16

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 into bottle oven kilns in the West, the former continued to exist in the East while maintaining their archetypal characteristics.

On the Japanese archipelago, these two types of kilns have become known as examples of folklore (Fig. 16.1a). From prehistoric times until the present day, 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 East Asia, it has not been clearly positioned in the history 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 Sue-ware kilns dating back to the fifth 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).

Figure 16.1. Unroofed kiln. a: Kiln fired for Fushimi dolls in 1923; b: Experiment tunnel kiln in 2005.

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

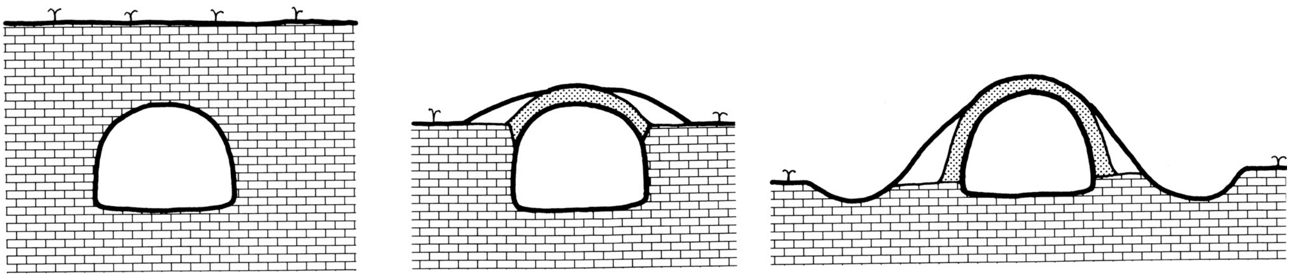

Figure 16.2. Pattern diagram of kiln section. a: Sunken kiln roofed with natural ground; b: Semi-sunken kiln with artificial frame for ceiling; c: Surface kiln with artificial frame for ceiling.

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

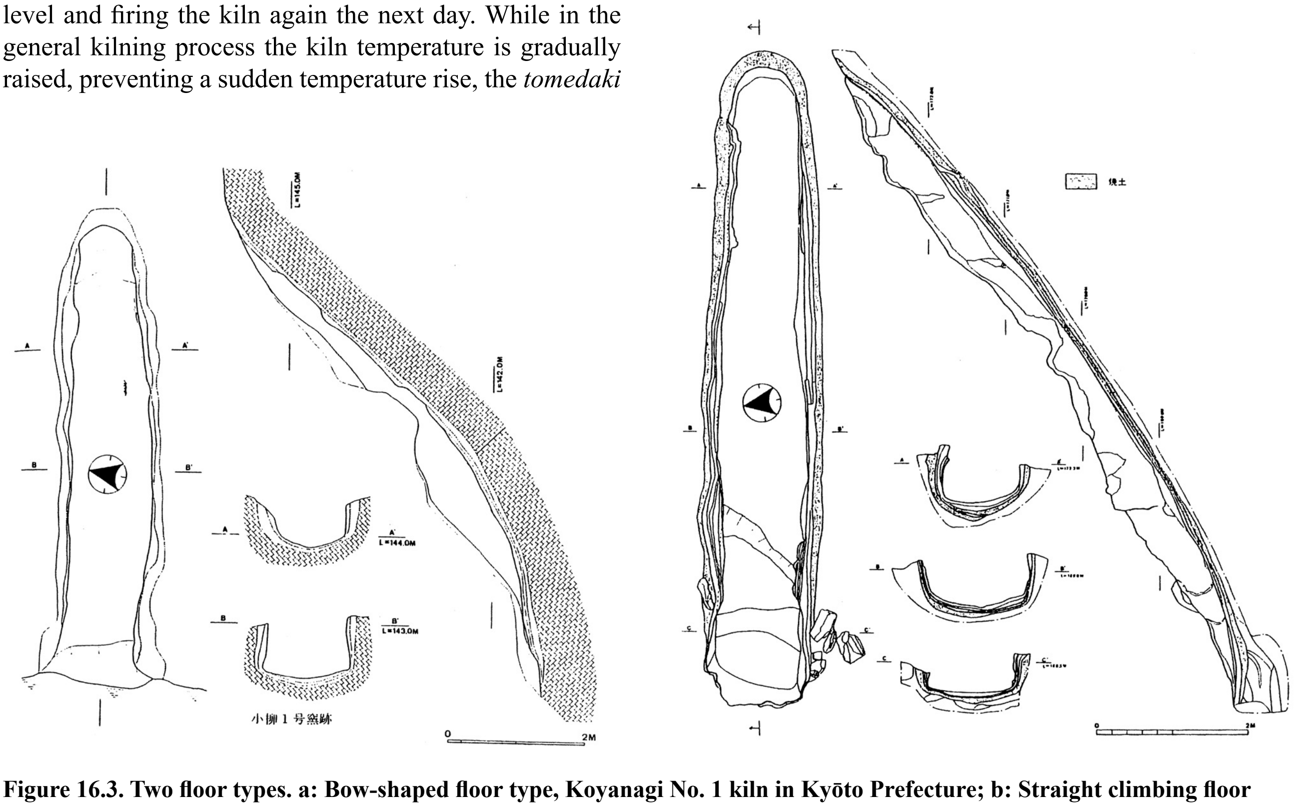

Figure 16.3. Two floor types. a: Bow-shaped floor type, Koyanagi No. 1 kiln in Kyōto Prefecture; b: Straight climbing floor type, Ishihrabata No. 2 kiln in Kyōto Prefecture (Kiln Research Society 2004).

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.

References

FUKASAWA Yoshiki 2011, Genealogy of Tunnel Kilns, *Gui Dong, Han Dynasty Chang'an Palace Site*, in Research Report of the Nara National Research Institute for Cultural Properties,85: 157–192, Nara National Research Institute for Cultural Properties. Nara [深澤芳樹「窖窯の系譜」『奈良文化財研究所学報』]

FURUTANI Michio 1994, *Tunnel Kilns: Kiln Construction and Firing,* Rikogakusha Beijing [古谷道生『穴窯 築窯と焼成』]

FURUTANI Michio, 1981, Shigaraki, Ceramic viewed from the kiln, Kogei publishing, Tōkyō, 93–112. [古谷道生「信楽」『窯から見たやきもの』]

HAN Sunguk 2005, Current Situation and Challenges in Excavation of Kiln Remains in Korea, *Kamaato Kenkyu*,1: 89–94, Kiln Research Society. [韓盛旭「韓国の窯跡発掘の現状と課題」]

Kiln Research Society 1997, *Haji Ware Production and the Remains of Firing Sites*, Shinyōsha. Kyōto. [窯跡研究会『土師器生産と焼成遺構』]

Kiln Research Society 2010, *Basic Studies on Ancient Ceramic Industry: Techniques and Genealogy of Sue Ware Kilns*, Shinyōsha. Kyōto. [窯跡研究会 2010『古代窯業の基礎研究－須恵器の技術と系譜』『窯跡研究』]

LEACH Bernhard 2020 (a Japanese translation by Kin'ichi Ishikawa 1939), *A Potter's Book*, Kawade SHINSHA Shobo (first edition of the translation: 1955) [バーナード・リーチ著／石川欣一訳『陶工の本』]

SEKIGUCHI Hirotsugu 1983, Story of Unroofed Kilns, *Collection of Papers in Chinese History and the History of Ceramics Commemorating the Retirement of Professor Shigeo Sakuma*, 553–577, Rokuichi shobo, Tōkyō. [関口広次「『天井のない窯』の話」『佐久間重男教授退休記念中国史・陶磁史論集』]

TANABE Shozo 1966, Suemura Cluster of Ancient Kilns: I, Heian Gakuen Kokogaku Club, Kyōto. [田辺昭三 1966『陶邑古窯址群I』]

MOCHIZUKI Seiji, 1993, The Seventh-Century Painting Period as Seen from the Structure of Sue ware Kiln: focusing on the Old Kiln Sites of Southern Kaga, Hokuriku acient pottery study, 3: 50–65. [望月精司「須恵器窯構造から見た7世紀の画期－特に南加賀古窯跡群の様相を中心として－」『北陸古代土器研究』]

MOCHIZUKI Seiji and KASHIMA Masaya, 2010, Ancient pottery production and kiln, workshop and specialist settlement in Hokuriku, Basic Studies on Ancient Ceramic industry: Techniques and Genealogy of Sue Ware Kilns, Hinyosha, Kyōto. 611–645. [望月精司・鹿島昌也　「北陸の古代土器生産と窯・工房・工人集落」『古代窯業の基礎研究-須恵器窯の技術と系譜-』]

MORIUCHI Shuzo 2002, Survey and Research of Kiln Remains, *A festschrift for Shozo Tanabe on his 70th birthday. Rokuichi shobo, Kyōto.* 279–292. [森内秀造「窯跡の調査と研究」　『田辺昭三先生古希記念論文集』]

MORIUCHI Shuzo 2010, Classification of Kiln Structures, Basic Studies on Ancient Ceramic industry: Techniques and Genealogy of Sue Ware Kilns, 25–40, Shinyōsha, Kyōto. [森内秀造「窯構造の分類」『古代窯業の基礎研究－須恵器窯の技術と系譜－』]

Municipal Institute of Cultural Relics ed. 2002 *Report of Excavation of the Longquanwu Kiln Site, Beijing*, Cultural Relics Publishing House. Beijing. [北京市文物研究所編『北京龍泉務窯発掘調査報告』文物出版社]

17

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

Naoko Nakamura

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 to 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;