

# Analysis of Pictographs at Phang-nga Bay, Western Coast of Peninsular Thailand

## การวิเคราะห์ภาพเขียนสีที่อ่าวพังงา ชายฝั่งด้านตะวันตกของประเทศไทย

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### ABSTRACT

There were 10 pictographs sites discovered in the Phang-nga Bay. However, the scientific analysis of the rock paintings is not available. Therefore 214 pigment samples appeared on the rock walls at 10 sites were detected by pXRF and analyzed by the experts. These results suggest that rock paintings were probably created by several artists. It reflected more than one group occupied the area of the Phang-nga Bay. There is a need for further multidisciplinary studies on archaeology, ethnology, paleoecology, and geomorphology in order that the rock art identification will give information on interaction between human and nature.

ปัจจุบันมีการค้นพบแหล่งภาพเขียนสีหรือศิลปะถ้ำบริเวณอ่าวพังงา จังหวัดพังงา จำนวน ๑๐ แหล่ง ซึ่งยังไม่มี การวิเคราะห์ทางวิทยาศาสตร์แต่อย่างใด นักวิจัยและผู้เชี่ยวชาญจึงมีการทดสอบและวิเคราะห์องค์ประกอบธาตุของสีที่ใช้ เขียนภาพ จำนวน ๒๑๔ ตัวอย่าง ด้วยเทคนิครังสีเอ็กซ์ (pXRF) ผลจากการวิเคราะห์พบว่าภาพเขียนสีที่อ่าวพังงา อาจมี การเขียนขึ้นโดยกลุ่มคนหลากหลายกลุ่มที่อาศัยอยู่ในพื้นที่อ่าวพังงา ซึ่งในอนาคตมีความจำเป็นต้องอาศัยการศึกษา แบบสหวิทยาการ ได้แก่ โบราณคดี ชาติพันธุ์วิทยา นิเวศวิทยาโบราณ และธรณีสัณฐาน เพื่อให้ได้ข้อมูลที่ชัดเจนถึงความ สัมพันธ์ระหว่างมนุษย์และธรรมชาติ

**Keywords:** rock art, pictograph, rock painting, pigment analysis, Phang-nga Bay, western coast of Peninsular Thailand, southern Thailand | ภาพเขียนสี, ศิลปะถ้ำ, การวิเคราะห์ภาพเขียนสี, อ่าวพังงา, ชายฝั่งด้าน ตะวันตกของประเทศไทย, ภาคใต้ของประเทศไทย

Phang-nga Bay is located in Phang-nga Province, southern Thailand, by the Andaman Sea. There is a karst topography which is a characteristic of the erosion of the limestone mountains (Figure 1). Rock paintings were found on the rock wall of caves and rock shelters on a small island and some sites situated near a mangrove forest.



**Fig. 1:** Karst topography at Phang-nga Bay, Phang-nga Province. **Source:** Photo by Thawatchai, 2021.

There have been reports of rock art sites in southern Thailand since 1912. Later, Thai archaeologists from Fine Arts Department continuously surveyed and studied archaeological sites in southern Thailand, discovering more than 30 pictographs sites at present (Figure 2).



**Fig. 2** Pictographs sites at Phang-nga Bay and Ao Luk area.

Pictographs can be seen in the form of figures and non-figures which reflect the way of life and environment in the past. However, scientific analysis is not available. The purpose of this paper is to report the result for interpretation.

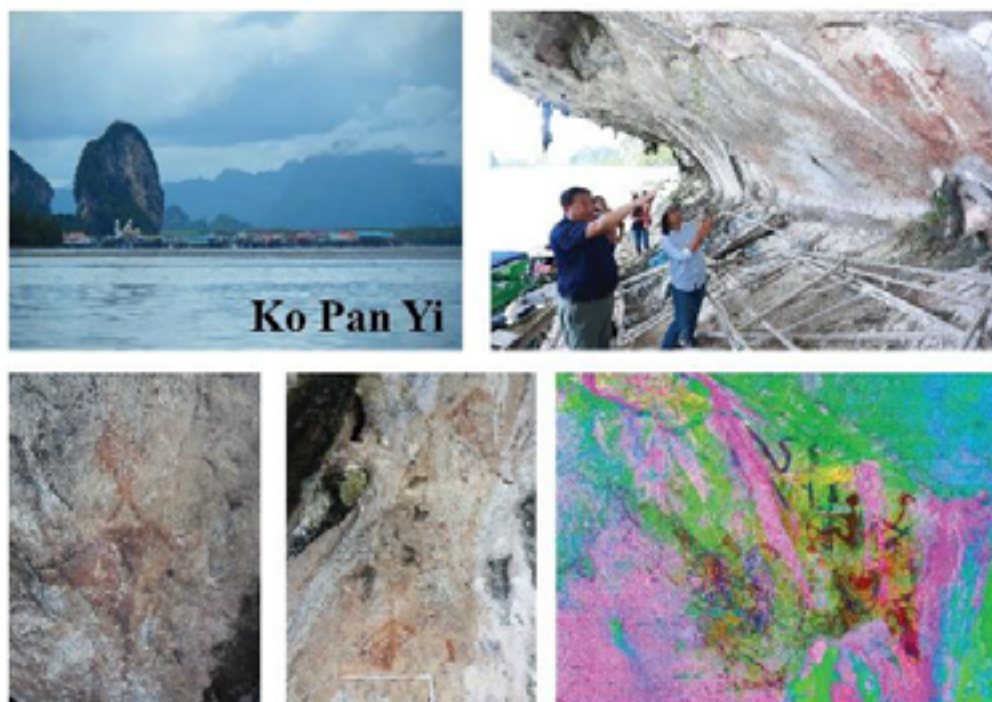
There were 10 pictograph sites discovered in Phang-nga Bay (Figure 3). Among these 10 sites, 5 new sites (No.6-No.10) were discovered by officers of Phang-nga Bay National Park in 2020. The conditions and paintings at each site can be summarized as follows:



**Fig. 3** Pictographs Sites at Phang-nga Bay.



1 Ko Panyi. The paintings were discovered on the rock wall of the shelter on the sea notch, northwestern side of the island. The significant features include red boat figures and human figures performing different actions such as standing, sitting, and dancing (Figure 4).



**Fig. 4** Pictographs at Ko Panyi. **Source:** Photo by Thawatchai, 2021.

2 Tham Nak is a large cave, located on Song Phi Nong Island. The important pictures are groups of boats and fish in red colour (Figure 5).



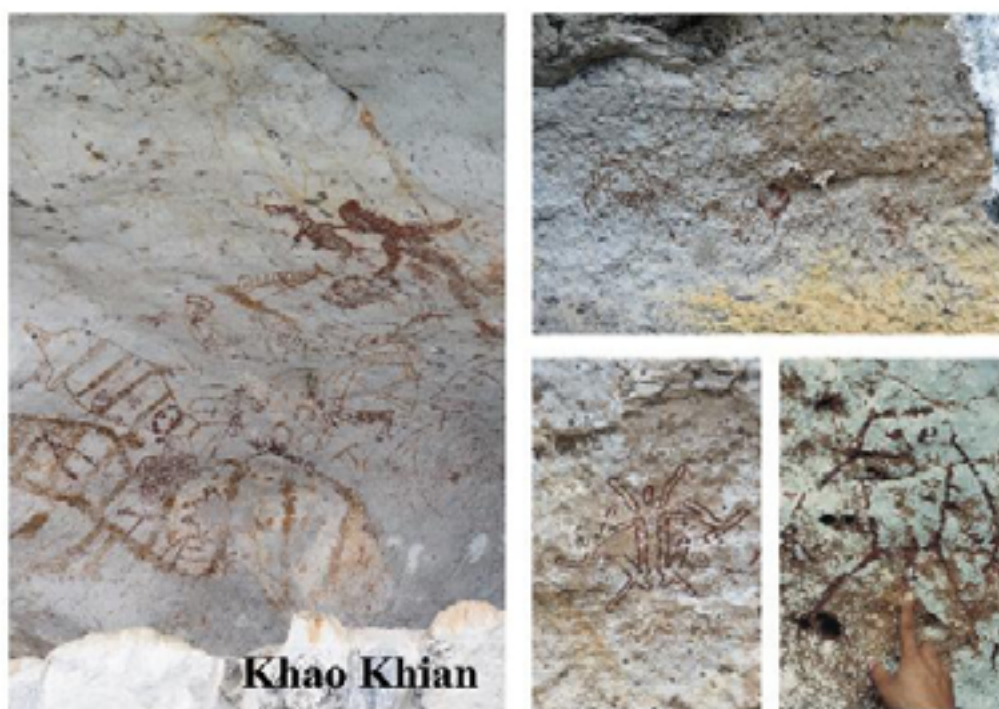
**Fig. 5** Pictographs at Tham Nak. **Source:** Photo by Thawatchai, 2021.

3 Khao Raya is a wall karst topography which is more than two kilometres long. Groups of geometric forms or nets with wavy lines in red colour were discovered on the rock wall of the cliff (Figure 6).



**Fig. 6** Pictographs at Khao Raya. **Source:** Photo by Thawatchai, 2021.

4 Khao Khian is the most well-known site in this area. At the rock shelters along the mountain, groups of various figures, including humans, dolphin, birds, fish, monkey, reptile, and geometric symbols. These figures were painted in red and reddish-brown colour (Figure 7).



**Fig. 7** Pictographs at Khao Khian. **Source:** Photo by Thawatchai, 2021.



5 Khao Phra-at Thao. There are two groups of red colour figures. The first group consisted of a large fish, shrimp and human. Another group represented figures of humans, reptiles, lines and geometric symbols (Figure 8).



**Fig. 8** Pictographs at Khao Phra-at Thao. **Source:** Photo by Thawatchai, 2021.

6 Ko Thalu Nok is a recently discovered site. There is a large rock shelter that is higher than the other sites. The significant figure is a group of cows and humans and discovered geometric forms in red colour (Figure 9).



**Fig. 9** Pictographs at Ko Thalu Nok. **Source:** Photo by Thawatchai, 2021.

7 Ko Khao Tao is a small island surrounded by mangrove forest. On the rock wall of the shelter, there were distinctive red figures of boats and humans. In addition, some of red figures were painted over with black human and animal figures (Figure 10).



**Fig. 10** Pictographs at Ko Khao Tao. **Source:** Photo by Thawatchai, 2021.

8 Tham Nok Krarian located on Sa-wang Yai Island. Unidentified red traces of pictures were discovered on the rock wall (Figure 11).



**Fig. 11** Pictographs at Tham Nok Krarian. **Source:** Photo by Thawatchai, 2021.

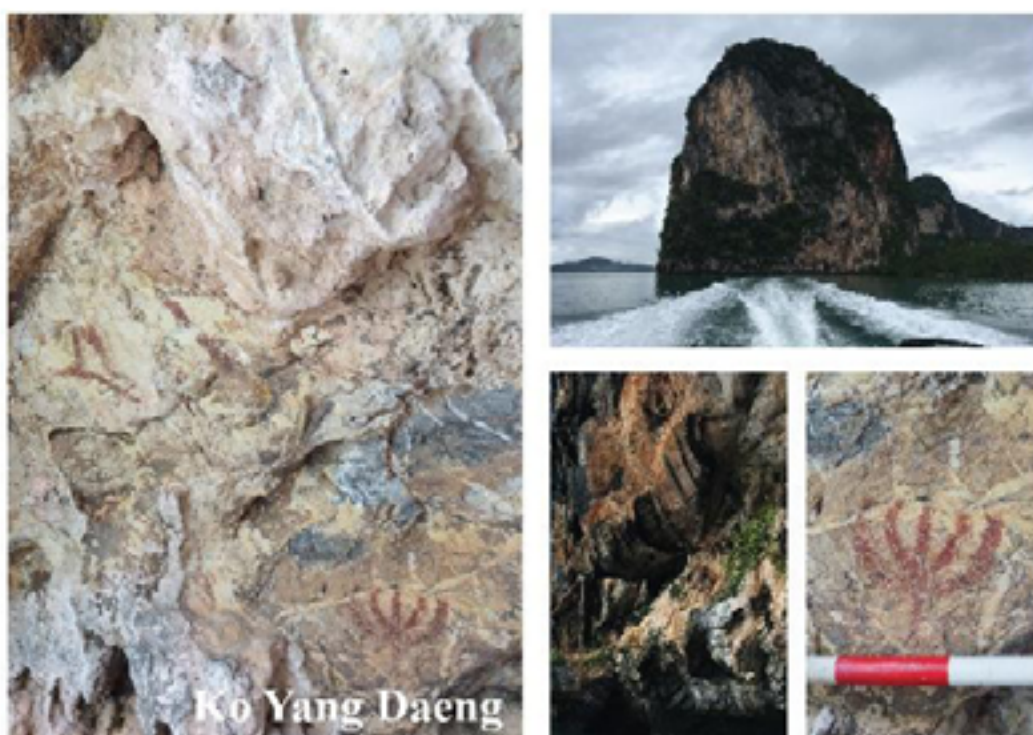


9 Ko Khai, there was a cave formed by erosion of sea water. Geometric forms or nets in reddish-brown colour were discovered on the rock wall (Figure 12).



**Fig. 12** Pictographs at Ko Khai. **Source:** Photo by Thawatchai, 2021.

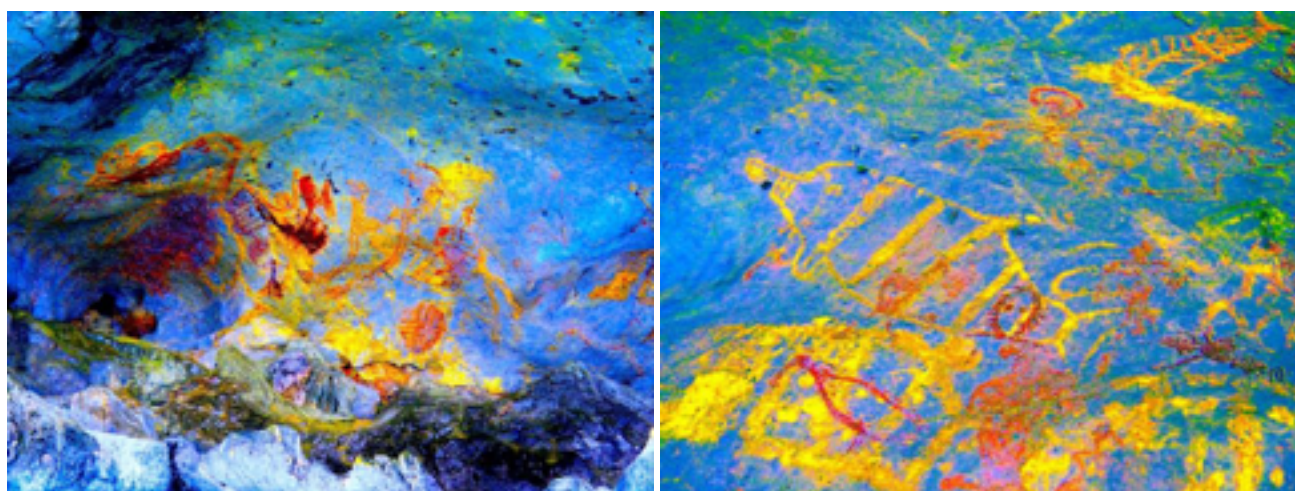
10 Ko Yang Daeng is a small island. Above, there was a narrow cave. The red paintings were discovered on the rock wall. The significant figure is a resemble flower. Other figures are geometric forms (Figure 13).



**Fig. 13** Pictographs at Ko Yang Daeng. **Source:** Photo by Thawatchai, 2021.

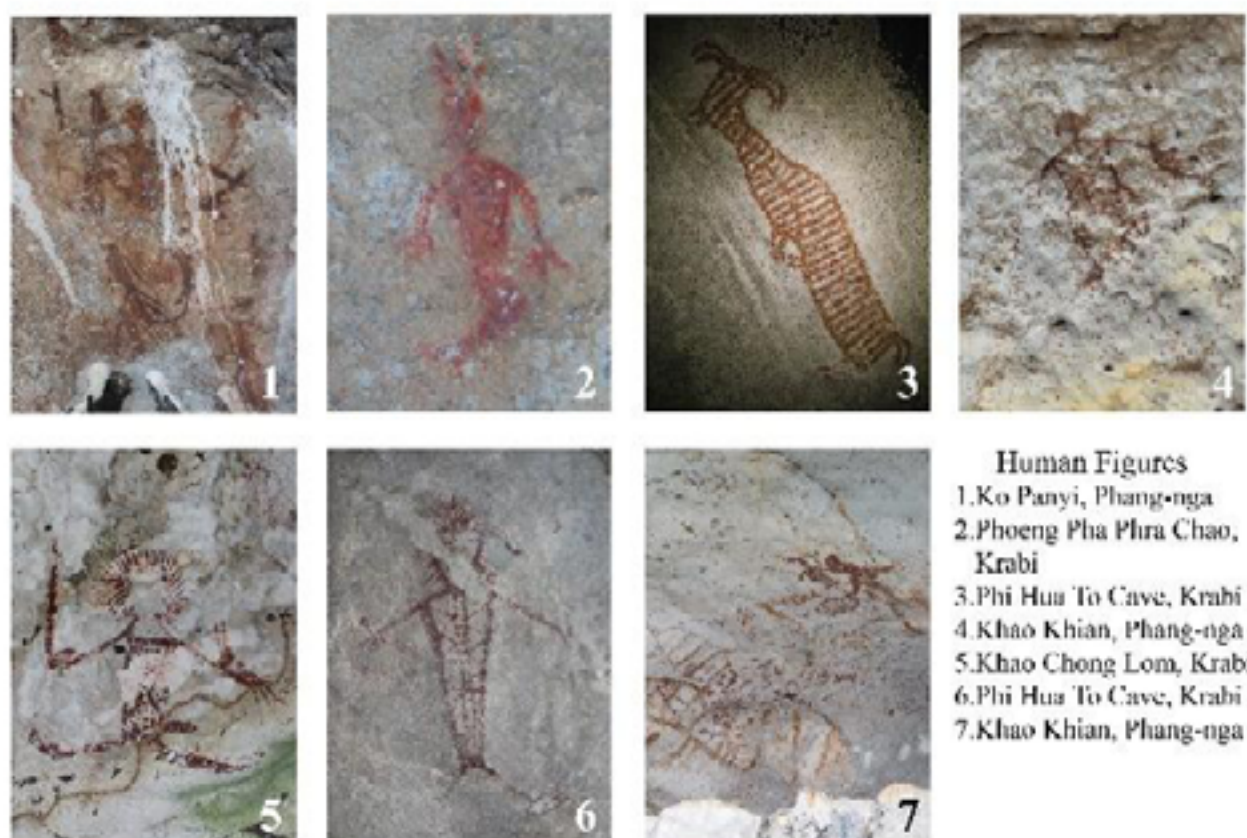


The comparative study of rock paintings at Phang-nga bay and Ao Luk were classified and compared according to technique, form and colour by using iDStretch application to enhance the pictures of superimposition that reveal some pictures are painted over multiple periods with different colours (Figure 14).



**Fig. 14** Images enhanced by iDStretch application showing the superimposition of rock paintings on the rock wall of Khao Khian, the Phang-nga Bay. **Source:** Photo by Thawatchai, 2021.

Human figures mostly use silhouette, outline and partial silhouette techniques (Figure 15). Some of the figures are showed details of faces and hair that are different from the figures in other regions. At Phi Hua To Cave in Krabi Province, only one pair of hands was discovered. The stylized human figures might represent a distinctive status and/or be related to the ritual beliefs of the communities in the past.



**Fig. 15** Comparison of human figures in the Phang-nga Bay. **Source:** Photo by Thawatchai, 2021.



The figures of land animals include cows, elephants, rhinos, monkeys, hedgehogs, and tigers or cats (Figure 16). At Phi Hua To Cave, there were two large birds and some of the figures had small birds perched on their arms, suggesting that they may have been useful for hunting. In addition, reptile figures such as lizards, crocodiles and turtles were also discovered (Figure 17).

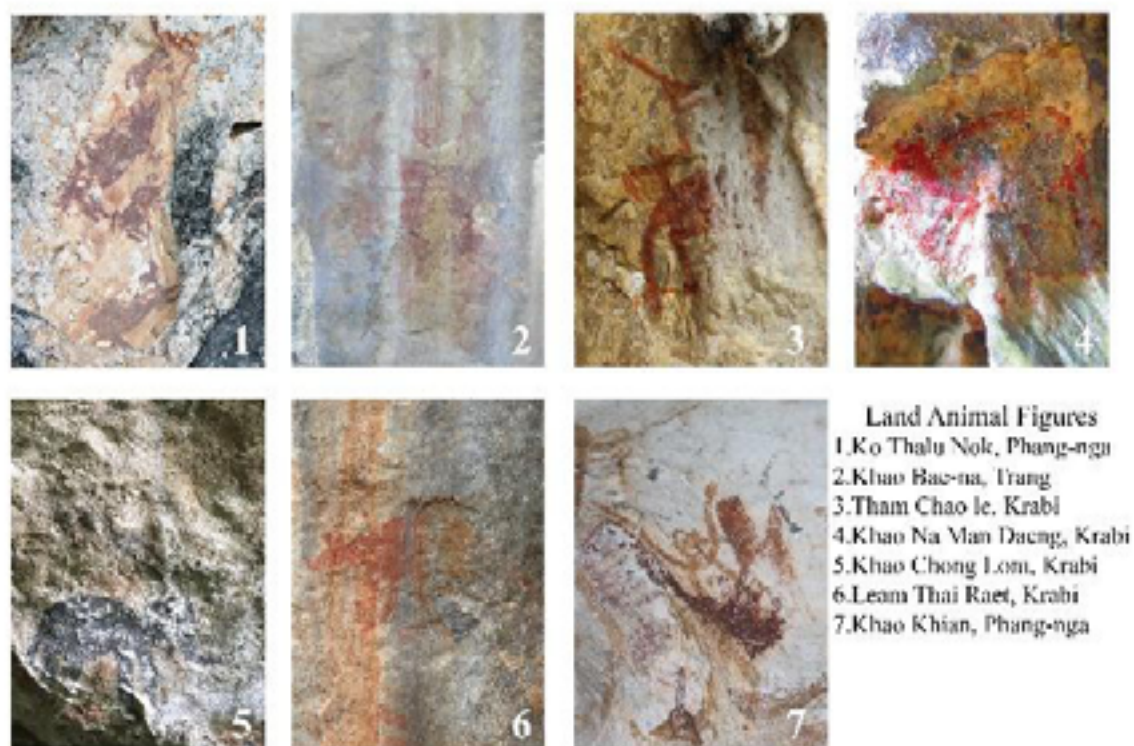


Fig. 16 Comparison of land animal figures in the Phang-nga Bay. Source: Photo by Thawatchai, 2021.

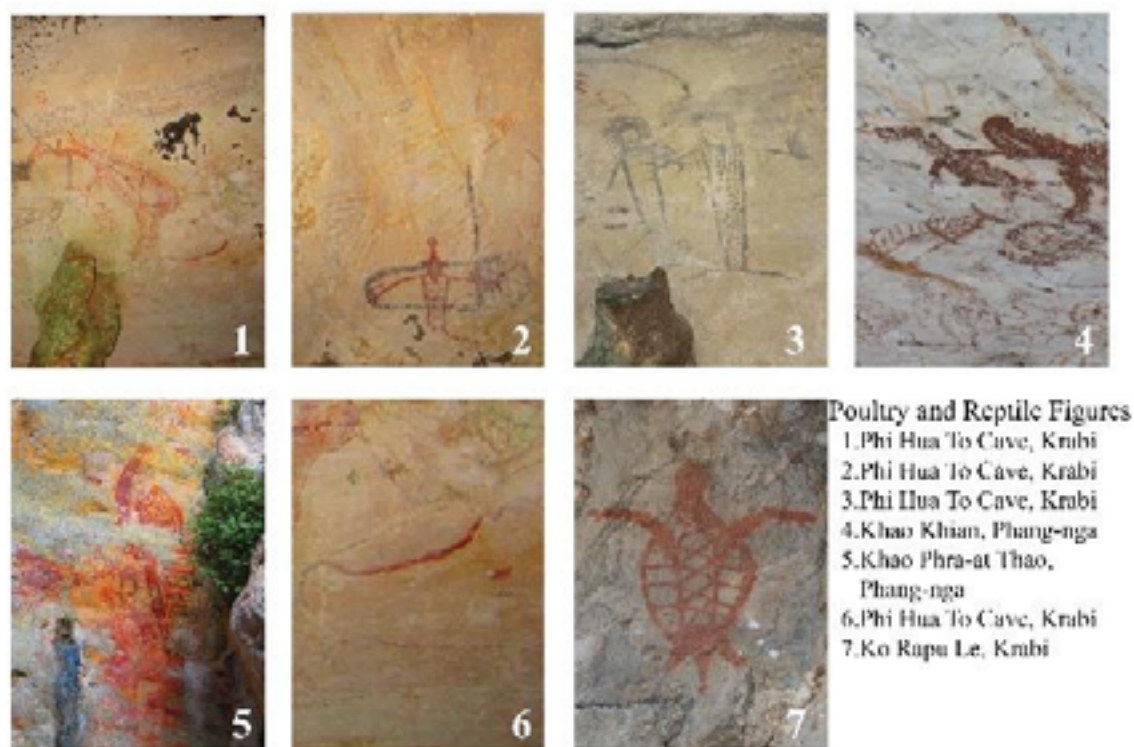
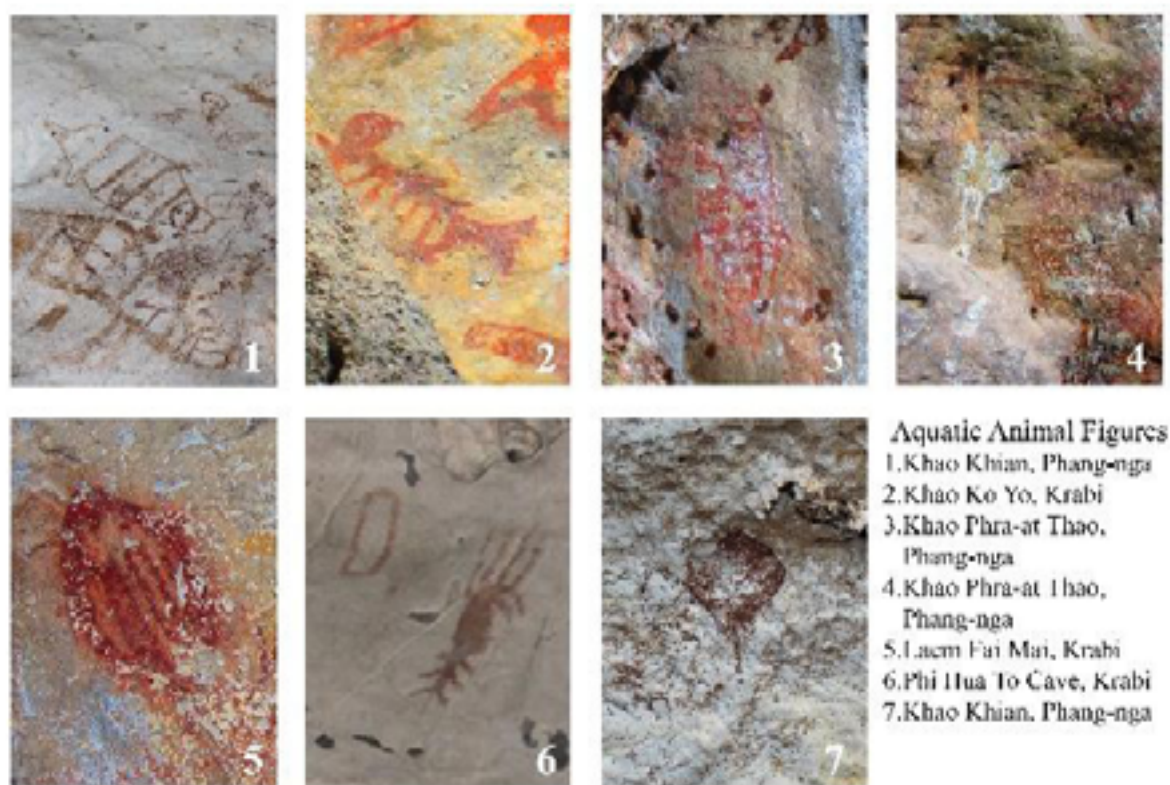


Fig. 17 Comparison of poultry and reptile figures in the Phang-nga Bay. Source: Photo by Thawatchai, 2021.



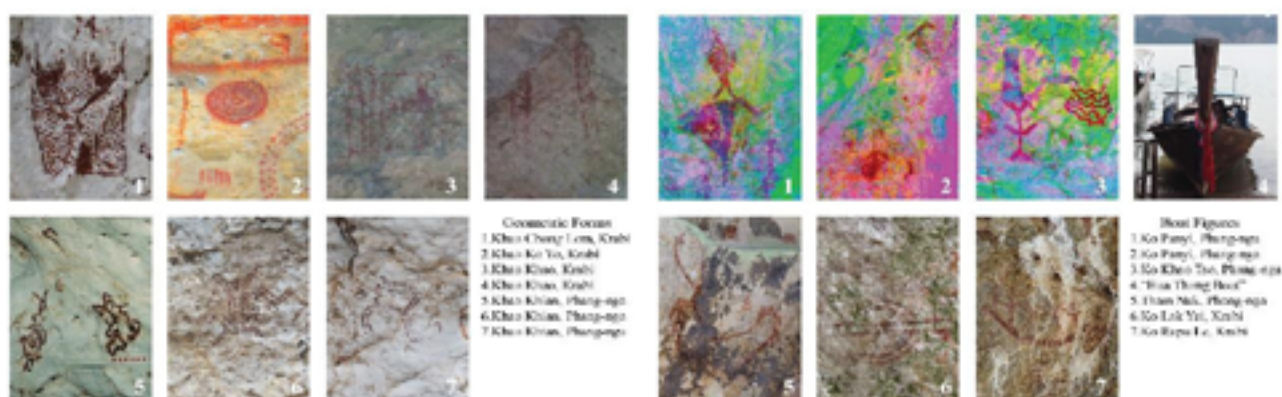
Aquatic animal figures were discovered in almost sites and were typically larger than the human figures in the same group and may have indicated an abundance (Figure 18). There were many different species of fish. A dolphin figure was discovered at Khao Khian, Phang-nga which is similar to the figure at Khao Ko Yo, Krabi. Other aquatic animals such as jellyfish or stingrays, shrimps and crabs were also discovered, demonstrating the environment in the past along the coast of the Andaman Sea.



**Fig. 18** Comparison of aquatic animal figures in the Phang-nga Bay. **Source:** Photo by Thawatchai, 2021.

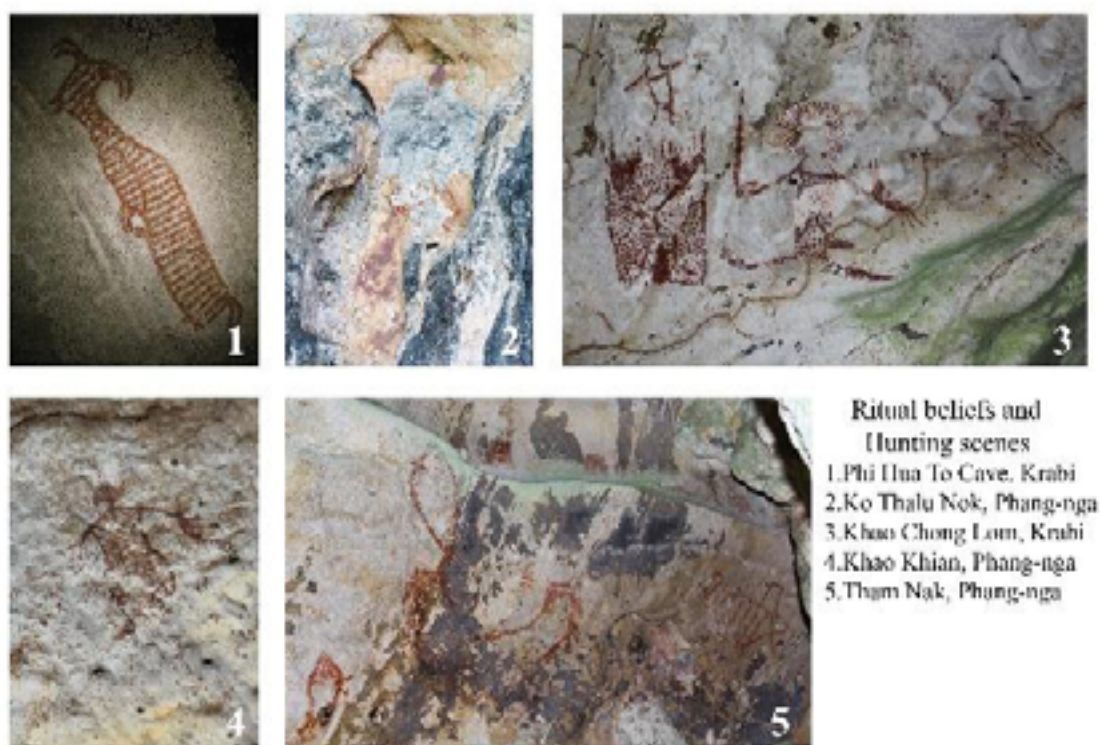
All pictographs sites have geometric forms that could be used as composite patterns (Figure 19). Therefore, it may be interpreted as symbolic pictures for a specific group of people.

Boat figures at Ko Khao Tao can be compared with Hua Thong Boat which is a regional fishing boat in southern Thailand, created by local people who lived close to the coast of the Andaman Sea with their knowledge (Figure 20). These boats are still used in nowadays.



**Figs. 19 and 20** Comparison of geometric (left) and boat (right) figures in the Phang-nga Bay. **Source:** Photo by Thawatchai, 2021.

Interpretation of pictographs that might represent a story and ritual beliefs. For the ritual beliefs, the masterpiece picture at Phi Hua To Cave is a human in stylized form, dressed in a long robe (Figure 21).

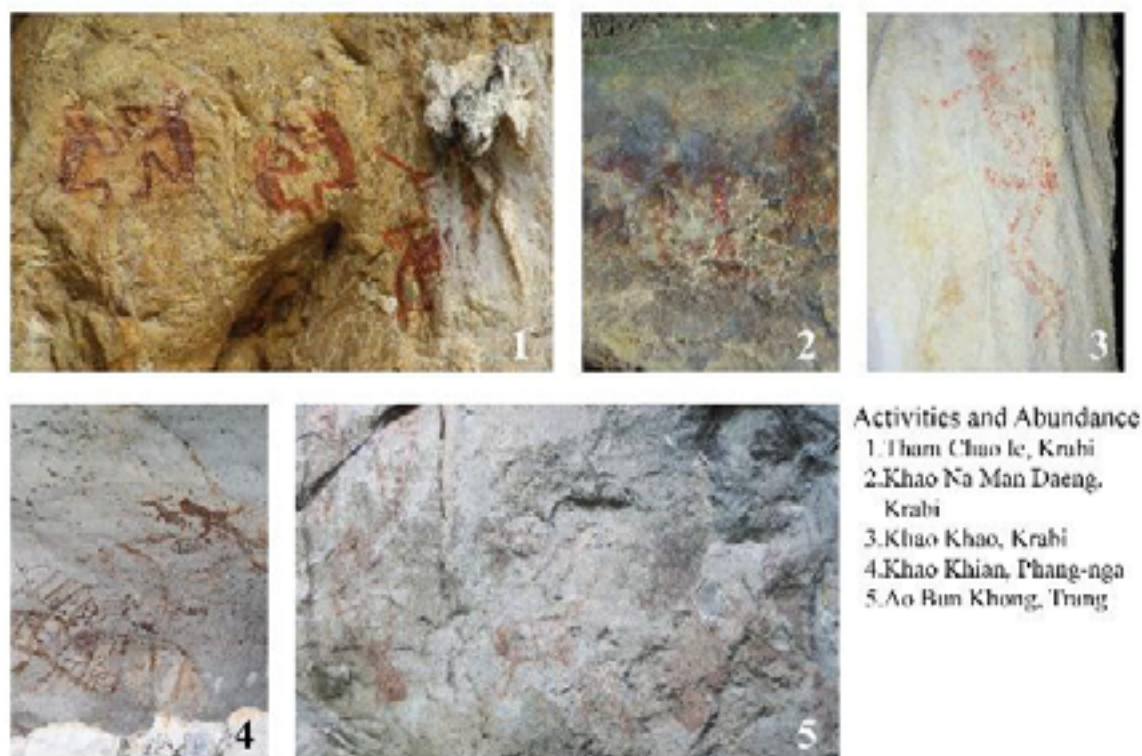


**Fig. 21** Comparison of ritual depictions in the Phang-nga Bay. **Source:** Photo by Thawatchai, 2021.

Regarding the hunting scene, there was a picture at Ko Thalu Nok depicted a group of cows being chased by humans. Picture of sailing in the sea, rows of boats and groups of fish. And pictures of humans catching animals.

Pictures that represent the activity such as dancing humans and a couples sitting and blowing or smoking, as well as humans riding a four-legged animal. There is also a male figure standing with exposed genitals at Khao Khao in Krabi Province and a scene of a large group of animals and humans for example at Khao Khian in Phang-nga. Therefore, the pictographs represent the way of life of the hunting-gathering society in the prehistoric period who lived near the coast of the Andaman Sea (Figure 22).





**Fig. 22** Comparison of human activities in the Phang-nga Bay. **Source:** Photo by Thawatchai, 2021.

From research, interpretation, and analysis, there is a possibility that the person or group who created these rock paintings is the ancestor of “Chao Nam / Chao Le” in Thai or Sea Gypsies who live close to the coast and have through experience about the sea very well.

The location of the sites may provide as a landmark in the route of their hunting and gathering. The paintings may represent the record to communicate the stories and way of life. Furthermore, based on legends and beliefs, it may be used for ritual ancestor’s worship.

The only methods used for dating pictographs sites in southern Thailand are comparative studies of archaeological evidence discovered nearby and geological studies which can be considered and compared with the duration of the incision (Notch) of the rock wall (Figure 23). These incisions were caused by the sea waves during the highest level about 5,000 years ago. In conjunction with archaeological evidence at nearby sites, these paintings should be date to prehistoric period, approximately 5,000–3,000 years ago.



**Fig. 23** Red pictographs on the rock wall of the shelter on the sea notch at Ko Panyi. **Source:** Photo by Thawatchai, 2021.

In 2021, FAD 12 Nakhon Si Thammarat collaborated with Kasetsart University on the project titled “Geomorphology and Rock Art Studies in the Phang-Nga Bay for Understanding of Prehistoric-Historic Societies and Migrations in Southern Thailand” This project is partly funded by the National Council of Thailand (awarded to P. Pananont).

The methods of this project are to study history, archeology, geology, ancient climate and sea level change. Collecting sea level data, topographic survey, 3D scanner, analyzing paintings with scientific and technological methods (Figure 24):

- Optical microscopy of pigment
- Spectroscopy and Raman analysis
- Chemical analysis of pigment and materials
- UV and IR Absorption Spectroscopy
- X-ray Diffraction
- 3D laser scanner

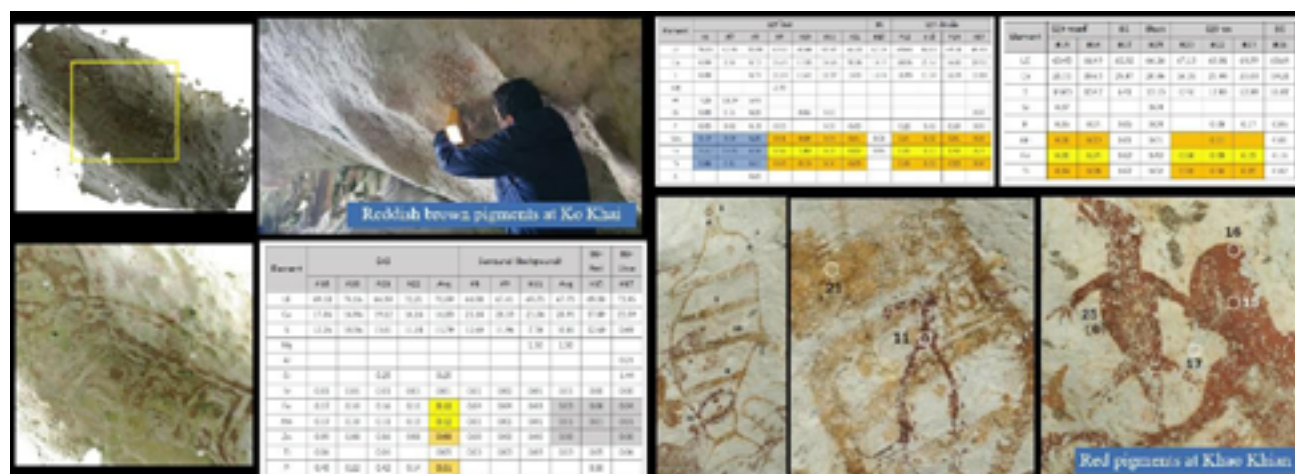


**Fig. 24** Left: Field data collection by project researchers at Pictographs sites in Phang-nga Bay. Right: Analysis by Synchrotron Light Research Institute and Kasetsart University. **Source:** Photo by Thawatchai, 2021.



In the first year, the project concentrates on pictographs sites at the Phang-nga Bay. In addition to conducting archaeological research, the project requires to analyze pigment by using pXRF for collecting data and comparing the component with other sites.

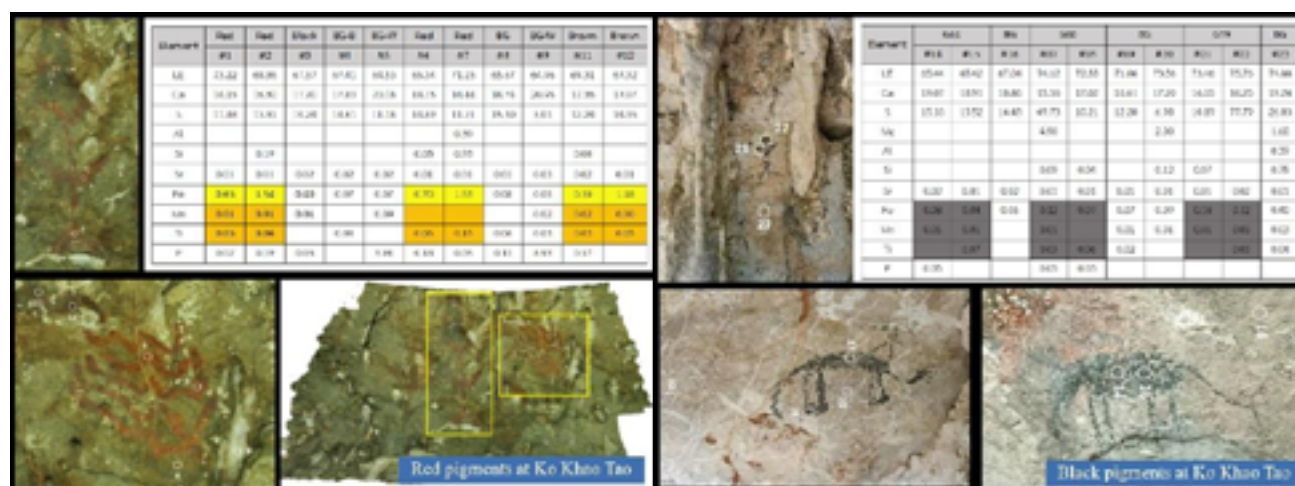
The result of the reddish-brown pigment sample at Ko Khai which consist of Iron, Manganese, Zinc and Phosphorus is the significant distinctive feature. The red pigment sample from Khao Khian and Ko Khao Tao reveals that the main component is Iron and trace of Manganese, Titanium and Phosphorus. While black pigment sample from Ko Khao Tao showed traces of Iron and other minerals (Figure 25).



**Fig. 25** Left: Reddish brown pigments at Ko Khai. Right: Red pigments at Khao Khian. **Source:** Photo by Thawatchai, 2021.

Therefore 214 pigment samples that appeared on the rock walls at 10 sites were detected by pXRF and analyzed by the experts of Synchrotron Light Research Institute and the Department of Earth Sciences, Faculty of Science, Kasetsart University.

The analysis results show that most rock paintings used red pigment. Its main component is Iron (Fe 0.12-13.89 %); Manganese, Titanium and Phosphorus were traced minerals. Reddish brown pigment for geometric painting at Ko Khai obtain the result of the component: Manganese (0.10-0.17%), Zinc (0.06-0.09%), Phosphorus (0.11-0.45%) which is the significant distinctive feature. Iron was a trace mineral (0.04-0.18%) of samples from black pigments of pictographs at Ko Khao Tao therefore, it was likely made from organic material (Figure 26).



**Fig. 25** Left: Red pigments at Ko Khao Tao. Right: Black pigments at Ko Khao Tao. **Source:** Photo by Thawatchai.

According to the XRF result, rock paintings were created by several artists who had also different tastes and skills. It reflected more than one group occupied the area of the Phang-nga Bay.

There is a need for further multidisciplinary studies on archaeology, ethnology, paleo-ecology and geomorphology in order that the Phang-nga Bay rock art identification will give information on the interaction between humans and nature. The next year, the project intends to perform collecting of data and expand to the nearby area at Ao Luk, Krabi Province.

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