

# Recent underwater investigations at Takashima: searching for the lost fleet of the Mongol Empire

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**Two vessels originating in China, which are related to the 13th century CE Mongol invasion of Japan, were recently discovered at Takashima underwater site in Nagasaki Prefecture. These finds have shed new light on naval tactics and how the event took place. The finds are thought to be one of the most famous underwater archaeological discoveries in the country. Realizing the significance and potential of the underwater cultural heritage, the national government has initiated organized efforts in the field of maritime and underwater archaeology of Japan.**

**Keywords:** Imari Bay, Khublai Khan, Mongol, Takashima, Quanzhou ships.

## Introduction

TAKASHIMA in Nagasaki Prefecture is the most famous underwater archaeological site in Japan. It was here that vessels from Khublai Khan's lost fleet, belonging to an attempted invasion of Japan that took place in 1281 CE, were discovered. Historical records mention that more than 3000 vessels were destroyed by the legendary typhoon Kamikaze<sup>1</sup>, commonly called the divine wind. The recent discovery of two intact hulls are well-known among marine archaeologists and maritime historians<sup>2</sup>. Although underwater archaeology at Takashima began more than thirty years ago, we present here findings from investigations carried out during the last decade. These investigations have not only shed new light on the history of the Mongol invasion of Japan, but also ushered in further development of underwater archaeology in Japan.

## Historical background to underwater archaeology at Takashima

### *The Mongol invasions of Japan*

The Mongol Empire was a world superpower during the 13th century; had conquered territories stretching from

parts of Europe to the west and the Korean peninsula to the east. In 1274 CE the Mongols sent 900 ships from Korea (Goryeo Dynasty) to attack Japan, but the Japanese Samurai forces successfully repelled the fleet. Despite this set back, the Mongols were quick to recover. After subjugating the Chinese Southern Song Dynasty and uniting the whole of China as the Yuan Dynasty, they embarked on a second naval invasion of Japan. In 1281 CE two separate fleets were dispatched to Japan including 900 vessels from Korea and more than 3000 from China's Yangtze Delta<sup>3</sup>. When the fleet from Korea reached the site of attack the Chinese fleet was yet to arrive and was delayed by several months. The lack of coordination between these forces led to another failure of their plan to conquer the port city of Hakata. Both the Chinese and Korean historical sources mention that when the Chinese fleet approached the Imari Bay, strong winds and waves crushed the vessels, sparing only one in ten ships (Figure 1)<sup>4</sup>. If we believe the number of vessels mentioned in historical sources is correct, this invasion was the largest naval campaign and second only to the landing of Normandy in 1945.

### *A brief history of investigations at Takashima*

Several Japanese historical documents unanimously mention that a large number of vessels had gathered near the island of Takashima in the Imari Bay of Nagasaki Prefecture. This is also attested by the local fishermen from Takashima who occasionally brought up ceramic jars and other artefacts from the seabed<sup>5</sup>. In the early 1980s, a survey project led by Torao Mozai, a marine engineer, was started at Takashima; several possible targets were identified using a type of echo-sounder<sup>6</sup>. Despite the fact that the project was not strictly scientific in nature by today's standards, the significance of the site was recognized and the area with the highest concentration of artefacts was registered as a known archaeological site protected from development under the Law<sup>7</sup>. Excavations and limited surveys were carried out intermittently by multiple institutions, during the 1980s and 1990s. During

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## SPECIAL SECTION: SHIPWRECKS

the 1990s, a non-profit research group ARIUA (the Asian Research Institute of Underwater Archaeology) conducted rescue archaeological operations at Kozaki harbour. Nearly complete wooden anchors with stone stocks, various ceramics, weapons and armour were found (Figure 2)<sup>8</sup>. One notable discovery was *Tetsuhau*, the earliest example of an explosive weapon from an archaeological site (Figure 3)<sup>1</sup>. More than two thousand artefacts

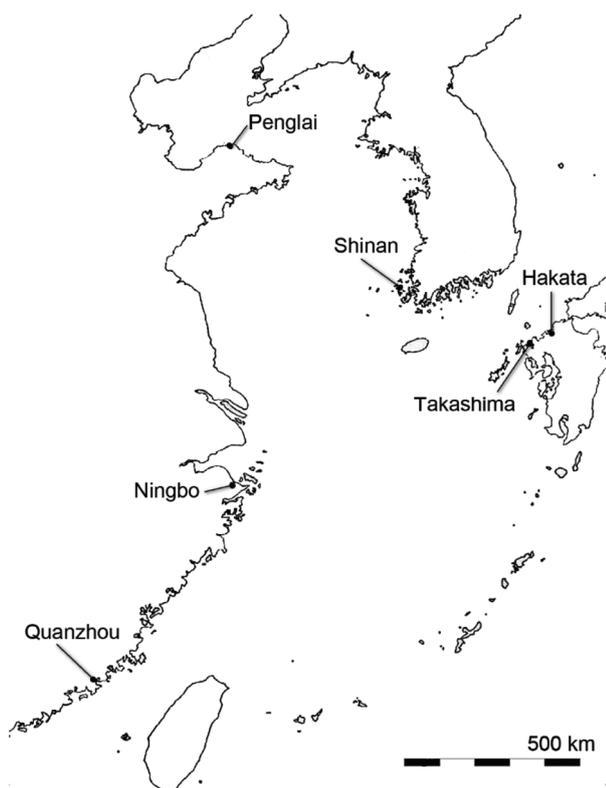


Figure 1. Map of East Asia (Randy Sasaki).

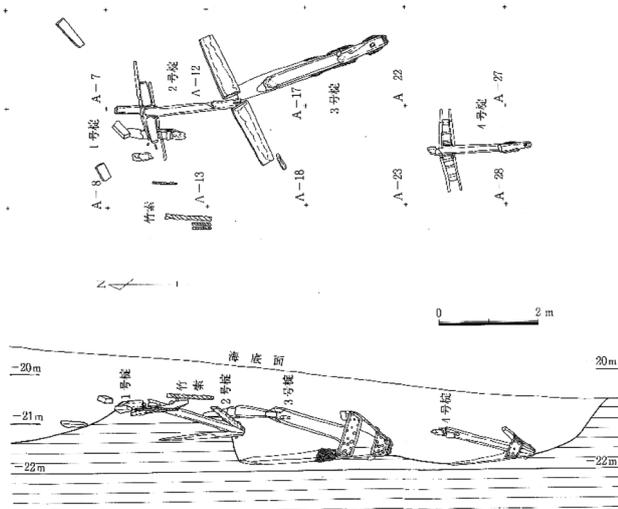


Figure 2. Anchors found in line at Takashima (Matsuura Board of Education, 2008).

were raised from the seabed around Takashima, scattered over several hundred metres and in heavily disturbed condition, indicating the presence of several shipwrecks in the area<sup>9</sup>.

### Current research at Takashima

Although previous research was restricted to a small area, the importance of the finds was obvious; it was necessary to expand the area of search to the entire Bay region to reconstruct a blue print of the failed naval expedition in 1281 to conquer Japan. In 2005, a new research team was organized by University of the Ryukyus and Tokai University. The team launched a systematic survey of Imari Bay. Firstly, the basic bathymetric map of Imari Bay using a multi-beam SONAR (Sea-Bat 7125) system was prepared<sup>10</sup>. The success of this phase of the project led to the second five year project (2006–2010 Grant-in-Aid for Scientific Research: Grasping and Analysing Mongolian–Expedition-Related Archaeological Sites and Remains on the Seabed of Takashima). This phase of the project aimed at not only recovering the submerged remains, but also assess the efficacy of the methods of underwater investigations. In addition to multibeam SONAR to continue mapping the Bay, a sub-bottom profiler (Ocean Date Equipment Strata Box and Innomar SBS-SES 2000) was used for prospecting what may be buried beneath the seafloor. Firstly, the survey lines were drawn at 50 m intervals for the entire Bay. At selected areas, the lines were drawn at 10 m interval. Based on the location, depth, size and other parameters, approximately a dozen possible anomalies were identified as possible shipwrecks. These locations were visually surveyed by professional divers and probed using 2 m long steel rods. Finally, test trenches were dug at selected locations. In October 2011, a partially preserved hull was revealed under the silt; the vessel was named Takashima No. 1



Figure 3. A photograph of broken and complete *Tetsuhau*s (Kyushu National Museum, and Matsuura Board of Education).

shipwreck<sup>11</sup> (wreck no. 1). The discovery of this hull appeared on many news outlets as a top story, and the Japanese Agency for Cultural Affairs took notice of the site's potential importance. The Takashima underwater site, now named Takashima Kozaki Underwater Site, became the first shipwreck site to be registered as the national historic site in 2011 (ref. 12).

Following the success of this project and the public support it received, the project was further extended for another five years (2011–2015 Grant-in-Aid for Scientific Research: The Research and Study of the Shipwrecks at the Mongol Invasions using the Underwater Archaeological Method). In 2014 a more complete vessel was discovered and was named Takashima No. 2 shipwreck (wreck no. 2)<sup>13</sup>. The detailed discussion regarding the origin of the vessels will be provided in the next section. Owing to lack of time for detailed documentation the hull remains were recorded in 3D using photogrammetry, providing a better chance to study the structures in detail (Figure 4)<sup>13</sup>. To preserve the site *in situ*, sandbags and a geotextile was placed over the sites. Two sites are being monitored at least twice a year, recording parameters such as dissolved oxygen and salinity. Decisions regarding how the sites will be managed are currently being discussed by municipal officials and experts in archaeological site management<sup>10</sup>.

#### *Description of Takashima shipwreck nos 1 and 2*

Wreck no. 1 is located along the bottom edge of an underwater gully, 200 m off the coast at a depth of 23–25 m. The partly disassembled hull was discovered buried below 1 m sediment. The keel and garboards were separated, and the bulkheads, one of the most characteristic features of a Chinese vessel, were found missing. The surviving length of the keel measured 12 m and appeared to be broken at one end. In order to prevent further damage, only the top surface of the hull was exposed. Therefore, accurate information about the thickness and cross-section of the planks could not be obtained. It appears that the hull was at least double-planked, or perhaps several layers of planks were overlaid. The hull was joined by using an adequate number of metal nails. The thickness of the strakes became thicker towards the keel:



**Figure 4.** Photogrammetry of Takashima No. 2 shipwreck (Matsuura Board of Education and University of Ryukyu; Image created by Tsuyoshi Machimura.)

the garboard was the thickest at 30 cm, while the outer strakes were 10–15 cm thick. The width of the planks varied between 30 and 45 cm. Nails or bolts were used to join the planks and the bulkheads and traces of lime plaster were still present on the surface of the planks, indicating the positions where some of the bulkheads had been fixed<sup>11</sup>.

Artefacts associated with the wreck included ceramics (mainly storage jars), stone shot and bricks. The bricks were numerous and at least three hundred of them were recovered. On an average, the bricks measured 28 × 9 × 6 cm, though with some variation in dimensions. These bricks may have been used as ballast, but this could not be confirmed<sup>11</sup>. Overall, it appears that the vessel was not carrying heavy load of cargo at the time of sinking or it may have been carrying only light cargo, such as food grains. The vessel may have been specifically built to carry troops; to confirm this further research is needed.

Takashima No. 2 wreck was also found along the bottom of an underwater gully, at a depth of 13–15 m, 200 m offshore. The vessel was found buried beneath a thick layer of sediment. A keel, planks and bulkheads were all found assembled. The surviving length of the vessel is about 12 m and the maximum width about 3 m. The vessel becomes narrower towards the bow, but blunt at its stern. Bulkheads can be seen at nine locations, creating separate rooms in between; the length of the rooms varied from 70 cm at the smallest, and the largest room measured 150 cm. Only two rooms located at the stern were excavated. The hull shows a V-shaped profile, resembling Chinese seagoing vessels of the time. The bulkheads were 9–15 cm in thickness. The planks were joined using metal nails with a double planking structure. The planks had a thickness of about 5 cm and width of 20–50 cm (ref. 13).

The vessel was carrying irregularly shaped large blocks of rocks, measuring about 20–60 cm. The first and second rooms were filled mainly with silt and sand, but the rest of the rooms were filled with piles of these boulders. Some ceramic bowls and jars were also present. More cargo may be still buried within the hull, but were not excavated at the time<sup>13</sup>. The country of origin of these vessels may be of interest for many scholars. Fortunately, the recorded information gives enough detail to illuminate their possible port of origin. It should be noted that the traditional Korean vessels were made without using iron nails or bulkheads. Traditional Korean vessels, such as Sibidong pado and Anjwado ships excavated in Korea, were made using thick planks that were connected using only wooden joinery, and the strength of the hull was supported by beams. The planks were usually made of softwood, such as pine. Traditional Korean vessels may be characterized as flat-bottom boats, and the cross section of the hull could be described as box shaped (Figure 5)<sup>14</sup>. The two vessels found at Takashima showed none of these features. The hull, V-shaped in cross

section, was constructed using hardwood, joined by nails. Some of the planks were thin<sup>10</sup>. A vessel with all these features is typical of Chinese origin.

The available evidence, when compared to vessels excavated in China, can be used to narrow down the region where the Takashima vessels were made. The hull of wreck no. 1 shows features resembling the Penglai ships in north China as well as the Ningbo ships in central China, dating from the Song to Ming dynasties<sup>14</sup>. The shape of the garboard more closely resembles the Penglai vessels<sup>15</sup>. The cross section of the hull needs to be measured again to be certain. The side dimension of the keel of the wreck no. 1 is 50 cm, wider than Penglai ships (40 cm), but narrower than the Shinan ship<sup>15,16</sup> (70 cm). The vessel appears to have a wide keel, suggesting a shallow draft. It is difficult to estimate the size of the vessel, but wreck no. 1 may be about the same size as Quanzhou or Penglai ships, about 30 m in overall length.

Fortunately, wreck no. 2 was better preserved and has been recorded in more detail. As mentioned above, the hull was digitally recorded in three dimensions, which allows for the observation of the hull in cross section. The planks were thinner compared to those of wreck no. 1. The strakes are composed of at least two layers of planks, joined with a combination of rabbeted lap-strakes and planks laid flush, similar to the structure of Quanzhou ship<sup>17</sup>. The keel was not exposed, so the actual dimensions can only be estimated. The assumption was made that the vessel was constructed using a plan similar to the Quanzhou ship, but slightly smaller. The curve lines of the Quanzhou ship, generated by Green, was reduced in dimension digitally to fit the cross-section of the Takashima No. 2 shipwreck<sup>16</sup>. The result showed that the reconstructed vessel was about 20 m long with a maximum

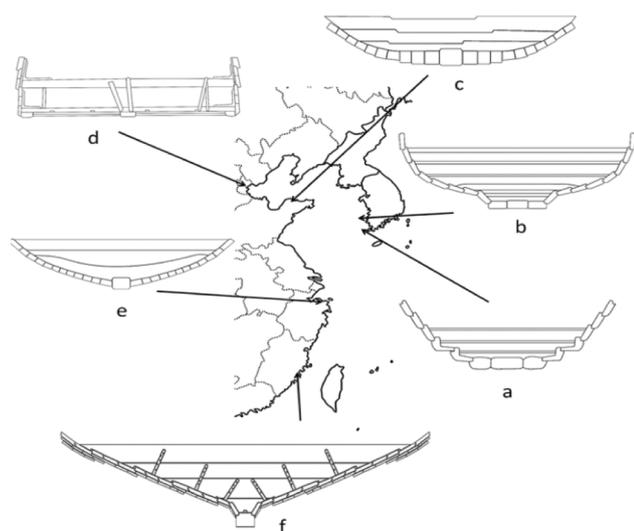
width of 7.4 m. It has a shallow draft, but a sharp stern. The vessel was most likely made to carry lightweight cargo not far from the shores.

### The discovery in context

Being a relatively isolated island nation, Japan has experienced very few invasions in its history. This rarity, combined with the dramatic account of the plight of the invading fleet, makes the Mongol invasion one of the most memorable events in Japanese history. Therefore, the prospects of finding exciting materials at Takashima are high. There is also an overwhelming public interest in unravelling the mysteries of historical past. How many new vessels were built? Were they built hastily? Where the vessels were built and what types of vessels were part of the fleet? These are the questions that need to be addressed. Only two vessels out of thousands of original ships have been found. Continuation of investigations is essential to find more shipwrecks and answers to basic questions listed above.

It appears that the vessels from Korea were not present at Takashima when the typhoon struck the area. As discussed above, two separate fleets were organized for the second invasion of Japan; one fleet left from the Korean Peninsula, and another from the Yangtze River Delta<sup>4</sup>. It has been commonly thought that the two fleets met near the island of Hirado. The combined fleet was then struck by the typhoon when they began to advance towards Hakata<sup>1,18</sup>. If this was true, there should be evidence of both the Korean and Chinese vessels at the site. The two vessels recently found at Takashima were both Chinese. In fact, the artefacts discovered around Takashima so far have produced only a handful of items from Korea<sup>7,8</sup>. Sasaki analysed the raised timbers from the previous excavations and found there were no Korean vessels at the site<sup>9</sup>. Further, Hattori states that it is actually difficult to find a historical source that mentions the meeting of the two fleets<sup>18</sup>. It appears that the Korean fleet escaped the onslaught of the typhoon. The Korean fleet had taken control of the Tsushima, Iki and Shiga islands all located along the route from Korea to Hakata Bay in northern Kyushu. It is unlikely that they would have left these strategic islands after taking control<sup>18</sup>. Perhaps only a small portion of the Eastern Fleet reached Takashima while the rest of the forces were spread thin defending the areas they had already subdued. After the storm, the Japanese forces were able to hunt down the Korean forces one by one.

The nature of naval organization and related questions may find answers in future investigations. However, the discovery at Takashima has contributed greatly to the development of the field of underwater archaeology in Japan. Until the discovery of the two wrecks at Takashima, underwater and maritime archaeology was a minor sub-field and received scant attention from the general



**Figure 5.** Section views of shipwrecks found in East Asia (a) *Sibidong pado* ship, (b) *Anjwado* ship, (c) *Penglai* No. 2 ship, (d) *Yuanmengkou* ship, (e) *Ningbo* ship, (f) *Quanzhou* ship. (Randy Sasaki).

public and scholars. Following the discovery of the first vessel, the Japanese Agency for Cultural Affairs realized the need for a policy to protect the country's underwater cultural heritage. Until that point there had been no official system or guideline regarding how underwater sites should be treated. The Agency established a committee to discuss how Japan should manage underwater sites. In 2017 the committee published guidelines for municipalities explaining how to manage underwater archaeological remains<sup>13</sup>.

## Conclusion

The use of advanced underwater survey equipment and problem-oriented search for the wreckage helped in zeroing down to the area leading to these finds. Wreck nos 1 and 2, both were constructed in China and help us understand the boat building techniques of the time. Their discovery has shed new light on the nature of the naval organization of the invading fleet and possibly confirms that the vessels from Korea did not join the fleet from China. The research project at Takashima is still ongoing. The investigations at Takashima had led to preserving the underwater heritage of the nation and has opened up prospects for the development of underwater archaeology in Japan.

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