

Ancient Megalithic Construction Beneath the Sea off Ryukyu Islands in Japan, Submerged by Post Glacial Sea-level Change

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Abstract

SEABAT sonic sounding, underwater robot and SCUBA diving surveys reveal the existence of artificial topographies constructed about 10,000 years ago beneath the sea off the Ryukyu islands in Japan. Features were found that look like an ancient city including stepped pyramids, roads and water canals off of the southern coast of Yonaguni Island. Its width is about 1 km×1 km and water depths vary from 0 to 35 m. Monuments are connected by roads constructed by cutting the basement rock or laying flagstones. The most elaborate one in the point is labeled as No. 1 Monument or Yonaguni Underwater Pyramid (YUP). It looks like a stepped pyramid which closely resembles a giant Gusuku from ancient Okinawa. The Gusuku is thought to be a mixed structure, part castle and part temple.

I. Introduction

Underwater robot, SCUBA and SEABAT surveys reveal the existence of a probable, ancient, megalithic civilization in the Ryukyu Islands in Japan. Those are found on the sea floor off Yonaguni and off Okinawa-jima Islands.

Detailed surveys such as SCUBA diving and sonic sounding using SEABAT with multi-narrow beams have been carried out off Yonaguni since 1992 at and around the underwater ruins sites by the Submarine Research Group of the University of the Ryukyus [1, 2]. Underwater robot surveys have been used since 2002.

II. ISEKI POINT AND YONAGUNI UNDERWATER PYRAMID (YUP)

We found megalithic constructions beneath the sea and also on the terrestrial coast. For the underwater part, artificial constructions are concentrated off Cape Arakawa-bana, the southernmost point of Yonaguni-jima Island. Our surveys reveal the distribution pattern of artificial structures at Iseki Point and its vicinity. The Iseki Point (Ruins Point) is located off the southern coast of Yonaguni Island, about 100 m offshore from the Arakawa-bana Cape. The center is located at 24.0°N and 123.0°E. Three-dimensional maps of the area were created (Fig. 1).

Yonaguni Underwater Pyramid (YUP) is a monolithic structure composed of layers of sandstone and mudstone. It would be relatively simple for natural forces to separate the layers

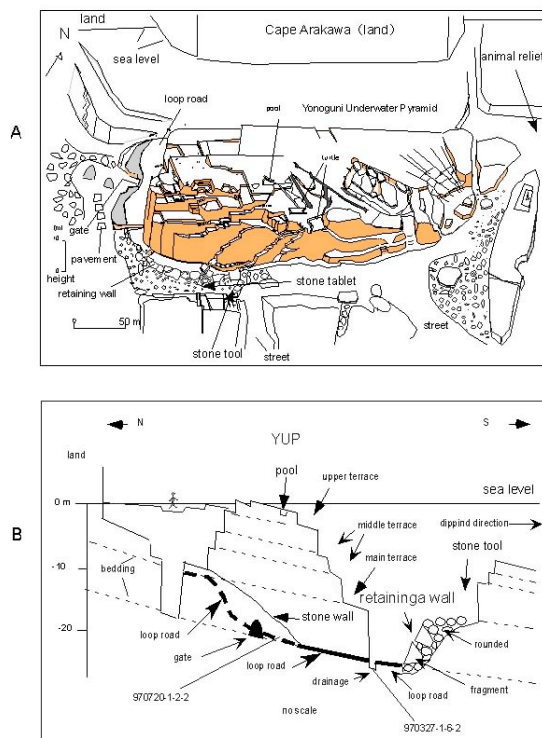


Fig. 1 Schematic features of YUP and surrounding constructions (A). Schematic cross section of the western part of Iseki Point (B). Numerals in B show sampling sites for ^{14}C and ^{10}Be age determination.

and move them apart. They separated, fractured, and slipped to make flat terraces and straight walls. Therefore, YUP would seem to have been formed by nature at first glance, though many believe it man-made.

Based on the survey data, YUP has steps running up from its sides. YUP is a rough rectangle, about 270 m in length, 120 m in width and 26 m in height. It lies about 25 m deep in the water and 1 m above sea level. The upper terrace can be found at only 5 m deep in the water (Fig. 1). Structures such as flat terraces, straight walls, and the surface structure of the walls are formed by cutting a huge, monolithic mass of sandstone. These strongly show characteristics of structures constructed by human beings.

III. SPECIFIC ARTIFICIAL FEATURES

Tool marks

Scars from tools driven in as a wedge have

been found among the other markings on the structure. Those strongly support the idea that this formation shows the hand of man in its construction. “*Kusabi*” is the name for the wedge-shaped cutting tool used by ancient people. Funnel-shaped depressions are evenly spaced from 20 to 30 cm apart. We made plaster casts of their distinctive shapes to show to marine biologists, who confirmed that these holes are not the work of creatures such as sea urchins. Tool marks in stone are the strongest evidence so far supporting a man-made explanation for the structure. Having once identified these marks, we began to find them everywhere.

The rock layers composing YUP today are inclined 10-12 degrees toward the southeast. Therefore, it is possible that tidal currents and wave action pulled them apart, and they slipped southward with the help of gravity (Fig. 1-B). However, the following evidence shows that it is difficult to explain the formation process of the shape of the terrace by natural forces.

1) Flat terraces are formed surrounding the YUP monument (Fig. 1-A, B). It is very difficult to explain their formation process by nature and gravity forces.

2) At the top terrace of YUP, there is a formation that looks like a fan-shaped pool (Fig. 3). Its walls are 2 m high, and the inside is perpendicularly cut but other parts are not. For a feature of this shape, where there is no gravitational sliding down the slope because of the surrounding walls, the handiwork of man offers the most sensible explanation for its appearance.

3) The formation rises nearly perpendicular to all the way from 25 m underwater within a few meters of the water's surface. A natural explanation would require that the same force has been exerted equally all the way up and down and around, but the distributional pattern of natural

forces to cut the wall varies from the shallow to the deep. In other words, it shows signs of having been worked on by human beings using stone tools.

4) No rock fragments can be found at the foot of Iseki Point. Next, we checked the deepest point around Iseki Point to look for fallen rock, rock that would have been peeled off and dropped into the abyss by natural forces. But there was not any. Instead of fragments and eroded debris, the area at the foot of the structure, some 25 m deep, looked cleanly swept.

Loop Road

It is very significant that there is a space that looks like a road, and that it surrounds YUP (Fig. 1). The thickest sediment should exist in this place, because it is in the deepest part in the narrow valley topography represented in the detailed map in Fig. 1.

The road changes its direction at almost a right angle along the western corner of YUP at the same width of about 6 m. It is very unlikely that this road was formed naturally, since the surface of the road is clear and there are no rock fragments from the pyramid on the road. If there exist it will be the product of natural erosion. A road surrounding the structure strongly indicates that human beings made the structure, because any bottom currents could never wipe off all heavier rock, weighing as much as 10 tons, from the foot along a structure like Fig. 1.

Drainage canals

Depressions looking like drainage canals are well preserved on the south side of the main site where the loop road is. These are a feature 20 to 30 cm wide and just as deep parallel to the road (Fig. 3-B). The drain crosses the road at the lowest portion toward the more lower place. It

could carry water at a rate of 0.02 tons per second. This is too much volume for such uses as irrigation or "city water", but is a useful volume for drainage (Fukumoto, 2000). This highly functional drainage canal is still visible on the upper terrace and the summit of the pyramid structure.

Retaining wall

Huge stones with diameters of about 2 to 6 m are arranged in a row along the road on the other side of YUP, and form what is like a foundation of a retaining stone wall. It is very unlikely that natural currents would form a road and a retaining wall surrounding the pyramid.

Along the southern side of the loop road, following the edge and going straight up, huge rocks are piled up. The height is about 5 m above the road. Strange to say, huge rock fragments stand in a line facing the road. The inclination of the wall is about 40°. However, the zone between the wall of South Pyramid and the top of huge rocks is almost flat or low angle (Fig. 1-B). The schematic cross section is shown at right in Fig. 1-B. These are quadrilateral shapes, and five- or six-sided rubble, piled to heights sometimes exceeding 5-6 m and roughly fitted together, although they appear random at a glance. At the southern margin of the road there is a straight wall cutting down to the south as drainage. The huge rock fragments are set along the outside of the cutting wall, and they are distributed in a single row.

Most of them are at least the same dimensions or longer than their front-facing side. The shape of the huge rock fragments accords with what modern stonemasons call the "*hikae*" (counterfoil) and "*tsura*" (face), and besides that, there are tool marks as mentioned along the edge of the face (Fig. 3-B). This is interesting to note because the

“tsura” part facing the road angles back, away from the road, at an angle of 30° to 70° , 40° on average, along the down side of the wall along the road. The bottom part of each corner stone is a wide flat shape, solidly seated in a bed of smaller, rounded stones, also abides by present-day building wisdom. A smooth, clean line follows the edge of the road, scooped out to hold the foundation stones firmly in place. That is, those huge rocks are identified as corner rocks of the retaining wall [3].

Thus, Instead of setting the huge rocks directly on bedrock, they are seated in a bed of gravel, and backed by small stones that in modern terms are called “Uragome-ishi”. Both are recognized ways to keep road and wall well drained. On the far side of the road from the wall, the south side, the indentation following the curve of the road would provide proper drainage for the road.

Stairways

Several stairways are recognized from the road to the main terrace, middle terrace and upper terraces. These seem to be artificially fabricated (Fig. 1-A).

Gate

There are several entrances and a gate out to the loop road along YUP at the western part (Fig. 1-A, -B). The gate is 1 m in width and 2 m in height and looks like a tunnel, but rock fragments are inserted into the ceiling as a foof. It is artificially constructed. Its characteristics are very similar to the arch gate of giant Gusukus in Okinawa.

Rock art monuments

Two big animals surmised to be turtles are carved in relief on the underwater bed rock at the upper terrace of Yonaguni Pyramid (Fig. 5-A).

Also, a submarine statue looking like a “Moa” in Easter Island is found 1.5 km east of Yonaguni Pyramid near Tachigami-iwa [4]. It stands on the coastal sea floor about 15 m deep and shows a carved mouth, and eyes with clearly-defined eyeballs. It is definitely a man-made construction.

A giant relief of a bird and turtle are found in relief carving on the central terrace of Sanninu-dai on the coast (Fig. 4). The site is about 2.5 km east of YUP. The total length of the bird's wings is 20m, and its relative height from the ground is 30-50 cm. Their overall shapes become clearest when seen from above as with the drawings of Nazca in Peru.

IV. REMAINS

Stone tools

Two stone tools were collected from near YUP (Fig. 2). They were made by chipping away the

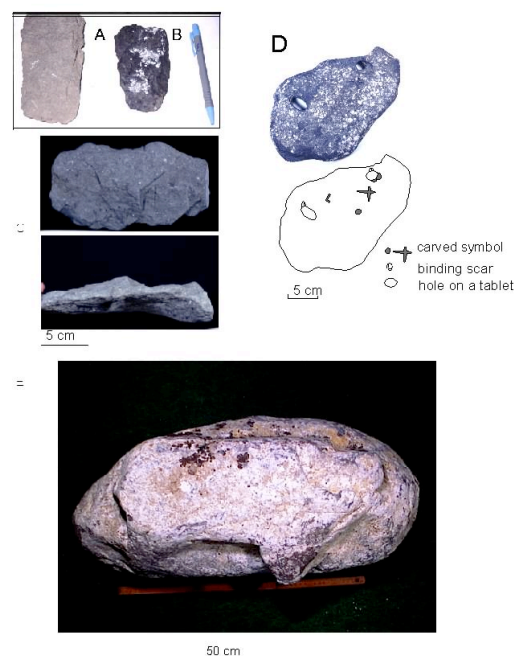


Fig.2 Remains recovered from the YUP and its vicinity. A: Hand ax in Taiwan. B: Adze from YUP found 15m deep. C: Stone ax recovered from the vicinity of the submarine Pyramid at 10m deep. D: Stone tablet carved with line symbols (letters?). E: Animal stone relief. Cow? The animal's head is on the right.

tool material, sandstone of the Yaeyama Group, and it was a tool used for chopping purposes.

Tools of this type are often found on the Yaeyama Islands in the same chain as Yonaguni dating from 10,000 - 2,000 years ago. Archeologists of Taiwan University commented that the rock samples strongly resemble stone tools frequently found on Taiwan. They are designated as a farming tool for chopping up the ground, like a hoe or mattock. The ages are 4,000 to 2,000 years ago. All experts said that these are tools used in farming.

Behind a huge corner rock of the retaining wall, a palette-shaped piece of stone was retrieved. The corner stone of the retaining wall recently collapsed during a 1994 typhoon at the depth of 23 m, the end of the loop road. It measures about 24 cm long, 16 cm wide, and 2 cm thick. It is made by black shale of the Yaeyama Group, distinguished by very thin black layers, and inscribed on it are two symbols. One looks like a cross mark, or the Roman numeral for ten (Fig. 2-D), and the other like a V, or the Roman numeral five. Those are similar to markings on the "Rosetta Stone of Okinawa" that was found on land in Okinawa, the main island. There are also two holes drilled through it, and a vague indentation in the submarine tablet. The cross-shaped mark, composed of two lines scratched into the rock, measures 2.7 cm by 1.5 cm. Clearly, it is a man-made symbol. The reason for that verdict lies in a close-up look at the place where the two lines cross. Just like at a traffic intersection, there are four corners. Three of the corners are worn away. One is sharply pointed. That sharply pointed corner is the key point. It means that when the mark was carved, the carving tool was moved in one direction, a hallmark of hand carving.

There is another artifact, not from YUP, but an inscribed tablet on display at the Okinawa Prefecture Museum. It is known as the "Rosetta

Stone of Okinawa" because of the mysterious writing it bears [4]. That writing has several points in common with the palette stone found at YUP. Next, it is very important to look at the relationship between the stone tablet and YUP. Here is how we know it was not carried there from some place else but is almost same age as the YUP, because the tablet had been covered by the corner stone of the retaining wall.

Animal relief

A big cobble carved in relief in the figure of a four-legged animal (Fig. 14) was recovered from the northern corner of the YUP, where the water depth is 10 m. It is composed of very fine sandstone of the Yaeyama Group. It weighs 60 kg. Its dimensions are 70 by 30 by 25 cm. From the outline, we can guess that it is either a wild boar or a cow, probably a wild boar. First, of course there are marks left behind by a carving tool. It is hard to believe nature would have left such a clear outline, in any case. Turning it to get a side view, it is clear that the raised animal shape does not arise from natural fracture lines inherent to the stone. The relief begins mid-layer.

V. CONSTRUCTION AGE

The formation age of YUP or Iseki Point, can be estimated as about 10,000 years ago, based on ^{14}C and ^{10}Be age measurements for over 40 samples [2, 5, 6]. Two underwater stalactite caves were discovered in the vicinity of Iseki Point during our surveys. Stalactite caves definitely represent former dry land circumstances, at least 40,000-10,000 years ago based on ^{14}C dating [2, 5]. Ten stone tools that were found in the Ginama Submarine Stalactite Cave in northern Okinawa-jima were identified by archeologists. Their age is estimated from 20,000 to 7,000 years

ago (Kimura *et al.*, 2003). They are a type of stone tool, a piece of stone peeled off from a large piece.

VI. LOST CIVILIZATION?

There, our data show specific features looking like an ancient city beneath the sea. There are artificial features looking like a giant castle or temple (YUP), many other smaller temples, a stadium, rotary and well organized road system connecting those structures, represented in Fig. 2. The stadium stands 300 m southeast from the main pyramid (YUP), and at a depth of 35 m. It spreads over a wide, flat surface that is 60 by 50 m in area. It is surrounded by steps, similar to the audience seats, or bleachers, for a baseball game surround it .

VII. MEGALITHIC CONSTRUCTION FOUND IN THE TERRESTRIAL COAST

Yonaguni Island

There is a similar type of a megalithic construction on the southern coast of Yonaguni Island. It is called “Sanninu-dai” or “Sanninu Tower” (Fig. 3). It stands on the coast but the

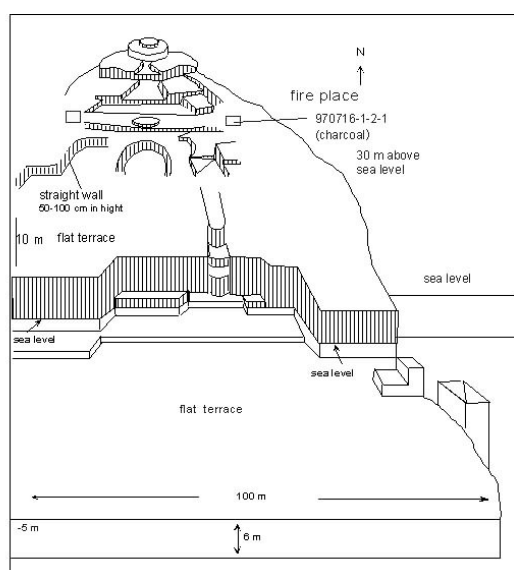


Fig. 3 Schematic structure of Sanninu-dai Tower.

lower part extends underwater to a submarine depth of about 20 m. A flat sandstone terrace at Sanninu-dai on the land bears the scars of stone cutting tools, *kusabi* or *teko* named for their wedge shape. Sanninu-dai (=Sanninu Tower) itself is regarded as ruins showing a pyramidal shape continued from the underwater formation, an impressive feature testifying to the presence of ancient peoples. A fireplace was discovered on the tower.

Charcoal in the 2-meter square hollow (fire place) showed ^{14}C age of 1,600 yr. BP. The measurement of ^{10}Be suggested that the formation age of Sanninu-dai is about 4,000-3,000 years ago. It is suggested that Sanninu-dai on the coast is younger than the submarine pyramid.

Okinawa Island

Megalithic construction such as dolmens estimated as dating from 10,000-20,000 years ago were found on the coast of Itoman, Okinawa-jima Island. There are several giant dolmens at the Yonaguni site. No.1 Dolmen is shown in Fig. 4-A. It is composed of Pleistocene reefal limestone called Ryukyu Limestone whose age is estimated as 1-0.5 Ma. The size of the overlying stone is larger than the corner stones constructing the retaining wall along the southern margin of the loop road of YUP. The construction age is deduced from the stalactite samples covering the contact point between the foundation stone and the overlying stone.

Very important thing is the existence of flat terraces and the distribution pattern of straight walls (Fig. 4-B). It is thought to be the same age as the dolmens because the degree of the surface weathering is almost the same. The reason why this is very important is that those essentially resemble those of Sanninu-dai Tower (Fig. 3), in that monolithic basement rocks have been cut.

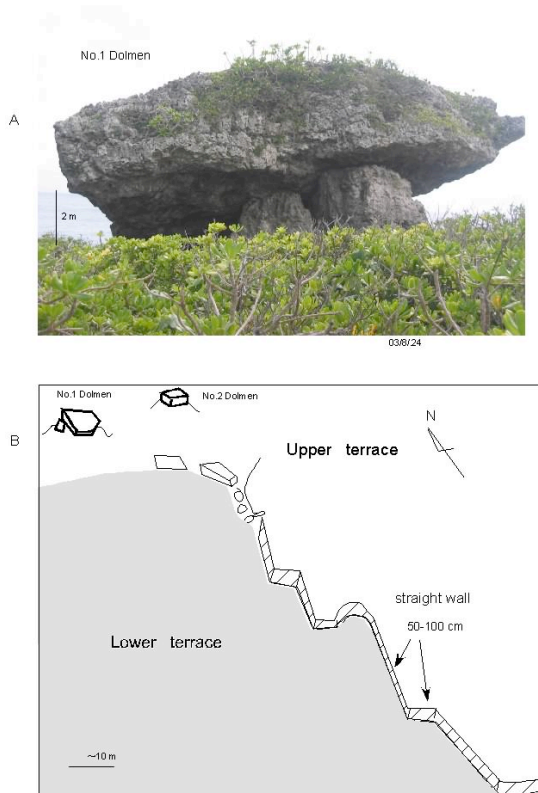


Fig. 4 Discovered, giant dolmen (No.1 Dolmen) on Okinawa Island (A). Relationship between giant dolmens and flat terraces and straight walls (B).

VIII. CONCLUSIONS

- 1) Submarine research reveals the probable, sunken, ancient city characterized by stepped pyramidal structures and a road system connecting them off Yonaguni in Okinawa, Japan.
- 2) The central pyramid stands under approximately 25 meters of ocean, tentatively named Yonaguni Underwater Pyramid (YUP). YUP is the biggest one among the fabricated, underwater structures off Yonaguni whose appearance and size are similar to the biggest ancient castles called Gusuku, such as Shuri and Nakagusuku Castles (Gusuku) on Okinawa Island.
- 3) YUP may have been constructed at about 10,000 years ago. It strongly supports the idea that those topographies might

have been constructed by human beings on the land and they may have been submerged by the rising sea level rising in the post-Glacial Age.

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