

The seamanship of traders of the “Asia inland sea” during the Age of Commerce

~Deduction of drawings from the Ryukyu Kingdom Period~

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1. Preview

1-1 Japan as an agricultural country

Since the development of the rice crop during the Yayoi period, Japan has been said to be an agricultural country. In early modern times, the *Kokudaka* system was enforced: an annual tax was levied in proportion to the crop. Agricultural products as well as all other produced goods, including marine produce, wood, cloth, buildings, and ships, were all assessed in terms of their value relative to rice. The unit of taxation was the *koku*, which was the amount of rice needed to feed one person for one year. With such a system, the word *hyakushou* has come to mean agricultural farmer. However, *hyakushou* originally meant “commoner.” The farmer was one of many in the *hyakushou* class, which included the fisherman, craftsman, and sailor, but gradually became known as the primary representative of the term.

Although the length of Japan's coastline places 6th in the world, Japan only ranks 62nd in terms of land area. In addition to relatively little land area, the area of plain field that is suitable for farming is even more limited. Taking this into account, Japan may not have only been an agricultural country.

1-2 Japan has been a trading nation since the medieval era

Some research has suggested that Japan was not an agricultural country but rather a trading nation.¹⁾ Domestic and foreign trade goods were transported and exchanged primarily by ship and boat. One riverboat going down the Hozu River could carry fifteen times the amount of cargo than that of one horse.

In a period when overland routes were underdeveloped, people in certain areas used boats to travel to neighboring villages rather than going by land. The loading and unloading of cargo happened in the harbor which became a place to exchange goods. With urbanization, these

harbors became port cities. Investigations of port cities have uncovered large amounts of porcelain from countries such as China.²⁾

Trade was not only domestic. Japan held an important geographic position in the Asian inland sea (which stretches from the island of Hokkaido to Indonesia), and experienced a golden age of sea trade from the medieval to early modern period that can be likened to the Age of Discovery. As recorded in traditional literature, Tairano Kiyomori excavated the Ondo-no-Seto and built Owada-no-Tomari harbor to develop trade with foreign countries by sailing ship.³⁾

It has become clear that, since the middle ages, large seagoing ships were used to engage in international trade by the countries connected by the Asian inland sea such as China, various countries in Southeast Asia, the Ryukyu Kingdom, Korea, and Japan.⁴⁻¹¹⁾

Well-known vessels from Japan include trading vessels that carried envoys to the Sui Dynasty (the *Ken-zui-shi* ship) and the Tang Dynasty (the *ken-to-shi* ship); and also vessels sent to raise funds to build a temple (the *Tenryu-ji* ship). Others include the Red-seal ships (trading ships licensed by the shogunate) and *Yamato-bune*. These large ocean-going ships can be considered to be trading ships even if they sometimes carried diplomatic envoys and monks as passengers.

1-3 Risk of sailing in Japanese waters

The danger of sailing in the seas around Japan must be considered when studying the area's history of maritime trade. Japan's coastal waters are said to be some of the roughest in the world. Shipwrecks are not unusual. The renowned Chinese monk Jianzhen failed five attempts to cross the East China Sea before finally arriving in Satsuma in 753. The shipwreck discovered near Sinan, South Korea in 1975 was identified as a junk ship, 30 meters in length, which had left Ningbo in Zhejiang province for Hakata, Japan in the 14th century.¹²⁾

Incidents of tragic shipwrecks were numerous in the Edo period as well. A large Japanese junk called the *Tokujomaru* was stranded at sea in the Sea of Enshu and was swept out to the Pacific Ocean where it drifted for 484 days. When it was found by a British ship near Santa Barbara, California, only 3 of the original 14 crew members were alive.¹³⁾

Low pressure systems commonly pass through the seas around Japan so it is not unusual for weather and hydrographic conditions to suddenly change or worsen. The examples above show that there are certain great risks involved in navigating such waters. Some may doubt whether ocean-going voyages could manage to cross the dangerous seas safely on a consistent basis. Trade cannot be established without reliable and consistent means of transportation. However, it is a historical fact that international trade thrived in the Asian inland sea for

over a thousand years. Therefore, these people must not have been foolhardy risk takers, but rather purposeful seamen equipped with the knowledge and skills to sail a dangerous sea.

1-4 The purpose of this paper

In recent years, the trading history and activities of the Ryukyu Kingdom in the Asian inland sea during the [Age of Discovery] have been clarified through the study of related materials.^{14, 15)}

The people operating these trading ships were not adventurers with no regard for danger. Rather, they were people who were familiar with the dangers of being at sea. Using the sailing technology of their time to its fullest extent, they faced that danger in order to achieve their intended goals.

The size and structure of the ships used for trade in the Asian inland sea are gradually becoming clear.¹⁶⁻¹⁸⁾

However, the seamanship of the sailors, the operation and navigation of these ships, is still unknown. Revealing the sailing skills of the experienced sailors and how they managed their ships and voyages may lead to further understanding of how they brought about the golden age of maritime trade in the Asian inland sea.

The first step in clarifying this issue is to examine the ships displayed on old pictorial maps that exist in Okinawa. The sailing and navigation techniques used by ships in the medieval and early modern periods in the Asian inland sea can be evaluated through a thorough examination of the condition of the ships and the roles of the crew members drawn on the maps.

2. The Asian inland sea

2-1 Sailing routes in the Asian inland sea

2-1-1 Geographical conditions

The Asian inland sea begins with the Sea of Japan in the north and includes the Yellow Sea, East China Sea, South China Sea, Sulu Sea, Celebes Sea, Banda Sea, Java Sea, and Andaman Sea. This inland sea is sandwiched between the continent that stretches from East Asia to South Asia and the islands that form an arch in the Pacific Ocean. The coastal waters delimited by the continents of East and Southeast Asia in the west and the Japanese archipelago, the Ryukyu archipelago, Taiwan, the Philippines, and Indonesia in the east, are suitable for sailing just like the Mediterranean Sea.

Geographic conditions of the Asian inland sea and the alternation of seasonal winds that control them resemble those in the Mediterranean Sea. Maritime trade in the Asian inland sea may have brought wealth and prosperity similarly to how it did in the Mediterranean Sea.

A sea chart of the Asian inland sea with the size of the Mediterranean Sea outlined in red has been inserted for comparison.

2-1-1-1 Asian inland sea chart: the Asian inland sea as viewed from the continental side (Mediterranean Sea outlined in red)



2-1-1-2 Naha, Okinawa to Fuzhou, China: 480 nautical miles

The longest distance between ports, which would have been between Naha and Fuzhou harbors, was 480 nautical miles. The speed of Ryukyu tributary ships was estimated to be

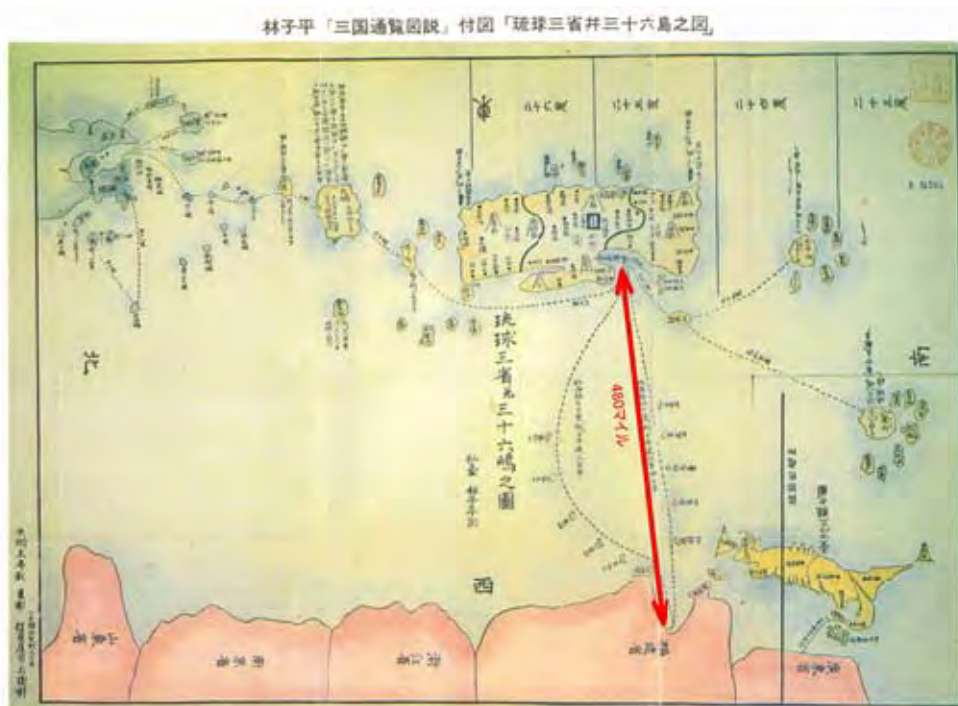
between 4 and 10 knots. A ship capable of averaging 4 knots could travel 96 miles in one day. Therefore, it can be presumed that these ships could make the journey within five days or less.

High-precision navigation would not be necessary to travel this distance. Even if the crew members did not use celestial navigation by using a sextant or similar device, they could use dead reckoning with a compass and still arrive at the desired destination. If they did this, then they would set their course from the point of origin to the port of destination. Then they could estimate their position by multiplying their speed by the elapsed time.

Experienced navigators are able to check and determine the ship's speed within an accuracy of 0.5 knots. The elapsed time can be measured using the sun, marking noon when the sun is at its highest point. An error in calculating the estimated position using this method for five days would be 30 miles at most. Because land is still within sight at this distance, this degree of error would not be a problem in practice.

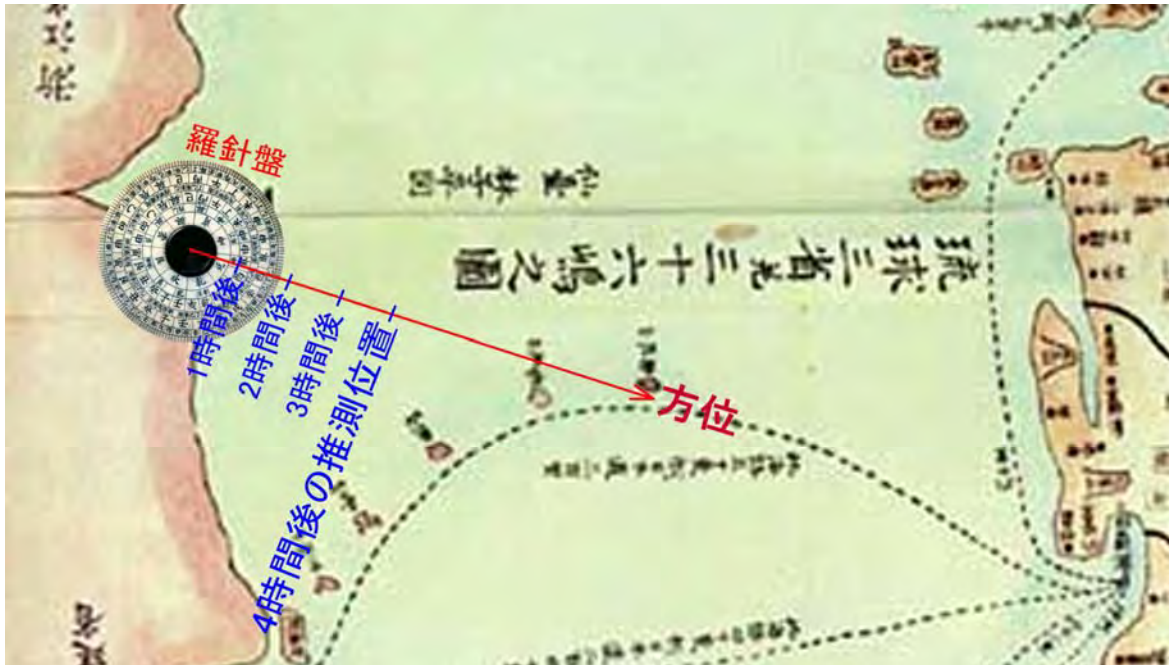
2-1-1-3 Appended figure from “An Illustrated Description of Three Countries” by Shihei Hayashi (Kyushu University Digital Archives)

480 nautical miles between Naha, Okinawa in Japan and Fuzhou, China



2-1-1-4 A diagram of dead reckoning

A ship is steered along with a fixed course in red line and the speed is to be entered in blue for each unit of elapsed time.



2-1-2 The oceanographic conditions of the Asian inland sea

Some believe that traveling to Japan by boat from the south would be easy if the boat rode the Kuroshio current from the south. For example, coconuts can drift up from the south and may eventually wash up on Japan's shores. However, there is a fundamental difference between drifting and sailing. Coconuts are simply carried along by the current without a set destination and with no control over their speed or heading.

Navigators of ships would dedicate all their effort in reaching their destination as quickly as possible by a day or even by an hour to fulfill their duty to safely transport their cargo over the dangerous seas.

Since the publication of Kunio Yanagita's *By the Road of the Sea* in 1960, the phrase "the road of the sea" has been commonly used, and with it spread the notion that there are fixed paths at sea just as there are on land. Nowadays electronic navigation, such as GPS, and self-steering gear allow merchant ships to follow a fixed sailing route like cars traveling along a road.

Because the sailing ships of earlier times were reliant on the wind, they would have to chart

a new course each time the wind speed or direction changed. Therefore, there was no such thing as a set path or road on the sea. Instead, sailors would create their own. In order to do so, they would have needed the knowledge and sailing skills required to create their own paths at sea in response to the changing conditions.

To arrive at the determined destination, it is necessary to be able to discern the appropriate wind speed and direction. The most favorable wind for a sailing ship is one that comes from behind or diagonally behind, otherwise known as a tailwind. A tailwind with a speed of 3 to 6 on the Beaufort scale would allow the ship to travel at a comfortable speed. The ability to chart a course that maintained these wind conditions greatly influenced whether the voyage succeeded or failed.

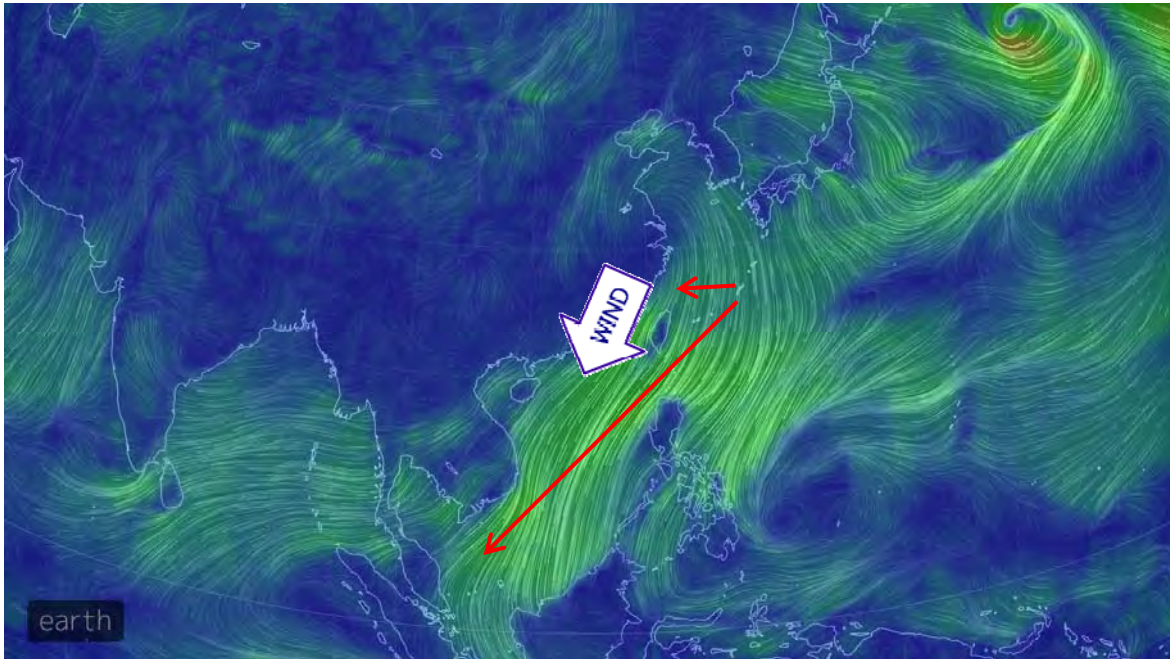
Although wind is fickle, there is a pattern to the changes in wind direction and force. These changes are determined by pressure patterns in accordance with the changing of the seasons.

Long distances can be traveled by understanding and utilizing the patterns of seasonal winds that control the Asian inland sea. Seasonal winds start at the beginning of September (in winter using Japan's lunisolar calendar) and would generally blow from the north or the northeast. This wind is called *minishi* in Okinawa, meaning "new northerly wind." In May (lunisolar calendar), the monsoon wind starts to blow from the southwest. This is the *kashibe* (summer solstice south wind). By taking advantage of the changes in seasonal winds, it is possible to sail for a long period, such as a year, and make a round trip from the southern to the northern part of the Asian inland sea. Ryukyu junk ships would pick up northeasterly winds in September (lunisolar calendar) and set sail for China and Southeast Asia. They would return to Ryukyu at the end of the rainy season in May (lunisolar calendar) by catching the southwest winds from the monsoon that is called "the tenth day after the end of the rainy season". The same wind could be used to sail from Ryukyu to the Japanese mainland and to the Korean peninsula.

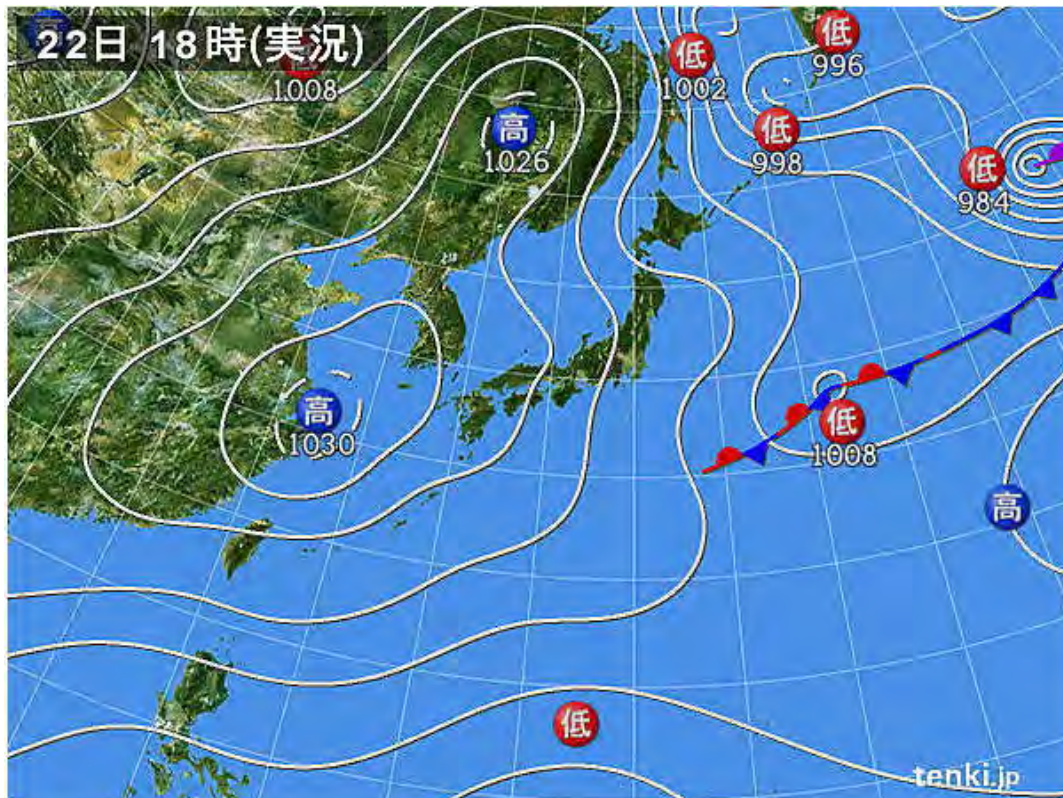
2-1-2-1 Pressure pattern to utilize the northeasterly wind

The main period to catch a fair northeasterly wind is from September to New Year's. The red lines show the sailing routes.

Wind direction on January 22, 2014 at 1500 hours (Earth Wind Google)



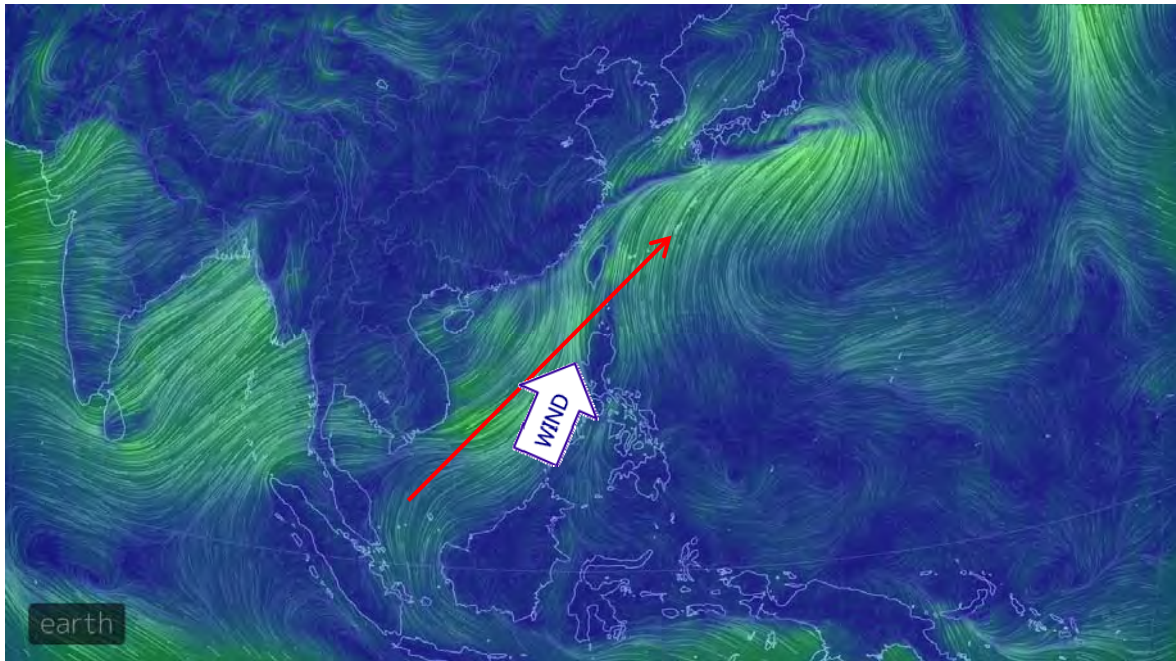
Weather map from the same day (winter pressure pattern where low pressure is located in the east)



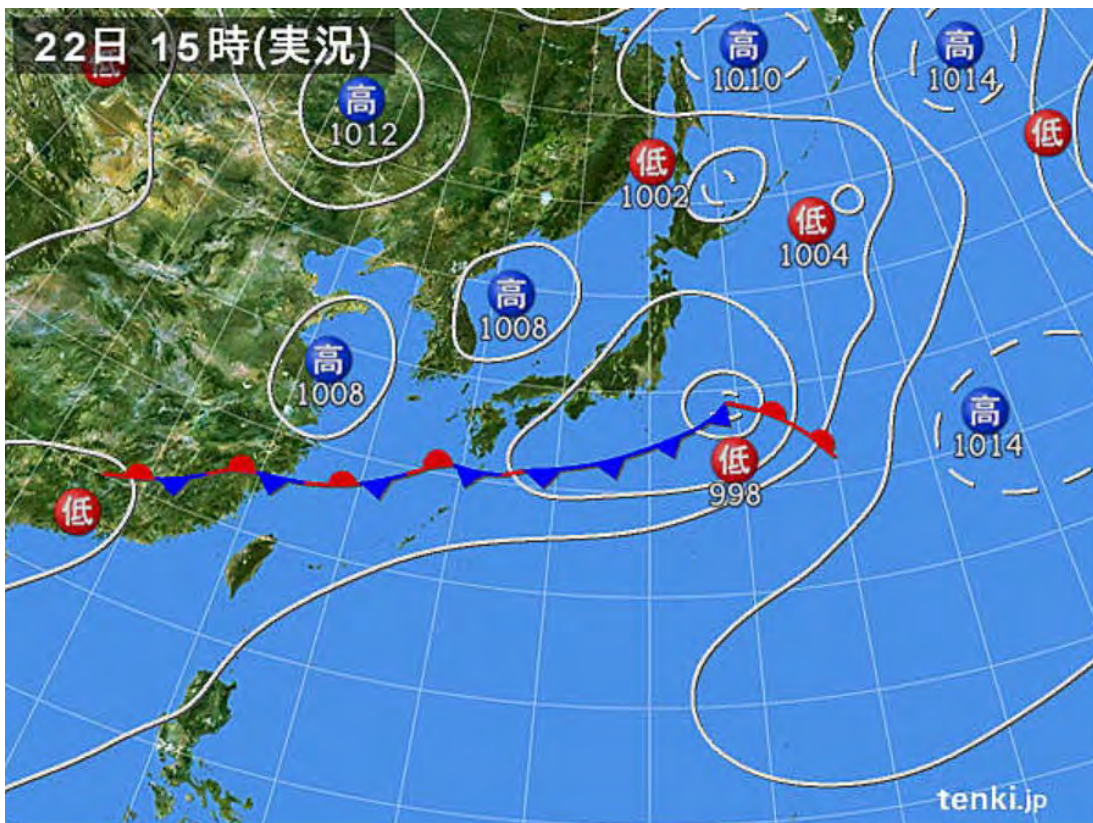
2-1-2-2 Pressure pattern to utilize the southwesterly wind of the monsoon

The main period during which a tailwind can be used is from May to June. The red line shows the route.

Wind direction on June 22, 2014 at 0700 hours (Earth Wind Google)



Weather map from the same day (the summer pressure pattern of the tenth day after the end of the rainy season in Okinawa)



2-2 Ships that sailed the Asian inland sea

Tributary ships used in the Asian inland sea, such as those that carried envoys to Sui China or T'ang China, those sent on voyages to obtain funds for construction of temples and shrines, and Red-seal ships (trading ships licensed by the shogunate), can all be classified as junk ships. In Japan during the Edo period, the Yamato ships were used to carry large quantities of cargo. Compared with Yamato ships, junk ships had less loading capacity but were more suitable for sailing the open sea.

Chinese junk ships are rigged with fore-and-aft sails which allow them to catch the wind from a wider range of angles.. Each ship had three masts, making each sail relatively small in area, which allowed them to respond to changes in wind force more readily. The single-masted Yamato ships, on the other hand, had one large, square sail and could not adjust as easily to changes in the wind.

Because the decks on Chinese junk ships were watertight, waves that surged onto the deck would drain off the sides rather than collecting on board. In addition, as both upper and lower parts of the rudder were supported, there was little chance that the rudder would break off in rough conditions. Losing a rudder would be like having a car with no steering wheel. The reason why the aforementioned Japanese junk *Tokujomaru* drifted in the Pacific Ocean for 484 days was that it lost its rudder in a storm.

Differences in equipment between Chinese junk ships and Japanese junk ships

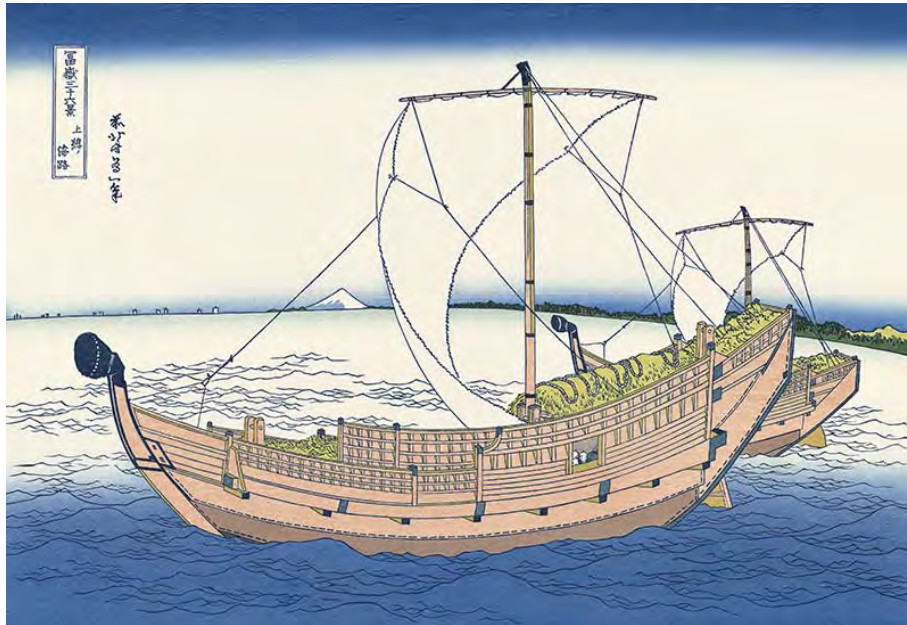
	Chinese junk ship	Japanese junk ship
Rig	Fore-and-aft rig with three sails and three masts	Square rig with one square sail and a single mast
Rudder	Hung through the deck, and hinged (supported) at the end	Hung through the deck, free at the end
Deck	Watertight	Rain and spray cover
Length	31m / 104 feet	29m / 97 feet

The comparison above shows that the hardier, more seaworthy Chinese junk ships were better equipped for trade in the Asian inland sea during the medieval and early modern periods.

Tributary ships used during the Ryukyu Kingdom period are well-known examples of Chinese junk ships.

Tributary trade relations with China brought great prosperity and helped shape the Ryukyu Kingdom. Trade existed not only with Japan and China, but also with Thailand, Java, and Vietnam.¹⁹⁾ Because tributary ships were the official trading ships used for the Ryukyu Kingdom's trading activities, many records of their voyages are maintained in Okinawa.

2-2-1 Yamato-type Japanese junk (Hokusai's *Thirty-six Views of Mount Fuji*)



(Wikimedia Commons, the free media repository)

2-2-2 Junk-type red-seal ship (Tokyo Naval Science Museum GDFL)



(Wikimedia Commons, the free media repository)

2-2-3 Chinese Junk ship tributary vessel from the Ryukyu Kingdom (Okinawa Prefectural Museum and Art Museum)



3. Survey of historical pictorials of Ryukyuan ships

3-1 Objective of the survey

The objective of the survey is to examine all the ships depicted in the pictures in 3-2 to clarify the following:

1. Determine whether the pictorials can be used as research material on nautical techniques.
2. Classify the types of ships that appear in the pictures.
3. Classify the state of the ships, i.e., what activity is taking place in each depiction.
4. Classify the behavior of those shown on board.
5. On the basis of the above classifications, evaluate and clarify the maneuvering and sailing techniques used on these ships.

3-2 Principal documents surveyed

Survey objects	Format	Location	Date examined
1. Illustration of tributary ship	8 Folding screen	Okinawa Prefectural Museum and Art Museum	2014/7/9
2. Folding screen depicting a harbor map in Shuri, Naha	Scroll	Okinawa Prefectural Museum and Art Museum	2014/7/10
3. Folding screen depicting a map of a Ryukyuan trading harbor	6 Folding screen	Urasoe City Museum of Art	2014/7/11

3-3 Survey personnel

For the purpose of this research, it is essential to distinguish the state of the ships depicted in the pictorials. This includes discerning whether the ship is sailing, being rowed by paddle or oar, anchoring, mooring, berthing, or being towed; and also noting the number and behavior of those on board.

To help determine the aforementioned factors, four of the five investigators themselves are sailors of sailboats, who can be considered as the modern equivalent of those depicted in the pictorials. They were paired up to discuss data for the survey and record information on a survey card as the information was confirmed.

Names of the survey investigators

1. Yoshio Makino, sailor residing in Naha.
2. Misako Aoki, sailor residing in Osaka.

3. Masami Sakiyama, residing in Itoman.
4. Takashi Nishino, sailor residing in Itoman.
5. Yoh Aoki, sailor residing in Osaka.

Curators who collaborated on the survey

Ken Sonohara, Curator at the Okinawa Prefectural Museum and Art Museum

Ayano Touyama, Curator at the Urasoe City Museum of Art

3-4 Survey method

1. The survey criteria was determined and the survey cards were created on the basis of the images that were the subject of the survey
2. All ships were numbered.
3. Investigators were assigned ships based on the numbering.
4. The investigators formed groups of two and investigated their assigned ships, entering data on the survey cards.
5. Yoh Aoki collected the survey cards.

3-5 Survey card

船種	進貢船	ジャンク型	サバニ	大和船	和船				
記録日	2014/ /	場所	沖縄県立博物館 / 記録者 :						
出所	進貢船図								
位置	左	中	右	/	上	中	下	/	
船の状態	帆走 / 櫓走 / 櫂走 / 錨泊 / 係留 / 停泊 / 被・曳航 /								
乗船者	合計	名	乗組員	名	乗客	名	/		
乗組員の動作	操舵	名	櫓	名	帆の操作	名	/		
	旗	名	音曲	名	見張観察	名	/		
	漁撈	名	/						
船長の動作	監督号令 / 操舵 / 見張観察 /								
乗客の動作	観察	名	談話	名	飲食	名	音曲	名	/

3-6 Objects of study

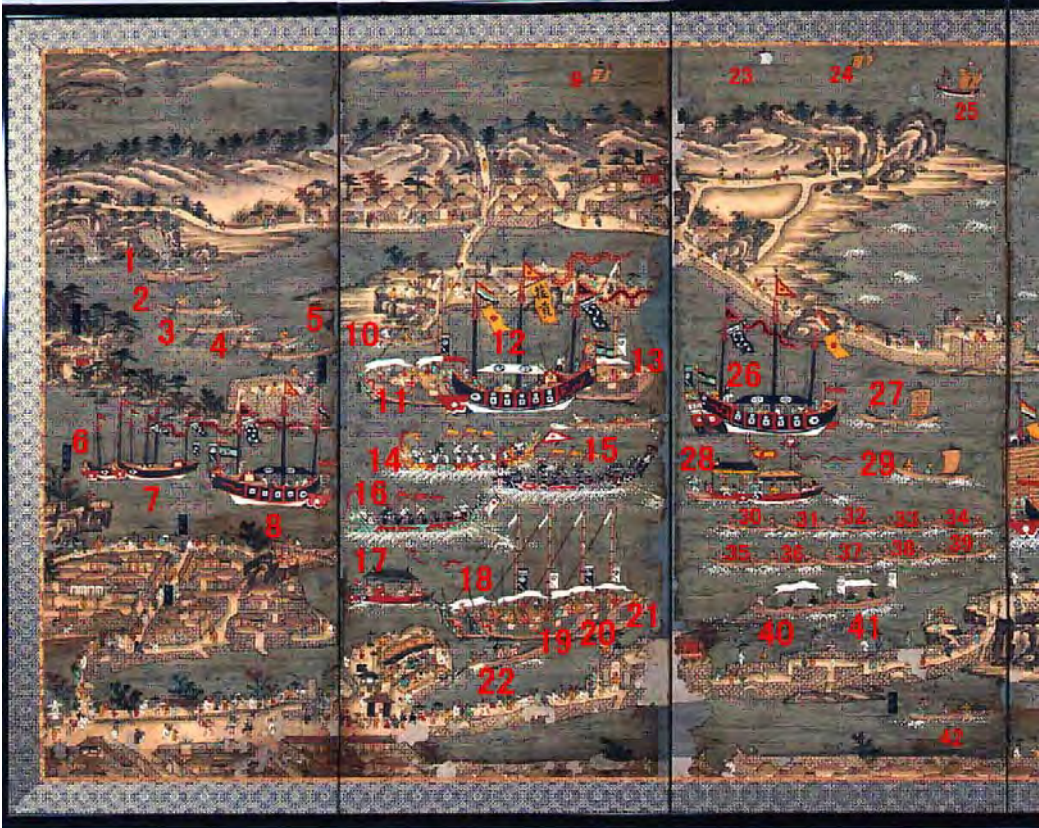
3-6-1 Illustration of tributary ships with numbering (Okinawa Prefectural Museum and Art Museum)



3-6-2 Folding screen depicting a harbor map of Shuri, Naha with numbering (Okinawa Prefectural Museum and Art Museum)



3-6-3 Folding screen depicting a map of a trading harbor in Ryukyu with numbering, produced in the early 1800s (Urasoe City Museum of Art) ^{20, 21)}



3-6-4 Tributary ship (Chinese junk)

A tributary ship being towed by Sabani boats to a place of anchorage after entering port. (3-6-3 #33, 34, 38, 39, 49)



A tributary ship sailing before it enters port. (3-6-3 #46)



3-6-5 Maran sailboats

Three boats at anchor. (3-6-3 #55, 56, 57)



Maran boats making way. (3-6-3 #47, 48)



3-6-6 Kerama sailboats

Kerama boats at anchor. (3-6-2 #5, 6)



Kerama boats making way. (3-6-2 #38, 39)



3-6-7 Yamato ships (Japanese junk)

Two anchored Yamato ships. (3-6-2 #32, 33)



Four anchored Yamato ships. (3-6-3 #18, 19, 20, 21)



3-6-8 Ryukyuan Sabani boats (3-6-3 #42)

Sabani boats steered and propelled by a paddle.



Sabani boat sailing, steered by a paddle. (3-6-3 #27, 29)



Sabani boats engaged in fishing, steered and propelled by paddles. (3-6-3 #2, 3, 4, 5)



3-6-9 Ryukyuan sculling boats

A Ryukyuan sculling boat carries water buckets using a scull to steer and propel itself. (3-6-2 #8)



On the left is a Yamato sculling boat; on the right is a Ryukyuan sculling boat. (3-6-2 #21, 22-1)



On the left is a Ryukyuan sculling boat; in the front right is a Yamato sculling boat. (3-6-3 #17)



3-6-10 Yamato (Japanese type) sculling boat

A scull is used to steer and propel the Yamato sculling boat. (3-6-3 #51)



Using a scull for steering and propulsion. (3-6-3 #40, 41)



A scull is used for propulsion and steering. (3-6-1 #34, 35)



3-6-11 Dragon Boat

Three dragon boats racing; paddles are used for steering and propulsion. (3-6-1 #25, 26, 27)



Paddles are used for steering and propulsion (3-6-3 #16)



Paddles are used for steering and propulsion (3-6-2 #29)



3-6-12 Full-rigged ships

A full-rigged ship berthed. (3-6-2 #50)



A full-rigged ship sailing. (3-6-2 #52)



3-6-13 Ships that could not be identified (3-6-1 #8, 10, 11, 12)



3-7 Results of the survey

3-7-1 There was a total of 176 vessels in the three pictorials examined.

The total number of ships and boats distinguished and the number of each type of craft

	Illustration of tributary ships	Folding screen depicting a harbor map in Shuri, Naha	Folding screen depicting a map of a trading harbor in Ryukyu	Total ships and boats
Tributary ships	2	2	5	9
Maran sailboats	12	20	13	45
Kerama sailboats	2	7	1	10
Yamato ships	1	10	9	20
Sabani boats	7	13	19	39
Ryukyuan skiffs	5	12	2	19
Yamato skiffs	3	3	6	12
Dragon boats	3	3	3	9
Full rigged ship	0	2	0	2
Unidentified	10	0	1	11
Total ships and boats	45	72	59	176

3-7-2 The total number of crew members in the survey was 599.

The total number of crew members taking part in each type of activity for each vessel

	Steering	Rowing, poling	Handling sails	Keeping watch, observing	Flag waving	Musical performance	Leading with Karate performance	Sight seeing	Dancing	Eating and drinking	Fishing	Total crew members
Tributary ships			25	12		6		54				97
Maran sailboats	6		8	3				4				21
Kerama sailboats	2		6					5				13
Yamato ships				5				66		2		73
Sabani boats	3	51	8	4				21			4	91
Ryukyuan skiffs		20		2		13		59	3			97
Yamato skiffs		10		1		11		28	1			51
Dragon boats	8	80			31	17	14					150
Full rigged ship				6								6
Unidentified												0
Total crew members	19	161	47	33	31	47	14	237	4	2	4	599

3-8 The activity of the vessels portrayed in the images and the behavior of crew members

3-8-1 The state of the ships as depicted in the illustration of tributary ships, distinguished by the type of vessel

	Tributary ships	Maran boats	Keram a boats	Yamato ships	Sabani boats	Ryukyuan skiffs	Yamato skiffs	Dragon boats	Unidentifi ed	Total craft
Sailing	1	10	2		3				10	26
Sculling						5	2			7
Paddling					2			3		5
Anchoring	1	1								2
Mooring		1		1						2
Berthing					2		1			3
Towed										
Towing										
Total craft	2	12	2	1	7	5	3	3	10	45

3-8-2 The total number of crew members taking part in each type of activity for each vessel that appears in the illustration of tributary ships

	Tributary ships	Maran boats	Kerama boats	Yamato ships	Sabani boats	Ryukyuan skiffs	Yamato skiffs	Dragon boats	Unidentified	Total craft
Steering		6			2			4		12
Row/paddling					5	8	2	35		50
Sail handling	17	5			3					25
Keeping watch, observing	9	3		2	4	1	1			20
Flag waving								13		13
Musical performance	2					4	4	6		16
Leading with Karate performance								3		3
Sight seeing	3			8	8	10	3			32
Dancing						3	1			4
Eating and drinking				2						2
Fishing										0
Total crew members	31	14	0	12	22	26	11	61	0	177

3-8-3 The state of the ships that appear on the folding screens depicting a harbor map of Shuri, Naha, distinguished by type of vessel

	Tributary ships	Maran boats	Kerama boats	Yamato ships	Sabani boats	Ryukyuan skiffs	Yamato skiffs	Dragon boats	Full rigged ship	Total craft
Sailing		10	3	5	3				1	22
Sculling						10	3			13
Paddling					10			3		13
Anchoring	1	10	4	5		1			1	22
Mooring						1				1
Berthing										0
Towed	1									1
Towing										0
Total craft	2	20	7	10	13	12	3	3	2	72

3-8-4 The behavior of crew members on the folding screens depicting a harbor map of Shuri, Naha, distinguished by the type of vessel

	Tributary ships	Maran boats	Kerama boats	Yamato ships	Sabani boats	Ryukyuan skiffs	Yamato skiffs	Dragon boats	Full rigged ship	Total crew members
Steering			1					1		2
Rowing/paddling/ sculling					18	10	3	25(1)		56
Sail handling		3	5		3					11
Keeping watch, observing						1			6	7
Flag waving								9		9
Musical performance						4		5		9
Leading with Karate performance								8		8
Sight seeing	23	4	5	20	3	45	13			113
Dancing										0
Eating and drinking										0
Fishing										0
Total crew members	23	7	11	20	24	59	17	48	6	215

3-8-5 The state of the ships that appear on the folding screens depicting a map of a trading harbor in Ryukyu, distinguished by the type of vessel

	Tributary ships	Maran boats	Kerama boats	Yamato ships	Sabani boats	Ryukyuan skiffs	Yamato skiffs	Dragon boats	Unidentified	Total craft
Sailing	1	7	1	3	2					14
Sculling						2	6			8
Paddling					13			3		16
Anchoring	3	6		6						15
Mooring									1	1
Berthing										0
Towed	1									1
Towing										0
Fishing					4					4
Total crafts	5	13	1	9	19	2	6	3	1	59

3-8-6 The behavior of the crew members on the ships that appear on the folding screens depicting a map of a trading harbor in Ryukyu, distinguished by the type of vessel

	Tributary ships	Maran boats	Kerama boats	Yamato ships	Sabani boats	Ryukyuan skiffs	Yamato skiffs	Dragon boats	Unidentified	Total crewmembers
Steering			1		1			3		5
Rowing/paddling/sculling					28	2	5	20		55
Sail handling	8		1		2					11
Keeping watch, observing	3			3						6
Flag waving								9		9
Musical performance	4					5	7	6		22
Leading with Karate performance								3		3
Sight seeing	28			38	10	4	12			92
Dancing										0
Eating and drinking										0
Fishing					4					4
Total crew members	43	0	2	41	45	11	24	41	0	207

4. Results and conclusions drawn from the survey of pictorials of Ryukyuan ships

The following findings were collected from the examination of three objects: the illustration of tributary ships, a folding screen depicting a map of the harbor in Shuri, Naha, and a folding screen depicting a map of a trading harbor of Ryukyu.

1. The wind in the paintings is blowing in a southwesterly direction.

The depiction of the area just south of the Kerama Islands (which is located in the upper part of the illustration) as being the windward side is consistent in all three paintings. Therefore, the direction of the wind is southwest. A southwesterly wind is typical of the monsoon and is consistent with the time when ships would have been returning to Ryukyu from China.

2. The sails of the sailing ships depicted in the images are positioned to most effectively utilize the wind.

This is true whether the ships are sailing port or starboard. It is the same for the tributary ship in the midst of lowering its sails, the Maran boats and Kerama boats making way, and the small Sabani fishing boats.

3. The flags of ships are depicted as waving leeward, in accordance with the wind's direction. All flags on the ships are depicted as waving from windward to leeward direction. This corresponds to the wind direction in the same way as in point 1.

4. Methods of propulsion are drawn corresponding to each type of vessel.

A mixture of propulsion methods has been depicted: scull, paddle, oar, and pole. The method of propulsion within each class of vessel is almost completely consistent.

5. The role of the operator of the ship and the person in charge of propulsion are standardized depending on the type of ship.

The number and position of crew members steering, taking charge of the sails, rowing, or paddling was consistent within each type of ship. Therefore, a standard of seamanship may have already been established.

6. Different types of ships had different roles.

The role of a ship was based on their size and method of propulsion. Tributary ships were used in foreign trade, Maran and Kerama boats transported cargo over short to moderate distances, and the Ryukyuan and Yamato skiffs were used as ferryboats inside the harbor. Sabani boats acted as tugboats for the tributary ships inside the harbor. Compared to other

ships the loading capacity of Sabani boats was small, but they were nimble and had more efficient propulsion within the harbor due to being controlled by paddle. This made them the most suitable vessel for towing and for fishing.

7. The appearance of the hull and sail of a ship was consistent within a class, and was different depending on the type of ship.

Each ship—tributary ship, Maran boat, Kerama boat, Yamato ship, Sabani boat, Ryukyuan skiff, Yamato skiff, and dragon boat—was identifiable because the design of each type of ship was consistent and each ship type had a distinctive hull color.

Because of the consistent depiction of the ships within each class, it can be assumed that the creator and the patron of these illustrations were able to distinguish the different types of ships by noting the distinctive appearance of each ship.

The points above support the conclusion that these pictorials were not merely ornamental. They were created by people who understood two essential characteristics of sailing: wind direction and the handling of sails. Furthermore, it is apparent that in the early 1800s, when these paintings were created, a common practice for the handling of sails had already been established along with the development of very skilled seamanship. Maritime trade throughout the entirety of the Asian inland sea would have been entirely possible with the development of these skills.

5. Topics for the future

1. The pictorials examined on this occasion depict the final stages of the [Age of Discovery] in the Asian inland sea. Further research is expected on when the [Age of Discovery] began and spread throughout the Asian inland sea. In order to do this, there will be a need for pictorial surveys of not only Okinawa but also other places that ships may have frequented such as the rest of Japan, and areas from China to Islamic countries.

In addition, further research on the trade of porcelain and other goods in Japan, China, and Southeast Asia would shed more light on the seamanship of those who traversed the seas by sailing ship.

2. During the Age of Commerce in the Asian inland sea, Japan conducted maritime trade with foreign countries and was not isolated. It is an island country, but has a rich history of trade including the exchange of goods, people, and culture far before the invention of modern transportation. Yet contemporary Japan, with all of its advanced technology, can hardly be said to have good relationships with its neighboring countries. The maturation of public opinion is essential when thinking of how Japan should interact with its neighbors in the coming century. The sea can be a place of conflict, but it is also a place of exchange and interaction. Therefore, these are the tasks that remain: to study the history of maritime trade by sailing ship to further understand how past interactions have taken place; and, just as the principles of sailing emphasize the value of being in harmony with the wind and sea, continue to advocate a respectful mindset toward nature and our neighbors. These are the tasks to help ensure that Japan does not lose its way and pick the course to conflict, but instead will find the course to harmony and mutual respect.

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References

- 1) Yoshihiko Amino, *Nihon no Rekishi o Yominaosu* (Reinterpreting Japanese History Continued), Chikuma Shobo, 2005
- 2) Yoshihiko Amino, *Kaimin to Nihon Shakai* (Sea people and Japanese society), Shinjinbutsuouraisa, 2009
- 3) Masataka Uwayokote, *Genpei souran to Heike monogatari*
- 4) Kurayoshi Takara, *Ryūkyū no jidai* (Age of Ryukyu), Chikuma Shobo, 2012
- 5) Matthew C. Perry, translated by Etsuko Kihara, *The Japan Expedition, 1852-1854: the personal journal of Commodore Matthew C. Perry*, Shogakukan, 1996
- 6) Waturu Enomoto, *Sōryō to umi-shō-tachi no higashishinakai* (East China Sea seen by monks and sea traders), Kodansha, 2010
- 7) Anthony Reid, translated by Hideaki Hirano and Tanaka Yuuko, *Southeast Asia in the Age of Commerce, 1450-1680, Vol. 1: The Lands below the Winds*, Hosei University Press, 1997
- 8) Akiko Uchida, Kyoko Takase, and Machiko Ikeya, *Ajia no umi no koryūkyū* (Ancient Ryukyu in Asian Waters), Yojushorin, 2009
- 9) Kazuyuki Tomiyama, *Ryūkyū Okinawa-shi no sekai Nihon no jidai-shi 18* (World of Ryukyuan and Okinawan History: Periodic History of Japan 18), 2003
- 10) Susumu Asato, *Ryūkyū Okinawa-shi no sekai 1 Ryūkyū ōkoku no keisei to Higashiajia* (World of Ryukyuan and Okinawan History: I. Formation of Ryukyu Kingdom and East Asia), Yoshikawa Kobunkan, 2003
- 11) Fusaaki Maehira, *Ryūkyū Okinawa-shi no sekai 2 Ryūkyū bōeki no kōzō to ryūtsū nettowāku* (World of Ryukyuan and Okinawan History: II. Structure of Ryukyuan Trade and Circulation Network), Yoshikawa Kobunkan,” 2003
- 12) Asako Morimoto, *Umi no Ajia 5 ekkyō suru nettowāku kaitei kōkogaku—shin'yasu chinbotsu-sen o chūshin ni* (Asia of Sea 5: Overriding Networks—Sea Bottom Archaeology – Case of Sinan Wrecked Ship), Iwanami Shoten, 2001
- 13) Masaaki Murase, *Ikeda Hirochika jihitsubon 'funaosanikki' tokujōmaru hyōryū-ki o yomu* (Ikeda Hirochika's "Captain's Diary"—Reading the Record of Tokujomaru's Drifting), Seizando Shoten, 2005
- 14) Toshihiko Miyata, *Ryūkyū shinkoku kōeki-shi—ni-shū 'rekidaihōan' no kenkyū* (Trade History of Ryukyu and Qing China, Vol. 2—Study of “Precious Documents of Successive Generations”), Daiichi Shobo, 1984
- 15) Shigeru Ikuta, *Ryūkyū ko no sekai (umi to rettō bunka) dainishō* (World of Ryukyu Arc (Sea and Archipelago Culture), Chapter 2), Shogakukan, 1992
- 16) Hiromichi Okamoto, *Koryūkyū-ki no Ryūkyū ōkoku ni okeru 'kaisen' o meguru shosō* (Various Aspects of “Sea Ships” in the Ryukyu Kingdom's Ancient Ryukyu Period),

East Asian Cultural Interaction Studies, 2008

- 17) Shigeru Ikeno, *Ryūkyū yanbarusen suiun no tenkai* (Development of Sea Transportation by Ryukyuan Yanbaru Ships), Roman Shobo Honten, 1994
- 18) Kazuyuki Tomiyama, *Fune to Ryūkyū-shi—kinsei no Ryūkyū-sen o meguru shosō* (Ship and Ryukyuan History—Various Aspects of Ryukyuan Ships in the Early Modern Period), Kansai University Education and Research Center for Cultural Interaction Studies, 2012
- 19) Akiko Uchida, Kyoko Takase, and Machiko Ikeya, *Ajia no umi no koryūkyū* (Ancient Ryukyu in Asian Waters), Yojushorin, 2009
- 20) Makiko Jyana, *Ryūkyū kōekikō-zu kō* (Consideration on a map of a trading harbor in Ryukyu), Urasoe City Museum of Art News, Kiyorasa, No. 19, 1998
- 21) Naoko Iwasaki, *Ryūkyū bōeki zubyōbu no seiritsu ni tsuite* (Concerning the establishment of “Folding screen depicting Ryukyuan trade”), *Research Bulletin No. 34*, Shiga University, Faculty of Economics, University Archives, 2001

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