sue kiln site centers in Kyūshū

Dazaifu was established in the late seventh century in Northwest Kyūshū, and the Ushikubi Sue kilns supplied the necessary Sue ware (Funayama & Ishikawa eds. 2006: 30, Ishiki 2010: 300). They were located about 3 km from Dazaifu and were used for 300 years, from the middle of the sixth to the middle of ninth century. During the latter half of the seventh century, production of Sue ware at other kilns in Chikuzen Province was discontinued and moved to Ushikubi (Ishiki 2010: 51). The kiln cluster consisted of a large number of sub-clusters and is estimated to have contained more than 500 kilns (Funayama & Ishikawa eds. 2006: 5), thus being by far the largest kiln site center in Kyūshū.

From the latter half of the eighth century, the Ushikubi kilns shifted to producing small-sized products, and production was suspended by the middle of the ninth century. During the same time, Sue-ware kiln centers in Higo Province became large-scale. Thus, during the latter half of the eighth century, the center of Sue-ware production in Kyūshū moved from Ushikubi to Higo Province, and at the same time the main Sue ware produced in Kyūshū shifted to storage containers (Ishiki 2007: 309, Kitano 2007: 263). The most important were the Arao kiln center, with an estimated 120 kilns (Amita 2012: 131), and the Uki kiln center, with an estimated 23 kilns (e.g. Yamamoto 2018: 125).

The Arao kiln center produced Sue ware from the sixth century to the ninth century, with its peak of prosperity from the late eighth century to the early ninth century (Amita 2003: 361). The Kita-Urayama-A kiln site in the Arao center was an underground-type kiln and probably in use during the late ninth century (Ishiki 2004: 128). Because the kiln collapsed during the firing process, 20 pots and 30 pieces of tableware remained in the kiln. On the floor of the kiln, there were seven steps for holding Sue ware made from rocks that were held in place by a mixture of clay and straw (Matsumoto ed. 1980: 51–66), similar to the kiln excavated in Nakadake Sanroku.

17.2.4.3. The role of Sue ware at the southern border of the ancient state

During the eighth century, Sue-ware production began in southern Kyūshū. It may have served three different purposes.

The first was the standard supply of Sue ware to local government facilities, such as the provincial offices and the provincial temples. Given the small quantities of Sue ware in southern Kyūshū earlier, it is clear that there was a need for Sue-ware products at local government facilities. Objects used for ceremonies and other necessities were made of Sue ware. This included the essential writing tool of inkstones, which, during the Heian period, were generally made of Sue ware (Nakatani 2020).

The second was to supply settlements. Narikawa pottery had been used in southern Kyūshū from the Kofun period. This style of pottery reflected the unique lifestyle of the residents of southern Kyūshū. After the Hayato people were subjugated by the Japanese state, Narikawa pottery disappeared and was replaced by Haji ware and Sue ware (Nakamura 2015: 29). The demand for Sue ware increased with the Hayato people’s change in lifestyle.

The third was to supply containers for trade. Since prehistoric times, southern Kyūshū had been a hub of active trade with the Ryūkyū islands. The Ryūkyū islands did not produce hard, durable ceramics, such as Sue ware, until the eleventh century, and Sue-ware items were both traded and used as containers for shipping.

17.2.4.4. Sue-ware kiln sites in southern Kyūshū

Besides Nakadake Sanroku, three other Sue-ware kiln site clusters have been identified in the southern half of Kyūshū. All of these started production at the time of the establishment of Satsuma and Ōsumi Provinces or thereafter. Two sites are in Satsuma Province and one site is in Ōsumi Province. Furthermore, the Sagariyama kiln sites in Higo Province north of Satsuma Province are close...
to the kiln sites from Ōsumi Province and are estimated to have been used from the late eighth to the ninth centuries.

The Okano kilns in Ōsumi Province were located in Isa City, in the former Hishikari District, bordering Higo Province. Five kiln remains have been found at this site, all of which were used for the production of Sue ware from the late eighth to the early ninth century. Four kilns and an ash heap have been excavated. The kilns were of the underground type. The best-preserved kiln, OK-III, shows similarities to a kiln in the Sagariyama kiln site cluster, which is the best-preserved kiln, OK-III, shows similarities to a kiln in the Sagariyama kiln site cluster, had an upright flue at the rear of the kiln and a bunen chū a pillar located in the center of the kiln (Aosaki et al. 1983: 10). It is assumed that the pillar was for spreading the heat of the fire evenly throughout the kiln (Ishiki 2004) or for supporting the ceiling of the kiln (Aosaki et al. 1983: 10).

The Tsurumine kiln site cluster is located near the former Satsuma provincial capital, and about 1 km from the site of the former provincial temples. During the early eighth century, one kiln produced Sue ware, and two kilns produced roof tiles (Oda & Kawaguchi 1975). The remains show that this kiln cluster was built with the purpose of supplying roof tiles and Sue ware to the Satsuma provincial offices and the provincial temple. The kiln site for Sue ware was the semi-underground type and had two pillars, one located in the center and the other against the wall of the kiln.

Nakadake Sanroku was in operation from the ninth century through the early tenth century (Kamimura 2005: 246). It was located 50 km away from the Satsuma provincial capital (Fig. 17.2), far from where kilns would be situated if their purpose was to provide Sue ware to the provincial offices and the provincial temple. The site is located in Ata, the seat of local power in Satsuma prior to the establishment of the province, near the Manose River estuary, an important area for trade from prehistoric times until the fifteenth century. The location raises some interesting research questions about the power of the local elite, the kilns’ proximity to the Manose River port, and the environmental conditions for pottery production.

17.3. The Nakadake Sanroku Sue Kiln Site center

17.3.1. Research history

Nakadake Sanroku is located along the lower southwest side of Mt. Nakadake, a 287 m sandstone hill. The hillsides are etched with gullies, a topography which is well suited for Sue-ware kilns (Fig. 17.2). It was discovered in 1984 (Kamimura 1984: 191) when erosion due to intensive rainfall began to reveal ash heaps and kiln sites. However, no excavation had taken place in the 30 years since its discovery, and the last field-walking prospection for more than 30 years was in 1985. Therefore, the entire size of the kiln site center, the period that it was in operation and the construction style of the kilns, as well as the kinds of pottery produced there, were not understood until recently.

When field-walking prospections were carried out in 1984 and 1985, five kiln site sub-clusters were confirmed. At one of these, sub-cluster Arahira 1, remains of five kilns were identified on a slope, artifact finds were reported, and a topographical map of the sub-cluster area was created (Kamimura 1984, Kamimura & Tsubone 1985).

In 2012, tentative prospections showed that erosion had increased significantly and had almost completely destroyed some of the reported kiln sites in the Arahira 1 sub-cluster, but some potential kiln site areas reported in 1985 were confirmed again, and additional sites were discovered (Nakamura 2014: 283–85). Concentration of sherds, kiln furniture and wall fragments in a wider region on Mt. Nakadake hinted at a larger number of kilns in the cluster and an even wider extension of the whole production center than originally estimated.

Since 2013, the JSPS has supported a new approach of systematic research on an international and interdisciplinary level that was new to Sue-ware research and to kiln research in Japan. Excavations were carried out five times from 2013 to 2019, during which the structure of one of the kilns and artifacts found in a nearby ash pile were fully investigated (Nakamura 2020). Systematic analyses of samples from the excavation and prospections, as well as geographical investigations, are still being carried out, and a preliminary report is available (Nakamura & Shinoto eds. 2015), and a comprehensive report in English is in preparation.

17.3.2. Historical context and research hypotheses

Considering the historical context of southern Kyūshū as explained in the previous sections, the following questions are of particular interest: (1) From where did the technique and craftsmen come? (2) Why was the kiln site center set up at the foot of Mt. Nakadake?

To answer these questions, attention must be given to the following interrelated issues:

- The subjugation of the Hayato and the role of Ata.
- The role of the central administration in provincial governments.
- Immigration from other regions.
- The process of incorporating the southern regions into the Japanese state.
- The development and intensification of trade and exchange with the Ryūkyū islands.

The next two sections cover earlier research which played an integral part in the formation of our hypotheses.

17.3.2.1. Craftsmen and technology

From the time the kiln sites were discovered until 2013, numerous artifacts were collected at the site and surrounding areas which hinted at the specific techniques that had been used at Nakadake Sanroku (Fig. 17.3).
Figure 17.2. Structure and size of the Nakadake Kiln Site Center as revealed by ground-walking surveys in 1985, 2012, 2014 and 2015 to 2019 (top). Estuary of the Manose River, related harbor sites and the ancient access to the sea (bottom). Created from DEM Nr. 4730-12 (2016-10-01) (https://fgd.gsi.go.jp, downloaded 2020-02-23) by M. Shinoto (top) and (bottom) by the author with KASHMIR 3D from the same data source. Information about the former river location was taken from Yanagihara (2017: fig. 1).
Figure 17.3. Sue vessels from Nakadake Sanroku (collected in surveys in Nakadake Sanroku in 1985, 2012, and excavated at Shibahara site (Seki et al. 2012)) (1–6, 8 from Nakamura & Shinoto eds. 2015: fig. 6, 8, 12, 16; 10–14 from Seki et al. 2012: fig. 54, 58, 68, 69; 13, 14 (photos) from Seki et al. 2012: beginning of the book).
These artifacts had four similarities with those found at the Arao kiln site center in Higo Province, which led to the hypothesis that potters immigrated from Arao and introduced their techniques.

First, the main vessels produced at both sites were storage containers, like jars and pots. At the Arao kilns, by the ninth century, more storage containers were being produced than tableware. Likewise, the sherds of Sue ware collected at Nakadake Sanroku were only from storage containers. In examining the typology, the shapes of Sue ware found at both sites were similar, namely pots (kame) and jars (tsubo). Furthermore, Nakadake Sanroku is estimated to have been in operation from the second half of the ninth century (Amita 2003: 366).

Second, the flat bottoms of the pots that have been found in both kiln site centers show traces of anvil markings (Kamimura & Tsubone 1985: 170). The high ratio of anvil marking on flat-bottomed pots is characteristic of artifacts found at the Arao kiln site center (Amita 2003: 366).

Third, the shapes of the pots and the designs of the anvil marks are similar. To make it easier to remove the paddle and anvil from the surface of the Sue ware, the surfaces of the paddle and anvil were carved with patterns, such as parallel lines, concentric circles, and in one rare case, a wheel design. This wheel design was found both at Nakadake and at the Arao kilns (Amita 2003: 366).

Fourth, clay that contained straw was used for the kiln walls and stands (Fig. 17.5). Many lumps of clay that had been mixed with straw have been found at the Nakadake and Arao kiln sites (Kamimura & Tsubone 1985: 162; Becker et al. 2015). While this is also seen at other kiln site clusters, it is a common method both in Arao and Nakadake Sanroku.

To sum up the observations, the similarities both in kiln materials and in the process of molding the Sue ware suggest an exchange of technical knowledge and even a dispatch of craftsmen from Arao to Nakadake. Since the Arao kiln site center predates the Nakadake kilns, Kamimura (2005) concluded that Arao potters immigrated to Ata and started Sue-ware production in Nakadake Sanroku under the management of the Ata district offices.

This leads to the second set of hypotheses regarding Nakadake-Sanroku’s relation to the provincial government in northern Satsuma Province and to the nearby district administration.

17.3.2.2. Location and size of the Nakadake Sanroku kiln site center

Since its discovery, the number of potential sub-clusters has led to a relatively high estimated number of kilns that were in operation at the site, about 30 according to Kamimura at an early stage of research (Kamimura & Tsubone 1985; see fig. 2). Such a number is too high for district-level administration, so a relation to the provincial capital could not be ruled out, despite its distant location and the number of kilns, which far outnumber what would have been expected in a poor and small province like Satsuma. These factors have led to three alternative hypotheses as to why Nakadake Sanroku was chosen:

a. Good conditions for pottery production: clay, water, firewood.
b. Political power of the Ata region in contrast to the provincial administration.
c. Convenience for trade to the south, being near the active port of Shibahara site and its trading experts.

In southern Kyūshū, fuel and water are relatively easy to procure because the land is covered by mountains and forests, so these should not have been of concern when searching for a location for a pottery production center. The availability of raw materials could have been the main consideration. A geological map of Kagoshima Prefecture (Committee for the Edition of the Geological Map of Kagoshima Prefecture 1991) shows that the soil found in the area within 10 km of the Satsuma provincial capital is the same type of sandstone of which Nakadake is made. The project was set up to investigate the soil at Nakadake Sanroku in more detail.

As for the second hypothesis, it must be remembered that Ata was the seat of local power in Satsuma prior to the establishment of the province. When deciding where to establish Sue-ware production in Satsuma Province, the political and economic power of the various districts may have been taken into consideration, but this is difficult to investigate with the current archeological record.

Various archeological studies prior to the beginning of the recent Nakadake Sanroku project back up the third hypothesis: One of the most notable features of Mt. Nakadake is its location near the Manose River estuary, with its important role in trade. Earlier XRF analyses of a number of main and minor elements showed chemical overlaps with sherds from Nakadake Sanroku in sherds unearthed as far away as Tokunoshima and other Ryūkyū islands (Mitsuji 1985, Ikehata et al. 2008). This is interpreted as evidence for a distribution of products from Nakadake Sanroku far to the south and outside the borders of the ancient Japanese state.

Ports related to Mt. Nakadake have also been identified. The Shibahara site is located on the bank of the Manose River, 2 km from Nakadake Sanroku (Seki et al. 2012). Many kinds of storage containers produced at Nakadake Sanroku have been unearthed at the Shibahara site. Since Nakadake Sanroku is a production center from which complete vessels were exported while only fragments of rejects were left on site, we do not find fully preserved products in the kiln site center itself. However, many larger pieces of Sue ware with the same typological characteristics as those produced at Nakadake Sanroku have been excavated from the Shibahara site.
In addition, the remains of buildings considered to be warehouses have been found, as well as a sekitai – a decorative stone belt worn by low-level officials. These findings indicate that Shibahara was an administratively managed port facility (Seki et al. 2012: 484).

In the Mottaimatsu site adjacent to the Shibahara site, a large quantity of ceramics from China and South East Asia which were produced from the eleventh to fourteenth century have been excavated (Miyashita 1998, Nukumizu et al. 2007). It has been pointed out that the port administrative facilities from the ninth and tenth centuries found in the Shibahara site might have developed as a base for foreign trade in the medieval period (Seki et al. 2012: 486).

Although it is currently difficult to prove the second hypothesis with archeological methods alone, provenance studies and other scientific methods seem promising in solving the first and third hypotheses accompanying excavations, prospections and other archeological studies.

17.4. Recent international research at Nakadake Sanroku

17.4.1. Overview of the progress since 2012

Since 2012, the Nakadake Sanroku kiln site center and its surroundings have been subject to intensive and thorough research. While trying to find answers to the hypotheses described above, the investigations will also confirm the extent of the site. Excavations were conducted at the sub-cluster in Arahira 2, which was discovered in 1984. The excavations were an international joint research project involving researchers and students mainly from Japan and Germany.

In the 2012 field survey (Fig. 17.2), many Sue sherds were found in sub-clusters Arahira 1 and 2, where Arahira 2 was relatively well preserved in comparison to the sub-cluster Arahira 1. Since 2013, our research team has received JSPS KAKENHI Grants for seven years and has been able to conduct five excavations in Arahira 2.

In 2014, since most finds had thus far been concentrated on the western slope of the valley, trenches were mainly dug in the western area, and in one such trench part of a kiln was unearthed (Nakamura and Shinoto eds. 2015: 10, Becker et al. 2015, Shinoto et al. 2015). This kiln was named “kiln site No. 1.” Sherds of Sue ware and burned lumps of earth and clay were found in another trench below kiln site No. 1. They were debris from an ash heap (haibara).

From 2016 to 2019, excavations focused on a thorough investigation of kiln site No. 1 as well as locating and then excavating kiln ruins on the eastern slope.

Since Kamimura & Tsubone (1985) had identified kiln ruins on the eastern slope, magnetic surveys were conducted to search for kilns at the second Arahira kiln site cluster in 2017 (Hatakeyama et al. 2019). Anomalies in the earth’s magnetic field were detected on the eastern slope, so seven trenches were opened on that side. Burned bedrock and burned rocks were found in four of the trenches that were dug across the line of magnetic anomalies. Since the burned area was spread in a continuous belt, it is presumed that there had been a kiln and that its ruins had been scattered.

In order to determine the scale of the kiln center, along with the excavations, several field surveys were conducted throughout Mt. Nakadake (Nakamura & Shinoto eds. 2015: 7, Matsusaki 2018). The remains were hard to detect in the densely forested, mountainous area. Therefore, LiDAR data analysis was considered the method of choice for effectively identifying additional kiln sites. In 2018, with the cooperation of Nakanihon Air Service Co., Ltd., a LiDAR survey covering an area of 0.5 km² at the southwest foot of Mt. Nakadake was conducted (Shinoto et al. 2019), and in 2016 and 2017, geological and mineralogical surveys were also conducted in order to find suitable places for kilns and to research clay used for Sue ware (Steup 2017).

17.4.2. Surface investigation and LiDAR

As a result of surface investigation, artifacts have been found at 23 points covering an area of 4 km² on Mt. Nakadake. These points are concentrated in the southwest section of Mt. Nakadake, but new finds from 2019 hint at kilns in a separate valley in the south east (Fig. 17.2). There are pieces of kiln walls at 15 of these points, which are therefore considered part of the kiln site cluster. Five kiln sites have been discovered at the first Arahira kiln site cluster (Kamimura & Tsubone 1985), and if the other site groups have the same number of kilns, it is estimated that there are over 70 kilns at Nakatake Sanroku.

In 2018, LiDAR data analysis on a 0.5 km² test area in the center of the area covered by ground-walking surveys earlier succeeded in identifying some characteristic landforms that determine buried kiln sites in the first stages of interpretation of various visualizations. Tentatively, 65 elongated depressed topographies found on several slopes were deemed potential kiln sites, but a significant number may be natural depressions. Verification of the sites by ground-walking surveys could only be performed in one smaller valley, but at least two kiln sites, ash heaps and pieces of Sue ware could be verified as a result of the LiDAR findings (Shinoto et al. 2019, Doneus et al. 2019, Herzog et al. 2021).

Taking into consideration the results of surface investigation and the LiDAR data analysis, the number of kilns is large considering other sites that are typically found in rural provinces. It is estimated that this site operated on a larger scale than most other local Sue-ware production areas.
17.4.3. New discovery of artifacts

Many of the artifacts collected after 2012 were similar to those found in the past, such as pots and jars of Sue ware, fragments of kiln walls and clay stands, but there were some new discoveries. One is a piece of the shoulder of a jar on which a character is engraved (Nakamura & Shinoto eds. 2015: fig. 8-21), and the other is a piece of an inkstone made of Sue ware (Nakamura & Strätler 2017: fig. 4). Both were collected from the first Arahira kiln group.

About two-thirds of a Chinese character was engraved on the surface of the jar, which can be interpreted as “貢 (shin)” or “貢 (kō).” However, the reason why the character was engraved is unknown. The “貢” character was found to be written in black on three pieces of Haji ware found at the Hashimuregawara site in the southern part of the Satsuma peninsula. If the character was “貢,” it could be related to taxation.

From the eighth to the tenth century, many pieces of Haji and Sue ware were found to have characters written on them, but some of them were not accurate characters. Although a part of the character mentioned above is missing, it is an accurate character and was inscribed before the Sue ware was fired. This shows that some potters were able to write characters, and it is a sign of the social position of the potters and their leaders.

Inkstones are tools used by government officials and priests. The discovery of an inkstone in Nakadake indicates that Sue ware produced there was supplied to government offices and temples.

17.4.4. Excavation of a kiln and related structures

17.4.4.1. Kiln 1

Kiln site No. 1 (Fig. 17.4, 17.5) was found on the western slope of the second Arahira kiln site cluster, with a gradient of the firing chamber of 45 degrees. Kiln site No. 1 is the only kiln that has been excavated and analyzed at Nakadake Sanroku, and it is from this that we have learned the details of the kiln structure.

Fortunately, the kiln was well preserved. The whole form except the ceiling was uncovered, revealing the ruins of an underground kiln. The inside of the kiln was filled with earth and sand, and the ceiling of the kiln had collapsed; the floor and some of the walls remained intact. The lower half of the kiln had a sandstone base, as the kiln had been made by hollowing out a bed of sandstone.

The surface shape of the kiln is long and narrow, with a length of 6 m and a maximum width of 1.8 m. The height difference between the floor of the entrance and the flue was 4.5 m. The width of the furnace opening was 1 m. It is the largest kiln among Sue-ware kilns discovered in southern Kyūshū. The floor of the 2 m long firebox was inclined slightly so as to rise toward the firing chamber. The floor of the firing chamber had a length of 5 m with an inclination of 40–45 degrees.

Clay stands, used to hold the pottery in place during firing, remained in place at the rear of the kiln, but in the center, the stands had become displaced and tumbled to the bottom of the incline. The clay stands at the rear of the kiln were small, with a width of 0.2 m and a length of 0.15 m. They were used for small-sized Sue ware. There were large stands among the tumbled stands which were for large Sue ware, and they were presumed to have been placed in the front half of the firing chamber. It is presumed that large Sue ware and small Sue ware was placed in the front and the back respectively, and that they were fired in the same way as at the Kita-Urayama A kiln in the Arao kiln site center in Higo region.

There was an upright flue at the rear of the kiln. It was about 0.8 m long and its inner diameter was 0.5 m. The flue opening and the brittle rock surface surrounding it were flat. The surrounding rock seems to have been smoothed to provide a workspace. Holes for roof supports were not found around the flue opening.

Two layers of walls have been identified on either side of the entrance. The two wall layers of this kiln show that the kiln entrance was walled off at least two different times. This indicates that kiln No. 1 was not a single-use kiln. The entrance was filled with stands. It seems that when the kiln was abandoned, the potter closed the entrance with stands from nearby abandoned kilns.

A hole was found under the floor from the entrance to the firing section. The hole was not completely excavated, but a sub-trench 0.3 m in width was placed along the center axis of the kiln. From the section confirmed in the sub-trench, the length of the hole was 2.3 m, and the depth was estimated to be over 0.5 m, though the bottom could not be confirmed.

This type of hole is called a boat-bottom pit due to its shape. The hole was filled with soil and covered with charcoal, and so it is thought to have been dug shortly before the kiln was fired. It is assumed to have been made so that the potters would have more room in which to maneuver to place the Sue ware in the kiln. Systematic analyses of the kiln construction, materials used and firing technology are still ongoing.

17.4.4.2. Artifacts found in the kiln and its ash heap

There were few sherds of Sue ware inside the kiln. The artifacts found in the kiln were clay stands and fragments of the kiln. Some of the fragments contained large amounts of organic temper. X-ray investigation of a fragment with a thickness of 0.2 m showed the layers of soil bending like an arch from side wall to ceiling (Becker et al. 2015). Since the lower side wall remained intact and was not covered...
with a thick layer of clay, the fragment may have been part of the ceiling of the kiln.

An ash heap was found in a trench located 5 m to the northeast of kiln site No. 1. The upper side of the ash heap was destroyed by cultivation during the late modern period. However, a 0.3 m thick portion of the ash heap remained, and many sherds of Sue ware, stands and kiln walls were found. Because of the relative positions of kiln site No. 1 and the ash heap, the ash heap was presumed to have held the waste from kiln site No. 1.

Radiocarbon dating of charcoal collected from the ash heap showed Cal AD 775–890 (1σ) (Kokankyō Kenkyūjo 2015). Thermoluminescence dating of the kiln wall determined that it had been used in the ninth century (Shitaoka et al. 2018), which is consistent with the results of radiocarbon dating.

Figure 17.4. Excavation at kiln No. 1 in Arahira 2, Nakadake Sanroku. Longitudinal section of the kiln (top) and location of trenches (bottom).
The sherds of Sue ware excavated in the kiln and the ash heap are considered to have been fired in kiln No. 1. Most of them were containers such as jars and pots, and less than one-tenth of them were bowls.

17.4.5. Geology and analyses of raw materials and products

Mineralogical studies using the typical set of methods, XRF (X-ray fluorescence analysis) and XRD (X-ray diffraction) for sherds, soil samples and parts of kilns, and SEM and several other methods of analysis for thin sections of the sherds, have been carried out, and a detailed geological map was created. The soil surrounding the kilns is a ubiquitous yellow layer of sandstone containing clusters of rock, soil and good quality clay at various stages of weathering (Steup 2017). Among the various types of soil found in Nakadake, weathered sandstone is the most suitable material for Sue ware. As a result of analysis, it was determined that the clay has features similar to Sue ware but is not exactly the same. The raw material was probably processed in several ways (Raith & Hoffbauer 2015, 88) to increase its plasticity, which led to the different properties of the sherds. In addition, mineralogical analysis revealed traces of high temperatures (1050–1150°C) in all sherds.

An experiment in Sue-ware firing was conducted with the cooperation of a potter who produces ceramics with clay from the southern Satsuma region. For the experiment, clay dug from the second Arahira kiln site cluster was used. The results showed that the freshly dug clay has a low heat-shrinkage percentage and was suitable for use in high-temperature kilns, yet it was not suitable for Sue ware, due to its lack of plasticity making it difficult to shape. However, after one year of storage, the clay viscosity increased enough for it to be used in Sue ware. This experiment also tested weathered clay, and showed that it was not the best material for Sue ware but that it could be used if it was improved through storage and/or the addition of other material.
17.4.6. Provenancing

From 2014, the application of Neutron Activation Analysis (NAA) has been carried out on sherds, kiln fragments and soil (Sterba 2015, see Sterba in this volume). NAA of sherds from the Nakadake Sanroku kiln site center unveiled “chemical fingerprints” of the pottery, and analysis of sherds found on the Ryūkyū islands was conducted to find matches with these fingerprints.

The analysis of sherds from the Nakadake Sanroku kiln site cluster produced several groups, which may hint to the existence of several workshops in the kiln cluster, or perhaps to other reasons, such as differentiation in raw material selection or preparation or simply change in raw material over time.

Sherds of Sue ware which fit into the NAA groups found at the Nakadake Sanroku kiln site cluster have been found southwards down to the central part of the Ryūkyū islands, particularly on Kikai Island, and matching sherds were found at the Matsubara site on Tanegashima (Sterba 2015), which was part of Osumi Province in the ninth century. As mentioned above, the distribution of Sue ware from Nakadake Sanroku to the Ryūkyū islands had been suggested by XRF analysis earlier, and the rigid NAA analyses reinforced this.

NAA can minimize the destruction of artifacts because only a small amount of sample (50–150 mg) is used for analysis. Because many of the sherds found at Nakadake and on the southern islands are small, it is difficult to estimate their provenances typologically. Through NAA, we expect to obtain results on the provenance of many of these small sherds of Sue ware, and NAA studies on a larger scale are ongoing. Recent research suggests the fine-grained chemical groups based on NAA analyses may be used for chronological classification of sherds that are so fragmented that chronological identification based on archeological typology is impossible (Sterba et al. 2020).

17.4.7. Intermediate results from recent research

Because Sue ware from Nakadake Sanroku was distributed widely to the south beyond the ancient Japanese state and has been found in locations known to be trading centers, I am led to conclude that the purpose of establishing the Nakadake Sanroku kiln center was mainly for trade.

17.5. Conclusion

This chapter started with a description of the geographical and historical background of the Nakadake Sanroku kiln site center and then covered research that relates to the unique role and location of the site.

The Nakadake Sanroku kiln center was built in the Ata district, 50 km away from the provincial capital and Kokubunji temples, which were considered to be the main places to which Sue ware was supplied after the establishment of the provinces in the eighth century. Ata was the center of the indigenous Hayato on the Satsuma peninsula and the only site producing Sue-ware kilns in Hayato territory. The Hayato were considered a separate ethnic group until the end of the eighth century. The Nakadake Sanroku kiln center started producing Sue ware in the ninth century. This means that soon after the Hayato became incorporated into the Japanese state, the Nakadake kilns were purposely built far from the provincial capital, the stronghold of the local Japanese government. It is assumed that the Nakadake Sanroku kiln center was not only set up in order to supply the state administration, as is generally seen in local Sue-ware production areas, but also with exchange with the southern islands in mind.

Including the intermediate results of recent Nakadake Sanroku kiln site center research projects, the following four points can be summarized regarding the purpose of installation and the characteristics of this kiln center:

1. The topography and geology of Mt. Nakadake are suitable for Sue-ware production, although the clay is not ideal. In addition, the same geology and geography existed near the Satsuma provincial capital, so it cannot be said that geography and geology were the primary reasons for its establishment.
2. The structure of the kilns, the types and forms of the Sue ware produced, and the molding techniques are all highly similar to those of kiln sites in the Higo region, and so it is assumed that Higo craftsmen settled in the Nakadake area.
3. The number of Sue kilns verified in the Nakadake Sanroku amounts to 30 based on the surveys in the 1980s, but an estimate may well go beyond 70 kilns. This is large scale for local production of Sue ware in the ninth and tenth centuries. On the other hand, the governmental offices and temples in Satsuma Province, which are considered to be the main places supplied with Sue ware, are small in scale and therefore could not have factored in such a large production of Sue ware.
4. The distribution of Sue ware from the Nakadake Sanroku kiln site center covers a wide area that has been confirmed up to the central part of the Ryūkyū islands. The remains of a harbor were also found in the vicinity of Mt. Nakadake. This harbor later became a base for foreign trade in the medieval period.

From the above, it can be concluded that the main purpose of establishing a Sue-ware production area in Mt. Nakadake was to produce Sue ware for trade. The reason why the kiln was purposely built in Ata, which had been the center of local government, was not only because it was geographically and geologically suitable, but also because it was a base for trade with the Ryūkyū islands from prehistoric times and the people there already had the necessary experience with trade and seafaring.

The most interesting part is the role that Nakadake Sanroku played in the growth of trade centered in the Japanese
south. The trade route for Sue ware from the Nakadake Sanroku kiln center developed into a foreign trade route that became active after the eleventh century and eventually led to the connection with Western societies in the sixteenth century.

In understanding eras for which written sources are virtually nonexistent, the Sue ware from Nakadake distributed to the islands can provide an important source of information. The distribution of Nakadake Sue ware sheds light on ancient sea trade routes to the south, as well as the development of trade in southern Kyūshū and the Ryūkyū islands from the eighth century through the flourishing Middle Ages.

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Production at the Kamuiyaki Kiln Site Cluster and the Connection of the Ryūkyū Archipelago to Surrounding Societies During the Eleventh Through Fourteenth Centuries

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Abstract: Kamuiyaki is a stoneware that was produced in Kamuiyaki on the Ryūkyū island in Tokunoshima in the southwest of Japan between the eleventh and fourteenth centuries. In this chapter, the technological roots, production, distribution, consumption and typology of Kamuiyaki are introduced and the background of its formation, development and decline are discussed. While the technology was transferred from overseas, the production trend is related not only to the economic development in medieval East Asia but also the upgrading hierarchical organization on the Ryūkyū. Besides kiln technology, Kamuiyaki offers important information about the state formation of Ryūkyū in a time for which written documents are scarce on the islands.

Keywords: Ryūkyū archipelago, Kamuiyaki, Gusuku period, Japanese Middle Ages, Goryeo stoneware, status-symbol culture

18.1. Introduction

The Kamuiyaki kiln site cluster in Tokunoshima is the oldest stoneware industry site in the Ryūkyū Islands. It was not based on the techniques for production of the local earthenware or the ancient Sue ware of southern Kyūshū, but was established on the basis of the stoneware technology of the Korean peninsula during the Goryeo period (918–1392). The emergence of Kamuiyaki signals that the Ryūkyū Islands had entered into the commercial area of East Asia, and this was the first step of the Ryūkyū archipelago in becoming connected with international societies. The Kamuiyaki kiln site cluster was designated as a National Historic Site of Japan in February 2007 because of its importance for understanding the Ryūkyū society and economy in an era when no texts were recorded.

18.2. The geographical environment of the Ryūkyū Islands and Tokunoshima

The Ryūkyū archipelago is the southernmost part of Japan, and consists of about 200 islands scattered between Kyūshū and Taiwan (Fig. 18.1a). It is characterized mostly by coral reefs in this subtropical climate area. The Ryūkyū Islands are divided into the Ōsumi Islands, the Tokara Islands, the Amami Islands, the Okinawa Islands and the Sakishima Islands, the proximate location of which is on the map (Fig. 18.1b). These islands are composed of volcanic islands (kōtō high islands) and of coral reef islands (teitō low islands). The former roughly corresponds to the area from the Ōsumi Islands to the Tokara Islands, and many of the latter are to the south of the Tokara Islands.

Volcanic islands are characterized by rich water and wood resources (Mesaki 1985: 12–21, Takanashi 2001: 221–30). Tokunoshima, included in the Amami Islands, is classified as a kōtō type island. On the central axis of Tokunoshima, there are six mountains with an altitude of over 400 m, and they are surrounded by terraces and dunes of Ryūkyū limestone (Fig. 18.1c). Isen Town, where the Kamuiyaki kiln sites were discovered, is located in the southern part of Tokunoshima, and its main industry is agriculture. The west coast of Isen Town has a wide, raised plateau of Ryūkyū limestone, and cliffs have been formed due to sea erosion. Coastal terraces and dunes have been formed from the south to the southeast. Contrasting topography can be seen in the east and west area of Isen Town. There are six rivers in Isen Town, which start from a high terrace close to the kiln site and flow radially into the sea through underground caves and valleys (Fig. 18.1c). Its highest mountainous area is composed of slate, tuff and diabase, and the surrounding plateau corresponds to the granite, Ryūkyū limestone and gravel zone. This means that topographical features are closely associated with its geology. According to a survey of natural vegetation (Terada 2015), the flora of the mountainous areas was similar to that of the Ryūkyū Aoki (Psychotria rubra (Lour.) Poiret)-Sudajii (castanopsis Sieboldii Subsp.) community. These results show that the plant distribution corresponds to the particularities of topography and geology.

18.3. The historical background of the emergence of the Kamuiyaki kilns

The Ryūkyū archipelago has a different history from its Japanese counterparts. First, the age of hunter-gatherers...
Figure 18.1. Geographical context and distribution of sites and cultural areas mentioned in this chapter. a: Location of the Ryūkyū Islands. b: Major islands, prehistoric cultural areas from north to south, distribution of Kamuiyaki pottery. c: Location of the Kamuiyaki kiln site cluster and related sites in Tokunoshima (Maps are redrawn by the author from Shinzato 2018: 2(a), Shinzato 2018: 2(b), Shinzato & Tsune eds. 2018: 5(c)).
In the prehistoric age of the Ryūkyū Islands, there were three cultural areas (Fig. 18.1b); the first is the northern area (Hokubu-ken), closely related to the pottery culture of Kyūshū (Ōsumi Islands–Akuseki Island in the Tokara Islands); the second is the central area (Chūbu-ken), with its own pottery culture (Tokara Island and Kodakara Island in the Tokara Islands, Amami Islands and Okinawa Islands); and the last is the southern area (Nanbu-ken), which also shows some contacts with Taiwan and the Philippines (Miyako Islands and Yaeyama Islands) (Kokubu 1966: 34–40). Since the north side is close to Kyūshū and the south side is adjacent to Taiwan, these cultural characteristics had a tendency corresponding to their location on the map. We can see such a diversity of material culture despite the common subtropical environment.

The proto-history period that followed is called the Gusuku period, during which the entire Ryūkyū archipelago reached the stage of a production economy supported by agriculture and livestock farming (parallel to the late Heian to Nanbokucho period, about eleventh to fourteenth century) (Asato 1990: 110–11). Rice, barley, wheat, foxtail millet, millet (Takamiya & Chida 2014: 132–37) and the bones of cows and horses used as livestock (Toizumi 2011: 123–26) have been excavated from many sites in the Ryūkyū Islands. These provide archeological evidence of the beginning of the Gusuku period. In addition, we can see a decrease in tortoises (Ryūkyū-ymagame (Goeomyda japonica) compared to the previous era (Toizumi 2011: 124) due to the land development aimed at the maintenance of the gusuku (castles), villages and cultivated land. This shows that these social changes also had an impact on the surrounding environment. Widespread distribution of commodities had also begun. Kyūshū’s tare pots for boiling were circulated throughout the Ryūkyū Islands, and local earthenware with the shape of these was produced in the Amami, Okinawa and Sakishima regions. The stoneware manufactured in Tokunoshima (Kamuiyaki) was used as a set of tableware with these kinds of pots and Chinese ceramics. This means that the prehistoric Chūbu-ken and Nanbu-ken above were integrated into a common pottery cultural area.

In the first half of the Gusuku period (mid-eleventh century to mid-thirteenth century), pottery production, iron production and goods distribution started in earnest, and in the latter half (late thirteenth century to fourteenth century), the fortresses (gusuku) were constructed prosperously. Then, at the end of the fourteenth century, the three chiefdoms (Hokuzan, Chūzan and Nanzan) on the main island of Okinawa entered into tribute trade with the Ming Dynasty of China. The Gusuku period was an epoch-making era in which a more organized society (social division of labor, stratification etc.) was formed than before, and was also the premise of the Maritime City Nation Ryūkyū kingdom. In the Ryūkyū islands, a long-term, constant hunter-gatherer era continued, and there was the establishment of the Ryūkyū kingdom shortly after the spread of agriculture. Imbalance between the two is among the major characteristics of its history.

The Song Dynasty succeeded in turning high-quality goods such as ceramics into inexpensive mass products by promoting its own industry, and its development of marine transport led to these becoming widespread in the surrounding areas (Kamei 1986: 30; Yoshioka 1994: 38; Tsuchihashi 1997: 61). Japan’s medieval era and Ryūkyū’s Gusuku period correspond to this age. Hakata in northern Kyūshū was the international port city at which there were Chinese merchants called Hakata Gōshū. They set up their houses in Hakata and engaged in large amounts of goods trade from their homeland (Kamei 1986: 30). This trading system is called Jūban Bōeki (Kamei 1986: 24–35). On the other hand, great green turban shells (Turbo marmoratus) and trumpet shells (Charonia tritonis) from the coral reef areas of the Ryūkyū Islands (Kinoshita ed. 2002: 129–34, Takanashi 2005: 251–56) and sulfur from the Ōsumi Islands (Yamauchi 2009: 56–58) were shipped to Hakata. In this way, the Ryūkyū Islands became incorporated in the East Asian commercial zone through Hakata. This is the historical background of the various kinds of tableware that were transported from distant regions such as China, the Korean peninsula and Japan to the Ryūkyū Islands. From the perspective of the Ryūkyū’s state formation, Pearson paid attention to the establishment of Kamuiyaki in such a historical context. He noted that the emergence of its population, distribution and consumption promoted population increase, technological diffusion, economic development, distribution patterns and social complexity, and they involved the creation of new identity. He also asserted that this process in the Ryūkyū Islands was part of medieval history in the Japanese archipelago (Pearson 2007: 145–46). Thus, Kamuiyaki is not only an archeological material symbolic of a time when the society
of the Ryūkyū Islands had begun to change significantly, but is also an important cultural heritage that is helpful in the reconstruction of East Asian history. Furthermore, this history is not limited to the Japanese archipelago. Due to its importance, the Kamuiyaki kiln site cluster was designated as a historic site in Japan in February 2007.

18.4. The discovery of the kiln

The earliest archeological record of Kamuiyaki pottery can be found in the manuscript “Local History Research ‘Tokunoshima’ in 1932,” by Yūryō Hirose, a local researcher who lived in Tokunoshima (Hirose 2019 [1933]: 43). Hirose discovered a small jar that had been stored in a private house in Kametsu Village, Tokunoshima. He introduced this jar as a pottery of Japan’s medieval period, with his own sketch of it. However, Hirose died at a young age, and the report was not officially published. Therefore, it was not until after World War II that Kamuiyaki pottery came to the attention of Japanese archeologists. After the 1950s, during which time there was a full-scale archeological survey of the Ryūkyū Islands, it became known that hard burned gray stoneware had been discovered along with Chinese ceramics in several sites of Amami and Okinawa (Tawada 1956). Kamuiyaki was excavated together with tacle pots from Kyūshū, so archeologists thought that its origin was the Japanese archipelago at the beginning of the research (Kokubu et al. 1959: 248). Subsequently, some theories were announced that its production area was the main island of Okinawa (Tomoyose 1964: 19) or the Korean peninsula (Mishima 1966: 51). Then materials showing the overall shape were found in the Tokara Islands and the Amami Islands; from a comparative study of manufacturing skills, the opinion that Kamuiyaki’s technique was related to the ceramics technology of the Korean peninsula was proposed. Focusing on the wavy pattern and the firing technique, Kazumi Shirakihara pointed out the relationship between the ceramic pottery of the Korean peninsula and Kamuiyaki (Shirakihara 1971: 264). Based on the similar patterns of Kamuiyaki pottery and Koryo roof tiles, Tadashi Nishitani thought that the production skills of Kamuiyaki came from the Korean peninsula during the Goryeo era (Nishitani 1981: 83–84).

Till the kilns were found, the production site of Kamuiyaki remained a mystery for a long time. However, the discovery of the kilns on Tokunoshima Island in 1983 led to the question of the industry being solved immediately. Nobuhiro Yotsumoto, who was working at the Isen Town History and Folklore Museum, found that many pieces of pottery, charcoal and burned kiln wall clay were scattered at the pond’s renovation work area in Asan, Isen Town. After confirmation by Norikazu Gi, a local researcher who lived in Isen, and several archeologists from the Kagoshima prefecture and Amami-Ōshima Island, they concluded that Tokunoshima Island was indeed the production area of Kamuiyaki pottery (Gi & Yotsumoto 1984). Before its homeland was revealed, this pottery was called ruisueki (Shirakihara 1973:11, 1975: 112), but then they named Kamuiyaki officially after the local name of the discovery area.

18.5. The history of kiln investigation

From October to November 1984, the year following the discovery of the kiln, the first confirmation survey was carried out with the aim of conservation, and three kilns and six ash heaps were excavated (Asan Kameyaki Group Area II, Fig. 18.2a). In addition, seven new kilns were found on the slope of a farm road located 50 m southwest of this area (Asan Kameyaki Group Area I). Since the former group would sink underwater in the pond after maintenance, an urgent full-scale survey of all the kilns in the construction area was carried out (Shintō & Aozaki eds. 1985a), and finally seven kilns, one pottery disposal pit and several ash heaps were excavated, and many relics were recovered (Shintō & Aozaki eds. 1985b, Fig. 18.2: b). The investigation of the production site revealed the kiln structure and size, the inclination angle and the height of the firing chamber, the shape of the firing entrance and the flue, and new knowledge about the vessel composition was gained (Fig. 18.3: 1).

Based on the shape of the kiln, and the existence of a bowl that imitated Song Dynasty Chinese ceramics, a technical and contemporary relationship with the Sagariyama kiln in southern Kyūshū was revealed (this is discussed below). Results from radiocarbon and geomagnetic dating concluded that the date of the kilns was between the eleventh and the thirteenth century (Shintō & Aozaki eds. 1985b: 97). In 1985, the range of the production area expanded to the east side due to the discovery of other kilns on the hill slopes southwest of the groups investigated in 1984 (Ushinohama & Inoue eds.1986: 13–14). Then, in the third investigation, carried out from 1996 to 1999, due to the general survey at the entire area of Mt. Hirasuku, new kiln groups were discovered, and the range of the production area expanded further to the east (Aozaki & Inō eds. 2001, Fig. 18.2: a). From 2001 to 2005, high-precision topographic maps around kiln sites were created, and good residual status of kilns was confirmed by magnetic and electrical surveys (Nishiguchi 2005). A natural science analysis was also conducted involving the radiocarbon dating of carbons excavated from ash heaps (Paleoenvironment Research Institute Co., Ltd 2005a), the identification of tree species (Paleoenvironment Research Institute Co., Ltd 2005b) and an XRF analysis of excavated sherds (Mitusuji 1985, 2001, 2005). Archeologists from the Ryūkyū University in Okinawa also participated in these surveys, and a typological study of surface-collected potteries from each group was carried out at the same time (Ikeda ed. 2005: 45–110).

The number of areas where kilns were found increased to 13 through the progressive investigations. As a result of re-examining the distribution, location, scale and range
Figure 18.2. Distribution of kiln groups and kilns in Kamuiyaki. a: Location of kiln groups (Shinzato ed. 2005, 7); b: Distribution of kilns at Asan Kameyaki Group Area II (Shintō & Aozaki eds. 1985b: 11).
Figure 18.3. Construction of kilns from the Kamuiyaki kiln site cluster compared with kilns from South Kyūshū and the Korean peninsula. 1: Asan Kameyaki Group Area II, kiln No. 1 (Shintō & Aozaki eds. 1985b: 13–14); 2: Sagariyama kiln site cluster, kiln No. 1 (Matsumoto ed. 1980: 130); 3: Sagariyama kiln site cluster, kiln No. 3 (Matsumoto ed. 1980: 139); 4: Sagariyama kiln site cluster, kiln No. 8 (Matsumoto ed. 1980: 149); 5: Mujangri kiln site cluster, kiln No. 3 (Lee H., Lee S., O Gyujin, Na Geonju eds. 2000: 39); 6: Mujangri kiln site, kiln No. 2 (Lee H., Lee S., O Gyujin, Na Geonju eds. 2000: 35). – Modified from the excavation reports by the author.
of the kilns, the group composition, 19 production points already confirmed were reorganized into seven groups (Shinzato ed. 2005, Fig. 18.2: a).

18.6. The actual conditions of production

As a result of the excavation of kilns, the general survey of the forest and the natural scientific analysis (achievements of vegetation and geography investigations are discussed in detail below), the actual conditions of the pottery production gradually became clear (Shintô & Aozaki eds. 1985a, b, Aozaki & Itô eds. 2001, Shinzato ed. 2005). In previous surveys, an excavation of 10 kilns, 20 ash heaps and one pit, which was a pottery disposal, was carried out. The other kilns were limited to investigation by confirmation of ash heaps and electrical/magnetic exploration for proper preservation as part of the national heritage. But the pottery workshops, related villages and the harbor for shipping have not yet been revealed.

The features common to several kilns that survived well are summarized below (Fig. 18.3: 1):

1. The kiln is of a completely underground type constructed by excavating weathered granite soil, which is the bedrock soil of the hill, and shows a climbing kiln structure. It is speculated that this soil was suitable for tunnel excavation because it was clayey and well tightened. Although the ceiling is largely collapsed, the height of the firing chamber can be estimated to be around 80 cm from the remaining cases. Since the width of the firing entrance is narrower than that of the firing chamber, the plane shape reveals a deflated balloon shape.

2. The firing entrance has a width of 1 m and a height of 1 m and expanded in a fan-like shape toward the direction of the ash heap. Its floor kept a constant elevation level, but it had bumpy surface.

3. The firing place was slightly inclined upward compared to the entrance, and had a flat floor surface. The side wall of the firing place was constructed by embedding cuboid-shaped Ryūkyū limestones in the wall clay. The method of closing the kiln entrance was to stack the pot supporters and seal it with clay.

4. At the center of the kiln, where the floor surface has a steep slope of 31–42 degrees, is the firing chamber, and there are severe cracks and flaking due to the high temperature. The structure was a slope type without steps. Its cross-section shows two types, a barrel-vault type in which both sides rose vertically and an oval type in which both sides were stretched. In the firing chamber, it was confirmed that hoof-shaped clay pot supporters were arranged in an arc following the outer shape of the kiln.

5. The flue was dug diagonally from the ground surface toward the innermost part of the kiln, and the angle was steeper than that of the firing chamber. There was an example of a drainage ditch dug near the vent, and the chimney was blocked with flat stone.

6. At Asan Kameyaki Group Area 2, it was confirmed that after the ceiling of the No. 4 kiln collapsed, the No. 5 kiln was constructed by digging out the innermost part of No. 4. It is probable that some kilns were repeatedly built in suitable areas for construction.

7. Taking the example of the ash heap from kiln No. 3 of Asan Kamuiyaki Group Area II, it had a length of 3 m, a width of 2 m, and a layer of 50 cm thickness. On the east side of the survey area in Asan Kameyaki Group Area II, four ash heaps were found with clay, which is a by-product of constructing the kiln, sandwiched between them. It can be seen that the top of the ash heap was developed when the new kiln was built.

The amount of excavated pottery from the kiln itself was small, and most of the excavated materials were from ash heaps. It is not clear how the potteries were placed in the kiln, because no kiln has been found that was abandoned during the firing process. Looking at the sherds of Kamuiyaki, the front and back surfaces are gray and the core is red, so it seems that oxygen was supplied by opening the entrance or flue during firing, rather than complete reduction firing. A flat stone near the chimney of kiln No. 1 at Asan Kameyaki Group Area II may be related to the opening and closing of the vent (Fig. 18.3: 1).

18.7. The natural scientific research

The geomagnetic (Tokieda & Itô 1985: 48, Tokieda 2001: 76) and radiocarbon (Yamada 1985: 55, Paleoenvironment Research Institute 2005a: 82) analyses showed dates between the eleventh and thirteenth centuries AD. These results are consistent with the ages of the distribution sites in the Ryūkyū Islands.

According to X-ray fluorescence analysis of the pottery itself, Kamuiyaki had higher Fe and Ca compared to the pottery from the Japanese archipelago in the same period (Mitsuji 1985: 54, 2001: 76, 2005: 65). It is possible to distinguish it from South Kyūshū and Korean peninsula pottery by analyzing the values of K, Fe, Rb and Sr (Mitsuji et al. 2006: 16, Shinzato & Mitsuji 2008). Most of the charcoal tree species found in the ash heaps were identified by analysis as Castanopsis sieboldii (Paleoenvironment Research Institute 2005b: 84), and it was concluded that this was frequently used as fuel (Shinzato ed, 2015: 15).

Based on the results of the natural science analyses, the natural environmental factors of the pottery production were also considered. Fe and Ca are abundant in the pottery; it is said that the former was derived from weathered granite soil that forms the bed-soil of the forest where many kilns are located, and the latter originated from the Ryūkyū limestone that is distributed around there. It was assumed that the pottery material came...
from the soil and minerals obtained around the kiln site (Naruo 2015). *Sudajii* (*Castanopsis sieboldii*), which still proliferates around the kiln site today, is said to be outstanding as a sustainable fuel because it has a strong fire power when burned and a high vitality of germination after logging (Terada 2015). Near the kiln site, there are some underground caverns and sinkholes made by water eroding the Ryūkyū limestone. In such an environment, a groundwater vein develops, so it is easy to gain abundant water (Naruo 2015). Clay, wood and water, the essential resources for pottery production, still remain around the kiln site.

18.8. Problems related to the shipping port and the potters’ settlement

A natural environment similar to that around the kiln site can be seen in Mt. Amagi and Mt. Inokawa in the central part of Tokunoshima Island, but no kiln site has been found so far, because their high altitudes would have made it difficult to transport many products. This shows that not only materials but also a location with easy access to the coast suitable for its transportation were important for pottery production and widespread distribution.

Supposing that there was a base of transportation near the kilns, Omonawa, which is 2 km south of the Kamuiyaki kiln site cluster, is a promising candidate port, since sherds of Kamuiyaki and Chinese ceramic have been found on the sea bed (Nansei Islands Underwater Cultural Heritage Study Group, Laboratory of Material Culture Faculty of Low, Economics and Humanities Kagoshima University eds. 2013: 26–31). However, no relics related to medieval shipping have been found, so further underwater archeological investigations are needed.

Although the potters’ residences have not yet been determined, as mentioned above, the settlements during the operation of the Kamuiyaki kiln site cluster were mostly distributed in the middle and high terraces of Ryūkyū limestone, the elevation of which is 100 m, lower than the location of the Kamuiyaki kiln site (Fig. 18.1c). Close to the kiln site, there are also the Mintsuiki site (Shirakihara & Gi 1976: 67), the Kawamimiutsuji site (Shinzato ed. 2010) and the Maetari site (Shinzato & Tsune eds. 2018), and they have the common characteristic that most of the excavated remains were Kamuiyaki. In particular, the excavation survey of Maetari sites found pillar holes of houses and warehouses, rice fields, iron furnaces, some tombs where iron swords, iron spindles, glass beads and Kamuiyaki pottery were buried (Shinzato & Tsune eds. 2018). But no tools related to the production of pottery were found in these sites, so it is assumed that the potters’ work area was located in the forest close to the production area.

18.9. Typological study

Shinji Satō, the pioneer of typological studies on Kamuiyaki pottery, clarified that the rim morphology of the jar became plain in shape along with the simplification of the drawing pattern technique; for example, the transition from an individual drawing style to a spiral drawing style (Satō 1970:178–82). This typological change was later confirmed by an examination of articles unearthed from cave sites in Okinawa too (Asato 1975: 45–46).

Shortly after the discovery of the kiln site in 1983, the characteristics of the excavated Kamuiyaki pottery in the Okinawa area were summarized (Kin 1986); for understanding the correspondence between the production site and the distribution sites, much archeological information was gathered (Ikeda 1987). The results of Satō’s research were inherited developmentally, and several scholars proposed a chronology of the jar that focused on its lip shape (Asato 1987: 76–77, 1991: 589–91, Ônishi 1996: 26). As the number of related archeological materials increased due to a survey of kilns in Tokunoshima and of distribution sites in various parts of the Ryūkyū archipelago, the research achievements were published one after another to clarify the vessel composition (Yoshioka 2002: 414–23, Ikeda eds. 2005: 45–110, Asato 2006: 135–36). Through these examinations, the production of a bowl, a kneading bowl and a water ewer imitating the shape of Chinese porcelain gradually became apparent too, and Kamuiyaki pottery has attracted much attention, as an international stoneware incorporating the East Asian tableware culture of the medieval period (Fig. 18.4).

By comprehensive checking of materials excavated from the kiln sites, I have constructed their chronology. The resulting conclusions are that Kamuiyaki pottery was manufactured from the latter half of the eleventh century to the end of the fourteenth century and its production techniques changed significantly in the middle of the thirteenth century (Shinzato 2003a: 88). Beyond that, some characteristics of Kamuiyaki production, including the new findings obtained by the additional studies, are summarized below (Shinzato 2018: 93–117):

1. Jars, kneading bowls and pots have a common feature that their rim changed in a series from a three-dimensional shape to a flat and simple shape. They can be divided into six types (Shinzato 2018: 94).

2. Focusing on the change in the morphology of the jar’s rim, the examination of its external form, the thickness of body, the presence or absence of wavy line patterns, the patterns of tapping and the treatments on their surface showed that Kamuiyaki can be classified into two groups. Group A have a thin body and there are dense grid marks or wide parallel lines on their inner surface. Group B has a thickened body type, their outer surface was smoothed by stroking, and narrow parallel lines are left on their inner surface sparsely. Group A corresponds to rim types 1 to 4; Group B correlates with types 5 and 6 (Shinzato 2018: 103–05). Similar classifications have been proposed by Okinawan researchers and will not change significantly in the future (Kin 1986, Ikeda ed. 2005: 108–09).
Production at the Kamuiyaki Kiln Site Cluster and the Connection of the Ryūkyū Archipelago to Surrounding Societies...

Figure 18.4. Imitation phenomenon of imported tableware seen in local earthenware and Kamuiyaki in the Ryūkyū Islands
2: Talc pot from Uminonakamichi site, produced in Kyūshū.
3–7: Kamuiyaki from Kamuiyaki kiln site cluster and Kanna Yūagimō site.
8–12: Chinese ceramics from Dazaifu site.

1: Local earthenware (pot shape) from Atta shell-mound site, produced in Okinawa.
2: Talc pot from Uminonakamichi site, produced in Kyushu.
3–7: Kamuiyaki from Kamuiyaki kiln site cluster and Kanna Yūagimō site.
8–12: Chinese ceramics from Dazaifu site.
Figure 18.5. Vessel formation techniques of Kamuiyaki, Goryeo and Sagariyama pottery. a (Kamuiyaki): 1: Isamēbaru No. 1 site (Tōme ed. 2001: 72); 2: Kamuiyaki kiln site cluster, Asan Yanagida South group (Aozaki & Iō eds. 2001: 15); b (Sagariyama): Sagariyama kiln site (Matsumoto ed. 1980: 135); c: 1–4: Mujangri kiln site cluster (Lee H., Lee S., O Gyujin, Na G. eds. 2000: 48; 58), 5–6: Dazaifu site (Kyūshū Historical Museum ed. 1990: 106; 101); 7: Hakata site (Shimomura ed. 1996: 30). – Photographs without scale. – Drawings modified by the author, photographs by the author.
3. The latest chronological chart created after typological examination is shown in Fig. 18.6 (Shinzato 2018: 111). Kamuiyaki production is largely divided into two stages, and there are six small epochs subdividing it.

4. The products of Group A were jars, kneading bowls and pots. In Group B, there were large vessels such as very large-sized kneading bowls and pots (Shinzato 2018: 112–13). However, in both groups, jars account for more than 60 percent of the total number of vessels (Shinzato 2018: 112).

5. The boundary between Group A and Group B is in the middle of the thirteenth century (Shinzato 2018: 113–15). At this time, the production in Kamuiyaki changed significantly.

The Isen Town Board of Education, which manages the kiln site, is currently repairing excavated potteries with the aim of publishing a comprehensive research report on the Kamuiyaki kiln site cluster. Recently, results have been published in which two scientific groups extracted by neutron activation analysis of 20 samples picked up from these restorations correspond to the Group A and Group B described in this paper (Sterba et al. 2020: 511). Archeologists and scientists have already begun collaborative investigations into the actual conditions of pottery production, and the continuation of such researches will reveal chemical characteristics of clay paste not only caused by differences in their age but also those from vessel types. Furthermore, by analyzing potteries excavated from the consumption sites, it is expected that the distribution conditions which cannot be visually confirmed will be elucidated – for example, the circulation process from a certain production group to a specific island.

18.10. Technical genealogy and distribution

As mentioned above, Kamuiyaki is similar to Goryeo pottery, and it has been thought that the kiln structure and vessel composition are closely related to Southern Kyūshū. In the 1990s, it became clear that Goryeo pottery tends to be excavated from the international port city Hakata and the national institution Dazaifu (Akashi 1991), and the similarity in production technology between Kamuiyaki and Goryeo pottery was refocused (Akashi 1999: 56, 2007: 127–30). Yoshifumi Ikeda, who paid attention to this situation, argued that further research with a broader perspective on East Asia was needed (Ikeda 2000). Nevertheless, from the standpoint of emphasizing the commonality of kiln structure and vessel composition, mainly the jar, the relationship between Kamuiyaki and Sagariyama continued to be supported (Onishi 1996: 64–65). However, an excavation survey of Mujangri kiln site (Lee et al. eds 2000) in South Korea from 1997 to 1998 made it possible to compare Kamuiyaki with Goryeo pottery and Sue ware from Sagariyama kiln site archeologically.

With this opportunity, I re-examined these potteries and confirmed the similarities between Kamuiyaki and Goryeo pottery in the rim-shaping technique with beating, as well as the tapping pattern (Shinzato 2004: 330–38, Fig. 18.6). Regarding the kiln structure, although there are differences in the angle of their flue, kilns from Kamuiyaki, Mujangri, and Sagariyama shared their basic plane shape: the deflated balloon type (Shinzato 2004: 330–38, Fig. 18.3).

Studies of Sue ware (Yoshioka 2002: 432–34) and roof tiles (M. Uehara 1980: 6) have confirmed that the ceramic production in medieval Japan was technically influenced by Goryeo, and old Okinawan roof tiles were too (S. Uehara 2000: 39). These facts indicate that the exchange of ceramic technique among these three regions was common in their history. Considering this historical background, it can be accepted that the Ryūkyū islands, which had lacked the tradition of pottery production until then, were directly influenced by the technology from the Korean peninsula, and then Kamuiyaki, which is similar to Goryeo pottery, was established. How was the transfer of ceramic techniques to Tokunoshima Island realized? To understand this, it is effective to examine the relics brought from the Korean peninsula to the Ryūkyū archipelago.

In recent years, archeological survey of the Amami Islands has reported the discovery of Goryeo’s pottery and celadon, which dated to the eleventh century (Shinzato ed. 2010: 108, Matsubara et al. eds. 2015: 43, Shinzato & Tsune eds. 2018: 53). These were not excavated in as great a quantity as Kamuiyaki and Chinese ceramics, and tend to be found on specific islands, such as Kikai Island, where the distribution base was located, and Tokunoshima Islands, which was the stronghold of Kamuiyaki production. The small amount of excavated material and limited find cases of these are the same in Kyūshū (Yamamoto 2003: 79). This shows that they were not imported as commodities, but as the daily necessities or transport containers of visitors from the Korean peninsula (potters and merchants). Focusing on this archeological condition, it is highly probable that the emergence of Kamuiyaki kiln site cluster was achieved by the migration of a certain number of potters from the Korean peninsula rather than just the transfer of ceramic technology (Shinzato 2020: 34–36).

In order to understand the economic background of its introduction to Tokunoshima Island, it is important to confirm the distribution of the older type of Kamuiyaki’s Group A. These were circulated mainly in Amami and Okinawa Islands, but were spread to Kyūshū in the north and Sakishima Islands in the south (Fig. 18.1b, Shinzato 2018 [2003b]: 120). This situation indicates that the Ryūkyū Islands had a strong economic relationship with Kyūshū when the Kamuiyaki production started. It is in harmony with the fact that Kyūshū’s tale pots have been excavated throughout the Ryūkyū archipelago. Considering the economic circumstances at that time, it is assumed that the transference of ceramic skills from the Korean peninsula reached the Tokunoshima Island via Kyūshū.

On the other hand, the newer Group B are very few in the north of Tokara Islands and Sakishima Islands, which
Figure 18.6. Chronology of Kamuiyaki pottery (Shinzato 2018: 111, modified by the author).
shows their different distribution status. As Asato (2006: 37) points out, the number of excavations in Amami Island and Kikai Island decreased, and Tokunoshima Island and Okinawa Island came to be the center of consumption (Shinzato 2018 [2003b]: 120–23). This means that the change of distribution area corresponded to the innovations of the production technique in kiln sites shown above. From their technological origin and distribution, it can be assumed that the series of historical processes, Kamuiyaki’s establishment, development and demise, correlated with the negotiation relationships in medieval East Asia. To verify this, the next section will examine how Chinese ceramics were brought into the Ryūkyū Islands, and consider the causality between Kamuiyaki production, the trade network and the society of the Ryūkyū archipelago.

### 18.11. The Ryūkyū Islands society from the viewpoint of Kamuiyaki production

Chinese ceramics from the Tang Dynasty to the northern Song Dynasty (late eighth century to early eleventh century) were excavated in the Amami Islands, but it was after the middle eleventh century that these ceramics were used throughout the Ryūkyū archipelago. In the eleventh to twelfth century, bowls and plates were mainly consumed, and these tend to be excavated together with Kyūshū’s tale bowls. Therefore, it is believed that these porcelains were brought to the Ryūkyū Islands via Kyūshū (Kin 1998). This is also supported by the fact that the types of Chinese ceramics before the first half of the eleventh century are not much different from the general archeological sites in Japan around the same time (Morimoto & Tanaka 2004: 366). From the historical situation that international trade was exclusively developed in the port city Hakata at that time (Ôba 1999: 89), it can be read that Japan’s international trade with Song and Goryeo Dynasty, which lay behind the transfer of ceramic technology from the Korean peninsula, reached Tokunoshima Island.

Among the islands of the Ryūkyū archipelago, the Amami Islands tend to produce many Chinese ceramics excavated from the eleventh and twelfth centuries. They are located on the northern edge of the Ryūkyū Islands, so it can be judged that they played a leading role in trade with Kyūshū (Shinzato 2018 [2015]: 79). The reason why Tokunoshima was selected as the production center of Kamuiyaki may be due to the trade advantage of the Amami Islands in addition to the natural environment suitable for pottery production.

From the latter half of the thirteenth century, Chinese ceramics were consumed more than before in the Ryūkyū Islands (Shinzato 2018 [2015]: 80). Because the composition of Chinese ceramics in the Amami Islands around this time is similar to that in Kyūshū, it is considered that the economic relationship between the Amami Islands and Kyūshū continued (Shinzato 2018 [2015]: 83). However, on the other hand, a new situation has been confirmed in the Sakishima Islands.

A certain amount of Fujian porcelain called Nakijin type and Birōsuku type was consumed, while there was little Chinese ceramic (White porcelain type IX in the F period of Dazaifu) of the type that was common in Kyūshū at the same era (Shinzato 2018 [2015]: 82). Both of these Fujian porcelains, which date from between the middle of the thirteenth century and the middle of the fourteenth century, proved to be the products of the Min River basin by the survey of their production area (Kinoshita ed. 2009: 253). These were rarely excavated in Hakata (Tanaka 2009: 97), and are thought to have been brought to the Ryūkyū Islands from South China via the Sakishima Islands (Kinoshita ed. 2009, Ikeda 2019: 34–35). Nakijin type and Birōsuku type are the archeological evidence that symbolize the new economic relationship between the Ryūkyū Islands and South China. In addition to this, the Sakishima Islands have the regional features that there are very few examples of Kamuiyaki Group B, and they are instead rich in possession of Chinese brown-glaze potteries, the vessel types of which are jars, pots, kneading bowls and water ewers (Shinzato 2018: 156).

From the distribution patterns of Chinese ceramics, we can read the process that the Ryūkyū Islands were connected to Kyūshū through the Amami Islands from the eleventh century on, and the economic network was diversified due to the linkage between the Sakishima Islands and South China after the mid-thirteenth century. This was not unrelated to the emergence of Kamuiyaki in the eleventh century, and in particular the major shift in its production in the latter half of the thirteenth century must be strongly related to the latter situation. This is because the rise of the Sakishima Islands must have led to competition between Kamuiyaki and Chinese ceramics. From this point, it can be accepted that the flat and simple appearance of Kamuiyaki Group B was due to the efficiency improvement of manufacture aiming at mass production (Shinzato 2018: 156). As mentioned above, it is clear that the production trend of Kamuiyaki was closely related to the economic situation in medieval East Asia. There is no doubt that the Kamuiyaki kiln site cluster is an important cultural heritage for understanding the history of the Gusuku period, for which there is no direct textual material. Finally, I would like to focus on the symbolic aspects of Kamuiyaki and conclude this chapter by giving my opinion on the process of increasing social complexity in the Ryūkyū archipelago.

It is highly likely that the Amami Islands had already reached a stratified social stage when the Kamuiyaki production started, because castles that require large-scale civil engineering work, and huge settlements which played the role of trading hub centers appeared on Amami Island and Kikai Island (Nakayama ed. 2003, Matsubara et al. eds 2015). This is the reason why plenty of Chinese porcelains were brought to the Amami Islands due to their strong economic relationship with Kyūshū. What we should pay attention to here is the existence of the Kamuiyaki bowl. These bowls, which imitated Chinese porcelain, were actively consumed in the Amami
Islands, where aggressive trading was developed and social stratification was relatively advanced (Shinzato 2018: 132). This fact indicates that these were not daily utensils that made up for the shortage of Chinese ceramics, but the symbolic tableware used effectively in a layered society. That is, it can be hypothesized that Kamuiyaki bowls had a cultural function that expressed the social hierarchical position of those who used them. If we confirm the consumption pattern of Kamuiyaki bowls according to this hypothesis, this expression culture begun to flourish in the Amami Islands, which had the advantage of trade, and after a while gradually spread to the entire Ryūkyū archipelago. Ultimately, it came to be a cultural phenomenon predominantly recognized in Okinawa Island in the middle of the thirteenth century (Shinzato 2018: 155). On Okinawa Island from the mid-thirteenth century to the fourteenth century, the construction of a large-scale castle began, and three kings started tribute trade with the Ming Dynasty of China. These historical facts are evidence that a more highly stratified society was established on the main island of Okinawa.

It can be read that the remarkable development of the hierarchical expression culture using tableware on Okinawa Island at this period was deeply related to these historical circumstances.

The reason for the end of production of Kamuiyaki is probably that many Chinese ceramics were brought to the Ryūkyū Islands by direct negotiations with the Ming Dynasty after the fourteenth century, and that it lost the economic competition with them (Onishi 1996: 33, Shinzato 2018 [2003a]: 117). The subsequent movement of the potters group has not been clarified. They may have been converted to roof-tile makers of Okinawa Island. This is a subject for future research.

18.12. Conclusion

The discovery of the Kamuiyaki kiln site cluster on Tokunoshima Island far from Okinawa Island, the base of the Ryūkyū Kingdom, is evidence of the social division of labor across the sea during the Gusuku period, and it reformed Ryūkyū’s historical image. The introduction of ceramic technology to Tokunoshima Island was due to the economic activities of the Amami Islands and Kyūshū. This can be positioned as an extension of the international trade between Japan and the Song Dynasty, Japan and the Goryeo Dynasty developed in Hakata. The centralized production of Kamuiyaki on Tokunoshima Island and its widespread distribution were inseparably achieved with the spread of agriculture in the Ryūkyū archipelago, and played a major role in the integration of tableware culture in the Amami, Okinawa and Sakishima Islands.

According to typological examination of Kamuiyaki, its production surely started in the middle of the eleventh century, and its appearance and production techniques changed significantly in the middle of the thirteenth century. During this period, because of the highly motivated trade activities of the Sakishima Islands with South China, it can be concluded that Kamuiyaki’s production conversion was the result of mass production in preparation for competition with Chinese ceramics brought from the south margin. In addition, the Kamuiyaki bowl had a cultural function that expressed the social class of its users, so it is very useful for understanding the evolution of the Ryūkyū Islands society, where hierarchization was progressing. In other words, this symbolic significance of Kamuiyaki has the potential to contribute to the elucidation of the state formation process in the Ryūkyū archipelago.

In this way, the production and distribution of Kamuiyaki corresponded to the economic situation in medieval East Asia and the development of the Ryūkyū Islands’ society. Kamuiyaki kiln site cluster provides us with the important historical information mentioned above, and so has remarkable value as cultural heritage. Some surveys of the industry areas revealed that the kilns were well preserved and various types of vessels produced, but the amount of products in a single firing has not yet been clarified. In addition, the potters’ settlements and the shipping port of the potteries have not been discovered. Also, the whereabouts of the craftworker group after the abolition of the kilns is left to future investigations. In order to clarify these problems, further research is necessary and depends on active cooperation among archeologists, historians and natural scientists.

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Glossary

The glossary lists names and terminology mentioned in this book that are characteristic to kiln research in East Asia. Several research traditions and languages use different names or writings for identical or mostly identical sites or concepts and methods. For each name or term that may not be well known to the Western reader, and which occur in one of the chapters, an entry is given exactly the way the name or term occurs in that chapter, i.e. in a writing that may be considered standard or a variant.

If a term or writing is considered a variant, the entry only links to an entry that is considered standard.

An entry is considered standard either if (a) it is a translation into English which conveys the meaning well and is not tightly bound to one of the various cultures or traditions, or (b) if it is a transliteration that follows a standard transliteration of the language as defined in the introduction. In some cases, the editors suggest an English translation that is not established but at least is not bound to one tradition one-sidedly. In most cases these are suggestions for Western terminology from the introductory chapter and therefore have no East Asian writing counterparts; these suggestions may be object to future discussion for a consistent and culture-independent terminology in this field of archaeological studies.

The standard entry also lists variants in translation or transliteration as well as in other languages that are used in this book or are otherwise common. Some of these variants may deviate slightly from the concept of the entry or are outdated; they are mentioned nevertheless since they can be found in literature that is still valuable. As for variants in East Asian scripts, the language is not indicated but may be inferred from the concrete form. However, the Chinese, Korean, and Japanese writing may look identical in many cases.

The aim of the glossary is to help the reader making connections between concepts and regions which may be difficult to understand otherwise; the editors are thankful for any critique that improves the suggestions for a consistent terminology. This glossary is the result of collaboration of authors and editors, however, responsibility for errors and other shortcomings is with the editors.

Abaoji (hist. name), also Yelü Abaoji. 阿保机, Амбэө.  海龙王.
Anagama (kiln term.), see long-body kiln without oven floor. 長体窯, 長体窯, 登窯, 登窯, 窖窯, 穴窯.
Anan’evka walled settlement (site), also Anan’evka walled town. Ананоевское городище.
Anshan (kiln site), see Xiaoshan Anshan. 安山.
Arahira (kiln site), also (Nakadake Sanroku Arahira subcluster). 荒平, (中岳山麓荒平支群).
Arao (kiln site). 阿多郡
Ash deposit (kiln term.), see ash heap. 灰坑, 灰坑, 灰原, 灰原.
Ash glazed pottery (ware). 灰釉陶器.
Ash glazed pottery kilns (kiln term.). 灰釉陶器窯.
Ash heap (kiln term.), also ash pile, ash deposit; not: ash pit. 灰坑, 灰坑, 灰原, 灰原.
Ash pile (kiln term.), see ash heap. 灰坑, 灰坑, 灰原, 灰原.
Ash pit (kiln term.), not: ash heap.
Ata district (hist. name). 阿多郡.
Atta shellmound (site). 熱田貝塚.
Babai cemetery (site). 八拜墓地.
Baekje (hist. name), see Baekje. 百濟.
Bairi (hist. name), also Paekche, Baekche. 百濟.
Baideng (battle of) (hist. name). 百登之圍, Пинчений тутаан.
Balhae (hist. name), also Bohai, Bokkai, Bokhai, Palhae, Parhae. 半島, 半島, 半島, 泊海, Пинчений тутаан.
Bokai, Bokhai, Balhae, Parhae. 半島, 半島, 半島, 泊海, Пинчений тутаан.
Bonggyeri (site). 百務里.
Bo bell (form/item). 多诤.
Boat bottom pit (kiln term.). 舟底状ピット.
Bokkai, Bokhai, Balhae, Parhae. 半島, 半島, 半島, 泊海, Пинчений тутаан.
Bonggyeri (site). 百務里.
Bottle oven kiln (kiln term.), see kiln with oven floor. 徳利窯.
Bowl (form/item). 括鉢, 鉢, 花鉢, 鉢, 花鉢.
Broad-short kiln with oven floor (kiln term.), also semi-downdraft kiln, flat kiln, flatland kiln, flatdraft kiln / type.