

Ocean Newsletter

Selected Papers

No. **21**
March 2017

Director's Message

As mankind moves into the 21st century, integrated policies of ocean governance are necessary for the sustainable development and use of our oceans and their resources and for the protection of the marine environment.

Towards this end, the Ocean Policy Research Institute, The Sasakawa Peace Foundation (formerly: Ocean Policy Research Foundation until March 31st,2015) orients its research on ocean issues in line with the mission statement "Living in Harmony with the Oceans".

The Ocean Policy Research Institute, The Sasakawa Peace Foundation aims to conduct cross-sectoral research in ocean related issues in order to initiate debate on marine topics and to formulate both domestic and international policy proposals.

We publish a Japanese-language newsletter titled the "Ocean Newsletter" (previously known as "Ship & Ocean Newsletter") twice a month. "Ocean Newsletter Selected Papers No.21" contains English-language versions of papers from the Japanese Newsletter edition, published from No.371(2016.1.20) to No.390(2016.11.5).

The Ocean Newsletter seeks to provide people of diverse viewpoints and backgrounds with a forum for discussion and to contribute to the formulation of maritime policies conducive to coexistence between mankind and the ocean.

Our Foundation believes that the newsletter can expand effective communication on these issues by introducing timely research abroad to an informed readership. It also welcomes responses from readers, some of which appear in the Newsletter.

It is our sincere hope that these Selected Papers will provide useful insights on policy debate in Japan and help to foster global policy dialogue on various ocean issues.

Hiroshi TERASHIMA
Executive Director

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Continually Expanding Pacific Island, Nishinoshima

— volcano observations in sea areas by Japan Coast Guard —

[KEYWORDS] volcanic activity / marine survey / delimitation of jurisdictional waters

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(Ocean Newsletter No.371, January 20, 2016)

Since the eruption of Nishinoshima volcano and a resultant newborn island in the Ogasawara Islands was confirmed on November 20, 2013, the effusive outflow of lava over two years has greatly increased the size of the island. A bathymetric survey around the island carried out by the Japan Coast Guard in the summer of 2015 revealed that this eruption of Nishinoshima volcano was one of the largest domestic eruptions in terms of expelled volcanic material since the end of World War II. As the broad extent of Japan's jurisdictional waters is dependent on volcanic islands, observation activities are important not only for the safety of residents and navigation, but also from the perspective of the delimitation of Japan's jurisdictional waters.

Observation of volcanoes in the adjacent seas of Japan

Japan is one of the major volcanic countries in the world. Many readers might remember broadcast images of the eruption of Kuchinoerabu Jima, Mount Aso, and Sakurajima in the past year. At present, there are 110 volcanoes classified as active. The Japan Coast Guard monitors and observes a total of 39 active volcanoes, of which 27 volcanoes are on islands in the south, including Izu Oshima, Miyakejima, Nishinoshima, and Ioto. The remaining 12 volcanoes are on islands in the southwest, such as Sakurajima, Suwanosejima, and Satsuma-Iojima. Coast guard aircraft conduct regular maritime patrols about twice a year regarding the southern islands, and once a year regarding Nansei Islands. In addition, these aircraft conduct extraordinary observations when any changes in water color or other signs of volcanic activities are reported from private vessels or other sources. As necessary, navigation warnings are issued to ensure that all vessels are aware of the danger.

Survey vessels are also acquiring data on underwater topography, geological structure, geomagnetism, gravity, and so forth regarding each volcano in order to develop basic data on a submerged part of volcano. Since each volcano is unique, the identification of the underwater topography helps estimate the location and type of volcanic eruption.

Findings from these observations are reported to the Coordinating Committee for the Prediction of Volcanic Eruptions and shared with volcano experts. They are also made accessible to the public through the database of volcanic islands and submarine volcanoes¹⁾ on the website of the Hydrographic and Oceanographic Department.

Ship-borne survey in the waters around Nishinoshima

On November 20, 2013, a newly formed island was discovered in the waters around 500 meters south-southeast

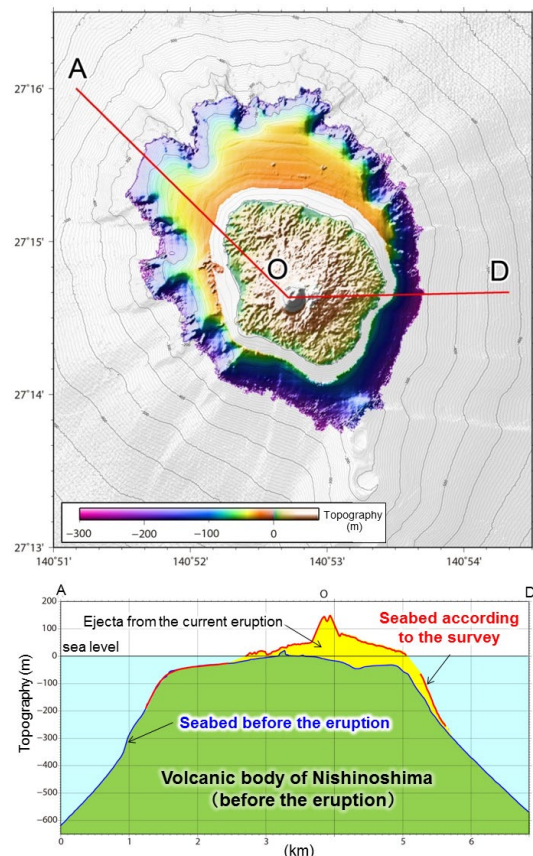


Figure 1
Seabed topography (top) and the change (bottom) identified by the unmanned survey vehicle. Land data: survey on July 28, 2015 by the GSI (Geospatial Information Authority of Japan)

of Nishinoshima. Ever since, effusive outflow of lava has expanded the land area. Little data from under the water was available while monthly observations using aircraft have been carried out. Accordingly, Shoyo, a survey vessel was mobilized from June 22 to July 9, 2015 to conduct a survey in the waters surrounding Nishinoshima. The Shoyo carried out bathymetric survey for underwater topography and seismic explorations for geological structure, in the

waters outside the volcanic alert zone (within 4 km from the center of the island). An unmanned survey vehicle was deployed inside the alert zone, for example, to study submarine topography, and to sample the water and volcano ash. The half-month observation on the eruption site managed to record changes in the volcano's activities, including a sudden lateral eruption and resulting interruption of the summit eruption, followed by the resumption of the summit eruption. These could not be captured by monthly aircraft observations that last at most one hour.

Notably, the bathymetric survey with a multibeam echo sounder mounted on the unmanned survey vehicle succeeded in obtaining the following scientific data regarding the underwater topography of the volcano on Nishinoshima, which had been completely unknown since the initiation of its eruption.

(1) A major change in submarine topography took place only in the eastern and southern parts, where lava and other deposited ejecta made the water shallower by several dozen meters (up to about 80 meters) (Figure 1).

(2) The change in the topography suggests that the total volume of ejecta from the eruption amounts to roughly 0.16 billion m³ (total weight of 0.4 billion ton assuming ejecta consisting purely of lava). In post-war Japan, the amount is second only to that from the eruption of Mt. Unzen. It is about nine times as much as the amount expelled during the previous eruption in 1973–74.

The latest observation by aircraft on December 22, 2015 confirmed reduced volcanic activity with no more eruptions from the crater and lava on the ground (Figure 2). The latest approximate dimensions of the island measured from the

sky were 1,900 meters east to west and 1,900 meters north to south. The resulting area of roughly 2.63 km² is about 12 times the area of Nishinoshima before the eruption.

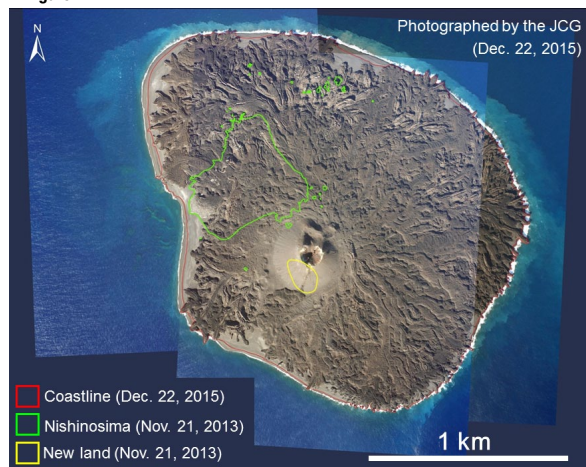
Volcanoes and Japan's jurisdictional waters

Many volcanic islands of Japan serve as base points for the country's vast exclusive economic zone (EEZ) that extends across an area 12 times larger than the national territory. For this reason, observation of volcanic islands is important for securing the jurisdictional waters. The United Nations Convention on the Law of the Sea stipulates that a low-water line in a large-scale nautical chart officially recognized by a coastal state is normally used as a sea baseline for demarcating territorial waters. Once the volcanic activity on Nishinoshima settles down and the safety is confirmed, the territorial waters and EEZ will be redrawn by revising the nautical chart by based on precise hydrographic surveys. Nishinoshima's growth is expected to expand the territorial waters around the island and the EEZ off the west coast. The latest observation indicates reduced volcanic activity, but careful monitoring of the island must be continued until the activity ends completely.

Aside from Nishinoshima, Fukutoku-Okanoba is another volcano in sea areas that is drawing attention. This submarine volcano is located near Minami Ioto about 1,300 km south of Tokyo. This is one of the most active submarine volcanoes in waters close to Japan. The volcano grew to become a new island with a length of 800 m following the eruption in 1986—it disappeared three months later. Island formation was confirmed at least three times after 1900, including the last eruption. But each such newly formed island disappeared within one year. The bathymetric survey conducted with an unmanned survey vehicle after two eruptions in 2005 and 2010 identified resulting changes in submarine topography. For instance, a pocket that appears to be a new crater was formed at the table-shaped top about 25 meters under water, from where a discolored water used to gush out.

Records of activities by volcanoes in sea areas and other relevant data are scarce as compared to those of onshore volcanoes. Many eruptions may have ended in the past without even having been recorded. In the southern waters of Japan, there are other submarine volcanoes that may shape new islands just like Fukutoku-Okanoba. The Japan Coast Guard intends to make the most of its mobile capability while continuing observation of volcanoes in sea areas in partnership with relevant agencies. ■

■ Figure 2



Latest volcanic activity in Nishinoshima (as of December 22, 2015)

1) Database <http://www1.kaiho.mlit.go.jp/GIJUTSUKOKUSAI/kaiikiDB/list-2.htm>

Time to Honour Yokohama-Based Alan Owston Who Amassed Famous Natural History Collections and Died Exactly 100 Years Ago

[KEYWORDS] marine biology / biological specimen / natural history

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(Ocean Newsletter No.372, February 5, 2016)

The natural history collections and specimens, including collections of fishes, sponges and bryozoa, created by Yokohama resident Alan Owston came to be widely known around the world. Given Owston's great impact on the development of marine biology in Japan, on the 100th anniversary of his death Japan's marine biology-related institutions should consider leading an initiative to borrow the Owston collections and specimens now abroad and exhibit them in Japan.

Exhibit the Owston Collections!

Famous natural history collections and specimens, including collections of fishes, sponges and bryozoa, created in Yokohama by Alan Owston (1853-1915) have lain almost forgotten and unseen for decades in many of the world's leading natural history museums.

On the 100th anniversary of Owston's death, Japan's marine biology-related institutions should consider leading an initiative and collaborating with other non-marine natural history institutions in Japan to borrow the Owston collections and specimens now abroad and exhibit them in Japan. The collections and specimens relating to Owston's close Japanese colleagues - MITSUKURI Kakichi, the Tokyo University zoology professor, fellow Tokyo University professor IJIMA Isao, and AOKI Kumakichi, the most famous Japanese collector of fishes, could also be included.

Why Owston and why should Japan's marine biologists take the lead? Because it was in the field of marine biology that Owston made the biggest impact.

Who Was Alan Owston?

Alan Owston was born in Pirbright in Surrey near London, England on August 7, 1853. After leaving school, he boldly went to and worked in Shanghai. After six months he moved to Yokohama where he was to live from 1872 until his death on 30 November 1915.



Alan Owston
(1853-1915)

After working in an office for several years, in 1878 Owston successfully launched his own business as an importer and exporter and this soon enabled him to devote a lot of time to his favorite interests - yachting and natural history.

Although he had no formal training, Owston began collecting, trading in, and often donating specimens of birds and fish, and later sponges and other forms of marine life, in Japan and also nearby countries where he acquired specimens from a network of other collectors.

Owston's Achievements

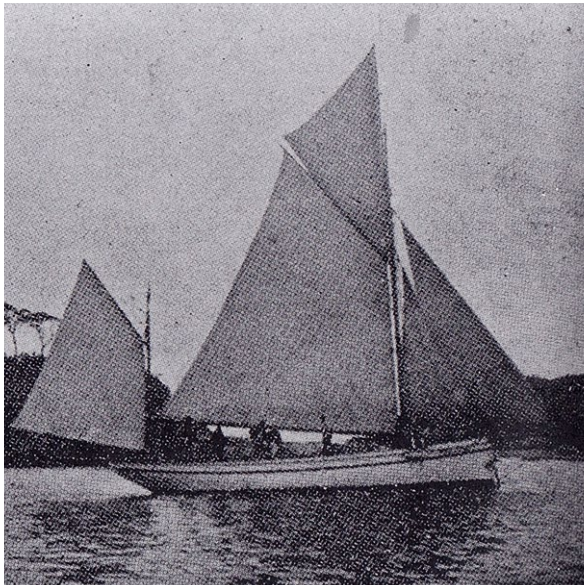
One result of Owston's collecting endeavors, and another reason for his high reputation, is the number of species whose Latin names honor him, principally with the pseudo-Latin word *Owstoni* based on his surname but sometimes using his first name or including its initial. Examples are *Acanthascus alani* Ijima (a sponge) and *Owstonia weberi* (a fish). There is even one case - Storm-petrel *Stonowa* - where the Latin genus name is an anagram of Owston's surname and initial.

A revealing example is the *Mitsukurina owstoni* - the extraordinary deep-sea goblin shark sometimes referred to as a living fossil. The first recorded specimen was caught in Sagami Bay off Izu and acquired by Owston who then presented it to Mitsukuri, who brought it to the attention of American David Starr Jordan, then the world's leading ichthyologist, who selected a Latin name honoring both men.

Mitsukuri initiated the 1884 moves to establish the Misaki Marine Biological Station (MMBS) in Sagami Bay after his German Tokyo University natural history professor colleague Ludwig Doderlein (1855-1936) discovered Sagami Bay had one of the world's richest concentrations of marine fauna.

Collecting Activities and the Tokyo University Misaki Marine Biological Station

Owston bought many of his specimens from local shops and markets and some he acquired via local Japanese collectors. He collected both for pleasure and to sell, especially to wealthy collectors like Lord Rothschild and museums



Golden Hind

and universities in the US and Britain eager to acquire specimens from Japan.

The turning point in Owston's work as a collector of marine life came when, combining his interest in yachting with his interest in marine biology, he fitted his yawl-rigged 36 1/2 rater deep-sea cruising yacht, the *Golden Hind*¹⁾, with dredging equipment and started dredging in search of benthyn marine life living in the deep water close to the coastline of Sagami Bay and Tokyo Bay.

Owston's dredging resulted in the discovery of a large number of new species and attracted the interest of Mitsukuri, and also the Japanese government to whom he supplied dredging equipment. Because the MMBS was unable to afford its own boat for ocean dredging until 1915, Owston sometimes took Mitsukuri and other MMBS marine biologists on his dredging trips and presented them with specimens. Jordan stated that of his acquisitions in 1900 and 1911, "those obtained through the help of Mr. Owston and of Mr. Aoki are vastly more important than the others."²⁾

The Owston Collections in the USA and Europe

In 1902 Owston sent 63 bottles, mainly bryozoans, of specimens from Sagami Bay and Tokyo Bay to Sydney Harmer at the Cambridge University Museum of Zoology

and was paid 5 pounds sterling. These and other purchases from Owston were later transferred or sold to the Natural History Museum in London (NHM) and form the core of its 114-specimen Owston bryozoan collection.³⁾

The World Register of Marine Species (WORMS)⁴⁾ lists 31 species with Latin names including *Owstoni* and 12 including *Owstonia*. It may seem a lot, but, of his Japanese colleagues, six different pseudo-Latin names referring to Iijima are in the names of 80 mainly sponge species, while Mitsukuri is honored in the Latin names of 57 species, with only Aoki appearing in the names of eight species. Of the 35 sponges in Owston's fabled sponge collection in London's NHM, 23 of the Latin names include the name Iijima and only one an Owston name.

In early October 1903 Owston's beloved *Golden Hind* was wrecked on rocks near Yokosuka during a typhoon and this was a severe setback for his dredging activities.

The invertebrate collections in the Smithsonian have 99 specimens collected by Owston and in many cases the accompanying information includes "Vessel: *Golden Hind*." In addition, Owston is also associated with 31 birds, 14 fishes, and two reptiles in the museum.

Despite his fine collections, his growing worldwide reputation and his fine yachts, Owston struggled to survive financially towards the end of his life. On a visit to Japan in 1911, mentioned in his memoirs, Jordan wrote "I found Owston much distressed over the financial outlook."⁵⁾

Shortly before he died on 30 November 1915 Jordan helped Owston to sell his valuable fish collection of 1,364 Asian fishes to the Carnegie Natural History Museum in Pittsburgh. In the 1950s it sold or passed its collections of fishes to Chicago's Field Museum, whose database lists 1,461 fish specimens collected by Owston. ■

1) Owston was a founder of the Yokohama Yacht Club and in 1898 he sailed the *Golden Hind* to victory in perhaps the most famous yacht race of the period against the yachting "pride of Yokohama - the 37-rater cutter the *Mary*.

2) Record of fish obtained in Japan in 1911, Memoirs of the Carnegie Museum, Vol VI. No. 4., Page 206

3) Japanese Bryozoans from the Meiji Era at the Natural History Museum, London, Part 1: The Owston and Mitsukuri Collections, Joachim Scholz, Mary E. Spencer Jones, Andrei V. Grischenko and Toshihiko Fujita

4) <http://www.marinespecies.org/>

5) The Days of A Man, Volume Two (1900-1911), Page 378, David Star Jordan

Increasing Tension in the South China Sea

— on the US Military's 'Freedom of Navigation Operation' —

[KEYWORDS] artificial island / warship / innocent passage

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(Ocean Newsletter No.376, April 5, 2016)

China is in disputes with ASEAN countries such as the Philippines and Vietnam over territorial sovereignty regarding the Spratly Islands and the Paracel Islands in the South China Sea. Since 2013, China has constructed seven artificial islands in rocky reef and atoll areas. Efforts towards militarization of the artificial islands, such as through the building of runways, have also been seen though this is denied by China. It is against this background that the US Navy began its 'Freedom of Navigation Operation' from October of 2015 in waters around islands and reefs effectively under Chinese control. This article discusses the aims of that operation.

What is happening in the South China Sea?

In 2009, the Chinese government sent a verbal note to the Secretary-General of the United Nations stating the following. "China has indisputable sovereignty over the islands in the South China Sea and the adjacent waters, and enjoys sovereign rights and jurisdiction over the relevant waters as well as the seabed and subsoil thereof. The above position is consistently held by the Chinese Government, and is widely known by the international community." The note went on to claim that "a joint submission by Malaysia and Vietnam, and a separate submission by Vietnam, to the Commission on the Limits of the Continental Shelf have seriously infringed upon China's sovereignty, sovereign rights and jurisdiction in the South China Sea." An attached map was submitted along with the note, featuring a "nine-dash line" encircling almost all of the South China Sea with a broken line.

The claim of the nine-dash line dates back to documents published on December 1, 1947 by the Regional Bureau of the Ministry of the Interior of the Republic of

China entitled "Map of Chinese Islands in the South China Sea" and "Map of South China Sea Islands." These maps officially announced by the Nationalist Government of China featured an eleven-dash U-shaped line that encircled the Spratly Islands and the Paracel Islands. The People's Republic of China issued these as official maps in 1949. When sovereignty over Bach Long Vi Island in the Gulf of Tonkin was transferred from China to Vietnam in 1953, the eleven-dash line on the map was re-drawn as a nine-dash line. Since then, it has become known simply as the "nine-dash line." The Law of the People's Republic of China Concerning the Territorial Sea and the Contiguous Zone (1992) stipulates that "the land territory of the People's Republic of China includes the mainland of the People's Republic of China and its offshore islands, Taiwan and all islands appertaining thereto, including the Diaoyu Islands; the Penghu Islands; the Pratas Islands; the Paracel Islands; the Zhongsha Islands and the Spratly Islands; as well as all the other islands that belong to the People's Republic of China" (Article 2, Paragraph 2).

China is involved in disputes with the Philippines, Vietnam, and other ASEAN countries over territorial sovereignty, regarding the Spratly Islands and the Paracel Islands in the South China Sea. In 2013, China constructed seven artificial islands in rocky reefs and atoll areas in the South China Sea. The Subi Reef (Zhubi Reef in Chinese) and Fiery Cross Reef (Yongshu Reef in Chinese) of the Spratly Islands, originally held by Vietnamese, but now effectively controlled by China, have runways with a length of 3 km, long enough to land fighters and bombers. Major reclamation work is underway also on Chinese-controlled Mischief Reef (Meiji Reef in Chinese), which used to be held by the Philippines. In 2014, China constructed military runways and ports capable of accommodating large vessels on Woody Island (Yongxing Island in Chinese) of the Paracel Islands. Surface-to-air missiles were also deployed on this Chinese-controlled island claimed by Vietnam and Taiwan. Although China denies it, construction of runways and so forth clearly demonstrate their intention to turn these arti-

■ Waters claimed by respective countries in the South China Sea



cial islands into military bases and to establish air defense identification zones.

What is the U.S. Navy's Freedom of Navigation Operation?

The U.S. Navy launched the Freedom of Navigation Operation, presumably because it could no longer tolerate China's unilateral challenge to the status quo to create a fait accompli in the South China Sea. The operation began there on October 27, 2015, when the destroyer USS Lassen sailed within 12 nautical miles of the Subi Reef. This low-tide elevation is not subject to rights based on territorial seas, as it emerges above water at low tide but is submerged at high tide. A country can claim a safety zone of just 500 meters around each artificial island, but not territorial waters extending 12 nautical miles. Freedom of Navigation Operations have been carried out by the United States since 1979 in many different parts of the world to challenge excessive maritime claims made by coastal States against international law. They are in no way anti-Chinese campaigns. As a matter of fact, such operations were carried out in a total of 19 countries or regions between October 2013 and September 2014.

In the past, one operation resulted in a bumping incident. The United States carried out the operation in 1988 when the Soviet Union required prior permission of any foreign warships to pass through its territorial waters. A Soviet vessel bumped into the American vessel in an attempt to block the passage. After this incident and the following negotiation, in 1989 both countries issued the Joint Statement on Uniform Acceptance of Rules of International Law Governing Innocent Passage, which confirmed the right of innocent passage by warships in territorial waters.

Meanwhile, China stipulates under the Law Concerning the Territorial Sea and the Contiguous Zone that "To enter the territorial sea of the People's Republic of China, foreign military ships must obtain permission from the Government of the People's Republic of China" (Article 6, Paragraph 2). This Chinese law to require prior permission for passage of foreign warships inside its territorial waters violates the UN Convention on the Law of the Sea that recognizes the right of innocent passage of foreign vessels including warships in territorial waters. In 1997, China made an interpretative declaration to justify its position upon the ratification of the Convention. Like China, Romania made a similar declaration in 1982 in an attempt to restrict passage of foreign warships in its territorial waters. Italy opposed such interpretation in 1983, pointing out that "None of the provisions of the Convention, which corresponds on this matter to customary international law, can be regarded as entitling

the Coastal State to make innocent passage of particular categories of foreign ships dependent on prior consent or notification."

The United States takes the same stance as Japan that warships have the right of innocent passage. The country's defiance to the requirement by China for foreign warships to obtain prior permission for passage through Chinese territorial waters was demonstrated on January 30, 2016, when the destroyer USS Curtis Wilbur conducted the Freedom of Navigation Operation near the Triton Island (Zhongjian Island in Chinese) of the Paracel Islands.

Bringing the South China Sea under the rule of law

Thirty percent of the world's maritime trade takes place through the South China Sea. Secure maritime passage is a life or death issue for Japan as the country depends on energy imported by sea. Japan cannot be an idle spectator of the current affairs of the South China Sea, which is our vital sea lane of communication. This important lifeline for the Japanese economy will be threatened, should China turn the South China Sea into "the Sea of China."

Like other waters, the South China Sea must be brought under the effective rule of the UN Convention on the Law of the Sea, and move away from forced changes being made by Chinese historical claims along the nine-dash line. In response to the operation by the U.S. Navy, China urged "relevant countries to refrain from taking risky and provocative action." This warning should be directed to China itself. ■

The Rebirth after 50 Years of a Swimming Beach on Inner Tokyo Bay

[KEYWORDS] NPO Action Committee for Thinking about Our Hometown of Tokyo / Tokyo Sea Life Park / urban re-development

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(Ocean Newsletter No.379, May 20, 2016)

In the summer of 2012, the signs posted at Tokyo Sea Life Park were changed from "swimming prohibited" to "unauthorized swimming prohibited," marking 35 years since we began taking action to revive a swimming beach on inner Tokyo Bay. The revival of swimming in inner Tokyo Bay means the revival of the bay itself, which bodes well for restoring its vitality and its fishing industry.

I grew up with Tokyo Bay

It has already been half a century since the swimming beach disappeared from the inner Tokyo Bay.

I was born in Kasai, a closed-off section of inner Tokyo Bay. Villagers there lived off fisheries combined with farming. The main industry there was growing *nori* (laver). As a child, I also often had to help my family in growing laver and farming on land. Other kids in the neighborhood also worked to help their families. Some would peddle clams before going to school. In order to earn a little pocket money, I would borrow a small boat from my father, dig out ragworms, then offer a ride and guide fishermen by paddling the boat. I grew up in nature. At high tide, I swam. At low tide, I would dig clams or play baseball. I think that experience taught me important lessons, to "be street smart to protect myself" and "take the initiative to protect my community."

Like elsewhere, my home sea there in Kasai became increasingly polluted, especially from the mid-1950s when the Japanese economy began to grow rapidly. In 1962, the contamination forced fishermen to give up their fishing rights in inner Tokyo Bay altogether. My experience led me to believe that the sea is spoiled when fishermen disappear. Indeed, the sea became even dirtier when they gave up their fishing rights. The swimming beach also disappeared.

Road to the rebirth of the swimming beach after 50 years

My personal belief is that whatever our generation tarnishes, we must restore before handing it down to the next generation. In 1977, therefore, I took the initiative to restore the swimming beach in inner Tokyo Bay, which would translate into a revival of a rich Tokyo Bay and its fisheries. Once an abundant sea returns, fishermen can sustain their local communities over generations. In other words, an abundant sea is a must for reviving a self-reliant community.

35 years have since passed. Without exception, restoring something that we lost takes great effort. In the summer of 2012, after many twists and turns, we managed to open our local beach at the Tokyo Sea Life Park for swimming,

■ Activities by Action Committee for Thinking about Our Hometown of Tokyo to date Charter of the Tokyo Bay (1977–2000)

- Tokyo Metropolitan Assembly adopted the Charter of Tokyo Bay

Involving people and developing water purification technology (2001–2007)

- 2001 • Establishment of Action Committee for Thinking about Our Hometown of Tokyo (unincorporated)
- Environmental Forum for Thinking about Our Hometown of Tokyo
- Collection of 100,000 signatures endorsing the cleanup of Tokyo Bay
- 2003 • NPO and Civic Network Forum on Tokyo Bay
- 2006 • Signatures by 20,000 citizens were submitted to Shigemasa Hyodo, special private secretary to the governor
- 2007 • Successful experiment in cleaning up a part of Shinsakongawa zone by marine gardening

Project for restoring a swimming beach in inner Tokyo Bay (2008–2012)

- 2008 • Announcement of project for restoring a swimming beach in inner Tokyo Bay
- 2009 • Swimming Beach Restoration Symposium
- Experiment began to purify water on the western shore of Tokyo Sea Life Park (in collaboration with the Bureau of Port and Harbor, Tokyo Metropolitan Government)
- NPO status was acknowledged by the National Tax Agency
- Events were organized for hands-on experience of community waterfront (*sato-umi*) and marine gardening
- 2010 • Experiment was conducted to purify water on the western shore of Tokyo Sea Life Park (in collaboration with the Bureau of Port and Harbor, Tokyo Metropolitan Government)
- 2011 • Community waterfront festival and marine gardening event were organized
- A water purification system was completed on the western shore of Tokyo Sea Life Park (in collaboration with the Bureau of Port and Harbor, Tokyo Metropolitan Government)
- 2012 • The beach was opened twice for swimming during the community waterfront festival
- Signs saying "swimming prohibited" were changed to "unauthorized swimming prohibited"
- 2013 • The beach was opened for weekends during the summer vacation (13 days) for swimming
- As a social experience, the beach was opened for 20 days for swimming
- 2014 • Opening of the Tokyo Sea Life Park for swimming in 2016 was stated in the long-term plan by the Tokyo Metropolitan Government
- 2015 • A social experience was conducted at Tokyo Sea Life Park jointly by our Committee and the Tokyo Metropolitan Government (beach opened for 20 days for swimming)

albeit for just two days. The signs posted there now read "unauthorized swimming prohibited" as opposed to "swimming prohibited." Many people visited the beach to enjoy swimming when the beach was open for an increasing number of days (13 days in 2013 and 20 days in 2014).

Tokyo Metropolitan Government also gets serious

Encouraged by our achievement, the Tokyo Metropolitan Government finally got into full gear and declared in its long-term vision in December 2014 that it would open the

The Rebirth after 50 Years of a Swimming Beach on Inner Tokyo Bay



The swimming beach was restored in inner Tokyo Bay. In 2015, roughly 40,000 people enjoyed swimming for 20 days.



Tokyo Sea Life Park for swimming starting from 2016. In 2015, the government and Action Committee for Thinking about Our Hometown of Tokyo jointly conducted a social experiment to open a swimming beach at the same park for 20 days. Almost 40,000 people came to enjoy bathing on the beach. The initiative was covered widely in the media—about 30 times on TV programs, including NHK and 20 times in newspapers and magazines, including five major newspapers.

Consideration has been given to expand the social experiment in fiscal year 2016 to open the beach for 33 days. We have also joined forces with the Tokyo Metropolitan Government and Tokyo Metropolitan Park Association so that bathing in the Tokyo Sea Life Park becomes a part of life from fiscal year 2017.

In this fiscal year, we began another project to have each

person install a bamboo stick for oyster farming to harness synergy between the waterfront and forest to improve the local environment. These bamboo sticks are expected to enrich the biota of the beach by attracting oysters that purify the water. The initiative has just begun, but we would like to involve more people for a bigger movement.

Spreading the initiative to the world

The rebirth of a swimming beach in the inner Tokyo Bay showcases that water quality can be improved. The experience is expected to set the pace for the redevelopment of urban neighborhoods in Japan and abroad. The key for successful urban renewal is an integrated approach away from sectionalism and without division between fisheries and resort industries. I believe that the revival of a swimming beach offers an option for urban landscaping. ■

"Hey, We Can't See the Ocean at All!"

— The documentary "Akahama Rock'n Roll" depicts man's pride as they live together with the sea and nature —

[KEYWORDS] seawall / reconstruction / living with the sea

Haruko KONISHI

Documentary Film Director

(Ocean Newsletter No.380, June 5, 2016)

A mammoth seawall 390 kilometers in length is about to be built along the Sanriku coastline at a cost of a trillion yen, paid for from the national budget. Confronting the government plan, residents of the Akahama district of Otsuchi Town, located in the very center of the Sanriku region, decided that they do not need the giant wall. They believe that "Nature cannot be controlled by man. For future generations, we must build our homes on higher ground, beyond the reach of tsunamis". I believe that we must find a way to our future in their wisdom, when we see the limits of controlling everything with power and money and pursuing profit in the short-term.

Otsuchi, where fishermen are nurtured by the bountiful waters that flows through the mountains, rivers, and ocean

Otsuchi is a fishing community in Iwate Prefecture. Horai Island in the bay there inspired a famous Japanese TV puppet show called Hyokkori Hyotanajima. Water from the Kitakami Mountains flows into Otsuchi Bay through the Otsuchi River, Kozuchi River, and underground. The water nurtures the blessings of the ocean, including three-spined sticklebacks that live only near springs. In the past, people used water from about 200 flowing wells.

The Great East Japan Earthquake on March 11, 2011 claimed 15,000 lives or ten percent of the population. When I went to Otsuchi as an independent volunteer in August that year, there was still a fire-devastated elementary school, along with the bare foundations of houses carried away by the tsunami. Just like salmon do against the north-west wind, I visited again in November, to see how people made lightly-salted salmon. It was fascinating to see the painstaking manual work to clean small bones, wash inside, sprinkle salt, and dry in cold winds.



Horai Island in Otsuchi Bay

We no longer depend on seawalls!

During my stay there, I had the opportunity to meet Hiromi Kawaguchi, the president of the Association for Reconstruction of Akahama, which helps form opinions among residents and presents them to relevant govern-



Hiromi Kawaguchi, President of the Association for Reconstruction of Akahama

ments. Hiromi lost his mother, wife, and a grandchild in the tsunami. The existing seawall blocks the view of the ocean with its height of 6.4 meters. It turned out that many people lost loved-ones who felt protected by the seawall and did not try to evacuate. He shared a very simple wisdom, saying: "Anything made by people cannot resist nature. They are destined to break. We should no longer depend on seawalls to protect our lives. My policy is to build a community on uplands where our children and grandchildren can live in peace of mind."

In October 2011, the national and prefectural governments proposed constructing a new seawall in Otsuchi. The proposed height of 14.5 meters is equivalent to the height of a typical five-story building. Residents of Akahama district in Otsuchi proposed in return to restore the existing 6.4-meter-high seawall without constructing the one being proposed (14.5 meters), as they intend to relocate to the upland at least 15 meters above water. The proposal from the Akahama district was approved by the town council in accordance with the policy of the mayor to develop a reconstruction plan based on the opinions of residents. Construction of the new taller seawall was approved to protect the center of the town.

But residents of Akahama faced another challenge in June 2013. The town proposed the construction of a road with a height of 11 meters right behind the existing seawall (6.4 meters). Residents and Hiromi insisted that the road

is unnecessary, and the government was harassing them by simply switching from the 14.5-meter-tall seawall to an 11-meter-tall road. Such realities I encountered while filming a movie made me really wonder for whom the reconstruction was intended. Strong attachment for and pride in the community were expressed as residents showed their determination to protect and reconstruct their town by their own hands. Perhaps such pride originates from the blessings of the natural environment, ocean, and water.

We must get along with the natural environment surrounding us

Tsutomu Abe, a fisherman from Akahama, offered me a ride on his boat for the filming of fixed nettings to catch oysters, sea squirts, sea urchins, salmons, and seaweeds like *wakame* and *konbu* (kelp). It takes time and effort to plant *wakame* seeds on ropes in October and remove mud from the ropes so buds can develop. In March, the buds begin to grow rapidly, reportedly thanks to water from melted



Tsutomu Abe, a fisherman

snow. Tsutomu leaves the port at 3 a.m. in the morning in March when the temperature is 6 degrees below zero and continues harvest until 6 a.m. I was awed by the power of the ocean and by the huge *wakame* that emerged from the sea to absorb the morning sunshine. It was pleasant—as if I had become a part of nature between the crimson sky and the ocean.

Tsutomu also taught me that water springs up from the bottom of Otsuchi. In his opinion, "there is no other option but to get along with the nature around us. It is futile to try to restore the ocean we knew once it was swept away by the tsunami." He was clear in going on that "it is only natural that some districts were affected by the tsunami because they used to be below sea-level in the past. It is wiser to build houses upland, not in the affected districts." Water flows through mountains, rivers, and the ocean. I sincerely pray that such a cycle between the land and the ocean won't

be broken by artificial structures like seawalls, as this only leads to the decline of local fisheries.

Legacy for the next generations

In February 2016, residents are facing challenges in reconstructing their houses and restoring their livelihood. Construction of an elevated area about 15 meters above the water is underway at a frenzied pace in Akahama. Yet, Hiromi and Tsutomu still need to live in temporary housing for two more years. An embankment with a height around 2.2 meters is hastily being built at the center of the town. But some sections take two years before the development is complete for housing construction. The embankment was planned based on the simulation that the tsunami like the one caused by the Great East Japan Earthquake will surge to a height up to 25 meters and flood the area by 2 meters even with the seawall with a height of 14.5 meters. Besides, there is no guarantee that the seawall won't break.

Worse still, the construction costs surged from around 120,000 yen/m² before the disaster to the current level of 240,000 yen/m². Many residents gave up housing reconstruction and moved inland to Hanamaki and Morioka.

People are seeking employment in public works to earn a monthly salary of 200,000 yen on average, shying away from fisheries where they earn a mere 130,000 yen. Deepening the depression of residents, public works for constructing the seawall and roads are depressing private industries.

We Japanese should never lose the lush natural environment of the Sanriku region that offers the blessings of the mountains and sea. Sanriku embodies the spiritual roots of the Japanese people. I encourage you to visit the proud residents there who are determined to protect their communities with their own hands. I believe it is my role to present the charm of this place and its people in this film. ■



Sand beach that remained along the Otsuchi Bay

The Katsuobushi Loved by the Japanese

[KEYWORDS] Japanese food culture / skipjack resources / *Shokuiku*(food education)

Yoshihiro FUNAKI

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(Ocean Newsletter No.381, June 20, 2016)

To the question of what is Japanese cuisine, *Katsuobushi*(smoke-dried skipjack tuna) and *Konbu*(dried kelp) are more likely to be given in reply before the names of individual dishes. This is because they are key ingredients in soup stocks, which are the basis of Japanese cuisine, and so feature in a wide variety of dishes. While there is much clamor about the Westernization of Japanese food, the fact that the phrases "*Katsuobushi dashi*" (skipjack soup stock) and "*Kezuri bushi*" (shavings of *katsuobushi*) are to be seen in all kinds of food products reflects the centuries-long love of the Japanese people for *Katsuobushi* and its unshakeable place in the local diet. This article introduces its history and current production conditions as well the activities of the Japan *Katsuobushi* Association.

Traditional Japanese cuisine and *katsuobushi* (smoke-dried skipjack)

Japan has been blessed with a lush natural environment from its mountains, rivers, and surrounding sea and ocean. Along with agriculture, the island nation developed a culture to eat shellfish and other types of fish. Traditional Japanese cuisine, called *washoku*, was cultivated hand-in-hand with the evolution of *katsuobushi*, or smoke-dried skipjack adored by the Japanese. First, let us focus on the smoke-drying technique that provided a major turning point in the evolution of *katsuobushi*.

Katauo (literally hard fish) mentioned in the oldest extant chronicle of Japan is considered the root of *katsuobushi*. It seems they simply sun-dried skipjack. Later modification led to *nikatauo*, boiled and sun-dried skipjack for improved shelf life. This food is mentioned in the *Taiho Code, Englishiki*, and other ancient writings along with *katauoirori* as the fish extract. Therefore, the food was already recognized for its excellent preservative qualities and valued as a tribute item (or a form of tax payment). The rich nutrition and portable nature of *katsuobushi* was valued also by warriors on battlefields where they shaved off pieces with their knives to make a soup stock or simply chewed a chunk, like we eat fast food today. The name *katsuobushi* is also auspicious, since in a popular play on words it could also mean "a victorious warrior".

A turning point came in the 17th century when skipjack was smoke-dried with firewood instead of being sun-dried. The resulting product, known as *arabushi* today, featured an appetizing aroma and far superior preservability. Around 1800, when maritime transport developed, especially between Osaka and Edo, mold grew on transported *arabushi* by accident, giving rise to *karebushi* with a richer and more condensed flavor. This completed the evolution of *katsuobushi* as a uniquely Japanese food. The flowering Edo culture also imparted cultural significance to the food. The practice of offering *katsuobushi* to the gods led

the common people to regard this food as an auspicious gift. For instance, as a wedding gift, a pair of *katsuobushi* produced from the belly-side and back-side of skipjack symbolized a bride and a groom. The pair, when combined as a married couple, looked similar to a turtle shell, which symbolized longevity. In this manner, *katsuobushi* became a vital part of people's life and customs.

Skipjack as internationally-traded commodity: Producers try to protect their tradition

In the past, Inami¹⁾ in the Kishu region used to be the leader of skipjack fishing. Sardines flocked along the Kuroshio current to this excellent fishery around Shiono Cape at the southern tip of the Kii Peninsula. They attracted schools of skipjack and whales. Fishermen from Inami adroitly wielded a group of skipjack boats to chase after the fish in many different parts of the ocean. Arguably, these fishermen were the most familiar in the handling of skipjack. Three of them made important contributions in improving the production techniques of *katsuobushi* and popularizing the food. Among them, Jintaro Kadoya adopted the smoke-drying technique to revolutionize *katsuobushi* production. But this innovation did not become popular straight off.

Fishermen from Inami hunted skipjack even off the coast of Tosa (Kochi). Primitive means of preservation compelled them to swiftly process their catch. *Katsuobushi*

■ Production of *katsuobushi* by top three producers (Makurazaki, Yamagawa, and Yaizu) and the national total

	Production by top three producers ¹⁾	Total production in Japan ²⁾
2008	32,930t(92.5)	35,587t
2009	33,831t(94.0)	36,005t
2010	31,005t(94.6)	32,759t
2011	29,403t(94.2)	31,202t
2012	31,445t(97.5)	32,265t
2013	30,116t(90.3)	33,348t
2014	29,014t(97.9)	29,649t

¹⁾ Total based on data from Makurazaki, Yamagawa, and Yaizu

²⁾ Statistical data published by the Ministry of Agriculture, Forestry and Fisheries
Each figure in parenthesis represents domestic share

The Katsuobushi Loved by the Japanese



Stuffed skipjack



A child shaving off *katsuobushi*

was no exception. They seem to have established a primary treatment facility at an anchorage site in Tosa. Such interaction led the domain of Tosa to adopt the smoke-drying technique as the first mover and establish exclusive rights. The monopoly was later broken by Yahei Mori from Inami, who introduced the technique to Makurazaki in Kagoshima. Yoichi Inami brought the technique to Chiba and then to Shizuoka. *Katsuobushi* production became popular throughout Japan thanks to these three individuals.

Today, Makurazaki in Kagoshima leads *katsuobushi* production followed by Yamagawa in Ibusuki, Kagoshima, then Yaizu in Shizuoka. These three ports are major landing sites for frozen skipjack owing to the abovementioned history of commercialization. The recent annual production is presented in the table. National production exceeded 40,000 tons in 2005 before declining to the level of 30,000 tons in recent years. Global preference for fish consumption following the incidents of mad cow disease (BSE) led to a greater demand for canned fish. Skipjack became an internationally-traded commodity as an alternative to other tunas for producing processed food. The price of skipjack as a food ingredient is already influenced by the market in Bangkok, Thailand. Producers have even more difficulties, such as increasing the proportion of small and fatty skipjack unsuitable for making *katsuobushi*, and slumping product

prices on the Japanese market.

There is only a small number of *katsuobushi* producers in other parts of Japan. For instance, instead of making *katsuobushi*, Kochi Prefecture became a major producer of *sodabushi*, smoke-dried frigate tunas. Likewise, *sababushi*, smoke-dried mackerel, now dominates in Chiba Prefecture.

Learn about food by seeing, touching, and enjoying it

Finally, I would like to introduce some of the food education activities by the Japan Katsuobushi Association.²⁾ There are many approaches, but we believe that *katsuobushi* is one of the most suitable foods for such education. It is a good, nutritious, and traditional food familiar to us, which also has cultural significance. Albeit mechanized, the traditional production process is still being followed. It is easy to understand the whole process whereby raw skipjack is turned into the final product.

As such, the association (and the members) proudly conducts food education activities. Opportunities to touch a stuffed model and shave *katsuobushi* are provided to pique visitors' curiosity, along with basic materials like educational leaflets and panels presenting the production process.

The stuffed model is used to explain the process involved for making *katsuobushi*. After removing the head and filleting skipjack, both back and belly portions are divided into two pieces. Each piece is called *honbushi*. It is hard to convey the process in words, but visitors seem to find it much easier when they see the stuffed animal divided into pieces. We also let people shave off *katsuobushi*. To avoid injuries, we prepared a shaver with a handle (just like traditional snow cone makers). It is physically demanding to shave off hard *katsuobushi*, but kids joyfully turn the handle the best they can. It seems a rewarding experience to see a lot of shaved pieces produced by their own effort. When they try eating these shavings on the spot, they are surprised with the aroma and taste that are different from what they are used to. They gain firsthand knowledge that *katsuobushi* has a special taste and aroma.

We believe that our presentation of the process leading from raw fish to the final product helps cultivate people's understanding and attachment to the food, and ultimately respect for the meals they eat. In this respect, it is important for guardians to learn about food side-by-side with children. Learning about food, including the importance of local consumption of local food, should take place at home, at school, and in each community. ■

1) In 2015, a monument mentioning the "birthplace of *katsuobushi*" was built in Inami, Wakayama Prefecture.

Official website presenting Inami as the birthplace of *katsuobushi* https://www.town.wakayama-inami.lg.jp/contents_detail.php?co=ser&fmid=169

2) Japan Katsuobushi Association <http://www.katsuobushi.or.jp/index.html>

Major Developments in Global Initiatives on the Ocean

[KEYWORDS] marine biodiversity / marine genetic resources / sustainable development goals(SDGs)

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(Ocean Newsletter No.383, July 20, 2016)*

There have recently been major developments in global initiatives concerning the ocean, including the UNGA Resolution on the development of an international legally-binding instrument on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction, and the adoption of Agenda 2030, which sets forth the Sustainable Development Goals (SDGs). Consequently, BBNJ Preparatory Committee meetings, SDG-related meetings, and various other meetings are being held, in which the Ocean State of Japan should actively participate and respond to.

The oceans are a continuous space filled with water that cover 70 percent of the planet, and global initiatives on the oceans have greatly affected countries, both nationally and locally, around the world, especially since the coming into effect of UNCLOS in 1994, which shifted the ordering principle of the oceans from “freedom of the seas” to “ocean governance,” and the adoption of the “sustainable development” principle and Agenda 21 at the Rio Earth Summit in 1992. Even among those ocean initiatives however, 2015 represented a turning point. From that year and continuing into 2016 there was great progress in initiatives across a wide variety of ocean fields, namely, the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction, the Sustainable Development Goals, climate change and the oceans, Arctic policy, and small island developing States.

Conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction (BBNJ)

In its resolution of June 2015, the UN General Assembly decided to develop an international legally binding instrument under the United Nations Convention on the Law of the Sea (UNCLOS) regarding the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction (BBNJ). While the issue had been discussed since the end of the 20th century, in 2004 the General Assembly set up the Ad Hoc Open-ended Informal Working Group to develop the main points for conservation and sustainable use of BBNJ. Also, at the UN Conference on Sustainable Development (Rio+20) in 2012, participating countries committed to urgently address this issue.

As a result of the resolution, a Preparatory Committee was established to make substantive recommendations to the General Assembly on the elements of a draft text of an international legally binding instrument under UNCLOS. The first session was promptly held at the end of March 2016 at UN Headquarters. Four sessions by the Preparatory Committee are planned to take place by the end of 2017. By

the end of the 72nd session in September 2018, and taking into account the report of the Preparatory Committee, the General Assembly will decide on the convening and on the starting date of an intergovernmental conference.

Negotiations over BBNJ are particularly focused on (1) marine genetic resources (MGRs), (2) area-based management tools including marine protected areas (MPAs), (3) environmental impact assessments, and (4) capacity building and the transfer of marine technology.

General topics to be addressed in the negotiations for this international instrument include ensuring its universality and effectiveness, maintaining consistency with the UNGA Resolution that it “should not undermine existing relevant legal instruments and frameworks and relevant global, regional, and sectoral bodies,” and defining the scope of the international instrument and its executing agencies. Specific topics to be addressed include: MGRs, their definition, legal nature, and sharing of benefits; and the regulatory focus of area-based management tools including MPAs.

The Preparatory Committee is open to participation not only from member countries, but also from international agencies, NGOs, and other stakeholders. As an NGO in consultative status with ECOSOC, the Ocean Policy Research Institute of the Sasakawa Peace Foundation will participate in the Preparatory Committee to make sure the expertise of specialists and intellectuals from Japan and around the world is reflected in the discussion. If an implementing legal instrument under UNCLOS relating to BBNJ is adopted during the intergovernmental negotiation in 2018, it would be the third implementation instrument adopted under UNCLOS, after more than 20 years since the adoption of the UN Fish Stocks Agreement in 1995.

Sustainable Development Goals (SDGs)

The UN Sustainable Development Summit in September 2015 adopted the 2030 Agenda for Sustainable Development, which set forth new Sustainable Development Goals (SDGs) to which we must apply our best efforts at the global, regional, and national levels to achieve.

While the SDGs put forth by the new agenda replace the Millennium Development Goals (MDGs) from 2001, they not only address those challenges we failed to adequately meet earlier, but go beyond, to address a wide spectrum of economic, social, and environmental challenges. There are 17 SDGs in all, with 169 targets having been set for their realization.

Among these 17 goals, the ones that have significance for oceans include Goal 13 to combat climate change and its impacts, Goal 14 to conserve and sustainably use the oceans, seas and marine resources for sustainable development, and Goal 17 to strengthen the means of implementation and revitalize the global partnership for sustainable development.

Along with the minimization of the impact of ocean acidification, which was first made a high-profile issue at Rio+20, Goal 14 clarifies by which year most targets need to be achieved, as in the following:

By 2025, prevent and significantly reduce marine pollution.

By 2020, sustainably manage and protect marine and coastal ecosystems to restore them.

By 2020, end overfishing, illegal, unreported and unregulated (IUU) fishing and destructive fishing practices and implement science-based management plans.

By 2020, conserve at least 10 percent of coastal and marine areas.

By 2020, prohibit certain forms of fisheries subsidies, which contribute to overcapacity.

By 2030, increase the economic benefits to small island developing States and least developed countries from the sustainable use of marine resources, including sustainable

management of fisheries, aquaculture and tourism.

These targets demonstrate that we have entered the phase of full-fledged implementation of the action programme for comprehensive management and sustainable development of the oceans that began with Chapter 17 of Agenda 21, adopted at the Rio Earth Summit.

Japan's proactive role as an Ocean State

In line with the abovementioned progress, many conferences and meetings are being organized this year in various parts of the world, including the BBNJ Preparatory Committee, SDG meetings, and COPs on the United Nations Framework Convention on Climate Change and the Convention on Biological Diversity.

The second session of the Preparatory Committee on BBNJ is scheduled to take place at the end of August, following the first session held at the UN Headquarters in New York from the end of March to the beginning of April. In early May, researchers from around the world participated in the Third Global Ocean Acidification Observing Network Science Workshop¹⁾ in Hobart, Australia to discuss ocean acidification. This mid-June, at the United Nations Informal Consultative Process on Oceans and the Law of the Sea, discussions on ocean pollution were focused on marine debris, plastics and micro-plastics as an international concern. In November, the 22nd session of the Conference of the Parties (COP 22) to the United Nations Framework Convention on Climate Change is scheduled to take place in Marrakesh, Morocco. The 13th session of the Conference of the Parties to the UN Convention on Biological Diversity is planned for this December in Cancun, Mexico. In June 2017, a high-level UN conference will be held in Fiji²⁾ to discuss implementation of Sustainable Development Goal 14 to conserve and sustainably use the oceans, seas and marine resources for sustainable development.

Global initiatives for oceans have now gained momentum after an interval of over 20 years. Based on a clear understanding of these developments, Japan should play a proactive role in these initiatives as an Ocean State with a new vision for establishing and leading ocean governance. ■



The ocean is home to many creatures

1) 3rd GOA-ON Science Workshop <http://www.goa-on.org/3rdWorkshop/>

2) Since this article first appeared, the decision has been made by the UNGA to hold the conference at UN headquarters in New York.

A New Effort Towards Research in the Arctic

— Japan's policies in the Arctic and the start of a new research project —

[KEYWORDS] scientific diplomacy / Arctic Ocean / development of observations

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(Ocean Newsletter No.384, August 5, 2016)

The Headquarters for Ocean Policy has announced Japan's Arctic Policy, articulating for the first time the government's policy guidelines for the region. Highlighting Japan's strength in science and technology, the policy details the government's intent to strengthen participation in international initiatives in the Arctic. Against this backdrop, the Arctic Challenge for Sustainability (ArCS) project was commenced for the purpose of furthering scientific research in the region. This article introduces several components of the project, including joint international research, the development of observational points around the Arctic Ocean, and field survey activities.

Japan's Arctic policy and the role of science

On October 16, 2015, the Headquarters for Ocean Policy (chaired by the Prime Minister Shinzo Abe) announced Japan's Arctic Policy¹⁾, articulating the country's policy guidelines on the Arctic for the first time. The context for the Arctic Policy are environmental changes in an Arctic Ocean with less sea ice, industrial use, and the increased importance of Japan's involvement with international society on Arctic issues, all affected by global warming and reduced sea ice in the Arctic.

Science plays an important role in Japan's Arctic policy. In its application to become an observer at the Arctic Council, Japan appealed to how its scientific achievements contribute to Arctic science. Accordingly, ever since it became an observer Japan has increasingly been invited to many kinds of scientific, industrial, and diplomatic meetings related to the Arctic region, and its activities are now closely followed.

Arctic science goes beyond the science of the Arctic region. It is now becoming the object of attention for the global environment and society. Ways to strengthen Arctic region research include the reinforcing of observation and analysis systems, development of cutting-edge observation devices, and the creation of a network of research centers in Japan. Discussions are being held on the development of research and observation bases for the Arctic region, as well as regarding research vessels.

Moreover, issues for international cooperation include the sharing of scientific findings and contributions to the shaping of international rules, a significant increase in support for Arctic Council activities, and expanding the scope of bilateral and multilateral cooperation with Arctic states and other stakeholders. There is also mention of the need for initiatives to develop an environment conducive to the effective use of the Northern Sea Route and to develop mineral and biological resources. How is this to be done? Arctic researchers, stakeholders, and relevant ministries and agencies in Japan are currently carrying out a variety of initiatives.

Beginning the "Arctic Challenge for Sustainability" project to promote Arctic research

Last September, the Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT) launched a new project called the "Arctic Challenge for Sustainability (ArCS)." Earlier, from 2011 to 2015, the cross-disciplinary GRENE Arctic Climate Change Research Project²⁾ was conducted on the causes of the rapid change of the Arctic climate system and its global influences. This research fostered close collaboration between models and observational activities. Meanwhile, ArCS aims to carry out scientific studies and research leading to active involvement in international discussions, and provide findings from research aimed at facilitating policy decisions and resolution of Arctic problems to international organizations, governments, the private sector, NGOs, and other stakeholders. The research group includes experts from the humanities, social sciences, and law.

Along with carrying out international joint research, the project will develop bases for international collaboration

■ Bases used for international collaboration through ArCS



<http://www.arcs-pro.jp/>

in leading-edge studies and research, carry out capacity building through exchanges of junior researchers, and send experts to meetings related to the Arctic, including those organized by the Arctic Council. Until now, international collaboration relied on bases in Svalbard (Norway), Alaska, and Greenland. In 2017, Canada will establish the Canadian High Arctic Research Station (CHARS) in Cambridge Bay, and preparation for its joint use has already been made. In vast Russia, preparation is underway for the joint use of a base in Spasskaya Pad (Yakutsk) in the inland forest and an additional base in Cape Baranov in the archipelago of Severnaya Zemlya along the Arctic coast. The base in Cape Baranov serves as an important meteorological observation point on Russia's vast coastline. This land area protrudes further north than any other on the coastline, and as sea ice in this area can obstruct Arctic sea routes, information on ocean conditions and meteorological information from the base is crucial for ensuring safe passage.

Arctic research and the ocean

There are observation sites along the coast in the Arctic area where Japan participates in observation activities, as well as other sites located on ice sheets or inland. The oceanographic research vessel *Mirai* accesses the Arctic Ocean when sea ice recedes during the summer. Coastal observation stations, meanwhile, can conduct observation throughout the year. An Arctic research technology in which Japan takes particular pride is its satellite observation technology, which is playing a crucial role in a system for identifying the best navigation routes based on the way sea ice recedes and various meteorological conditions above water. The satellite observation is validated by data collected by the vessels on site. The accuracy and openness of the data are appreciated by Arctic countries that often access the Japanese data website.

In Arctic research, many topics are directly related to the ocean, such as receding sea ice and changes in oceanographic structure and ecosystems. Specific examples include the meteorological impact of the ocean affected by receding sea ice, the impact of melting ice sheets on iceberg drift and rising sea levels, and green-house gases generated and absorbed by the ocean. Also, relationships between these themes and society and industry are studied. We must ask about their effects on the Arctic sea routes, passage prediction, hulls, and the economies centered on the Arctic sea routes. Research also provides useful information for shaping common rules for the Arctic Ocean.

Moreover, as we also need to learn the concerns of Arctic indigenous people, data is being collected directly from them in addition to statistics at the national level. In the summer of 2016, as a model case, a Japanese group will study and discuss with indigenous people of Greenland the conditions of the ocean, the ice along the coast, and their daily lives. They will also organize a workshop there.

Research has revealed that conditions for sea ice to retreat during summer are already set in the preceding winter. The area of sea ice fell to a new low during this winter. The hydrographic cruise is about to start this year in the Arctic Ocean to find out what kind of changes are taking place in the ocean and atmosphere.

Arctic research is beginning a new, but vast domains remain unknown to Arctic science. Efforts need to be made to carry out observation at higher latitudes, in deeper water, and throughout the year. While the Arctic sea route along the Russian coast is garnering attention, observation by satellite shows that an opening may be appearing through the ice-covered center of the Arctic Ocean. An effort to deploy an icebreaker through the ice covered sea for one year will begin in earnest from 2019 in response to international calls to do so.

The Arctic environment is changing rapidly. Through new Arctic research, we must consider those changes in advance. ■

1) Japan's Arctic Policy on the website of the Headquarters for Ocean Policy: http://www.kantei.go.jp/jp/singi/kaiyou/arcticpolicy/jpn_arcticpolicy/index.html
2) Green Network of Excellence (GRENE) Arctic Climate Change Research Project: <http://www.nipr.ac.jp/grene/about.html>

Japan and France Comprehensive Maritime Cooperation

— A catalyst initiative for development and security of seas and oceans —

[KEYWORDS] maritime security / comprehensive maritime policy / maritime task force

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(Ocean Newsletter No.385, August 20, 2016)

Comprehensive ocean policies are being called for to ensure the security of maritime spaces. While Japan and France are widely separated by the ocean, the two countries realize that they face the same global challenges and security issues and so should be able to respond to a variety of ocean problems within the context of their close relations. This article examines the enabling conditions towards a common comprehensive maritime initiative between Japan and France, taking into consideration the existing ocean policies of the two countries.

INTRODUCTION

Given the complexity of a subject that refers simultaneously to national inter-ministry problems and international relations issues, and to predictable or undergoing evolutions in these fields in both countries, this study cannot be considered an exhaustive analysis of official standpoints nor those currently under review. It has to be considered as an observation of national and international maritime challenges across the *Indo-Asia-Pacific* region affecting both Japan and France elaborated from the two blueprint documents, the National Security Strategy of Japan, issued in December 2013¹⁾, and the Defense and Security Policy for the Asia-Pacific, published by the French Ministry of Defense in April 2014²⁾. Based on the respective ocean policies' settings and a number of interviews, the study looks at the enabling conditions towards a common comprehensive maritime initiative to be part of the *Strategic Partnership of Exception* established between both countries.

MARITIME SPACES³⁾ AND INTEGRATED MARITIME POLICIES

The notion of maritime space as stipulated in this study has its origins in regional, physical, economic and cultural realities. Associated as a subset of the global ocean, maritime space encompasses all human activities and natural phenomena that take place or occur there. It includes the dependencies and local populations of all coastal countries whose activity wholly or partially is derived from, or directed towards the sea. Thus, maritime space comprises not only the sea itself, with most diverse activities, but also the on-shore areas where sea-based human activities or natural phenomena converge with those taking place on land and vice versa. The notion of maritime space unveils the extent of interdependence and the expansion of 'seaward' relationships between countries with geographical proximity and through networks established between more distant maritime regions.

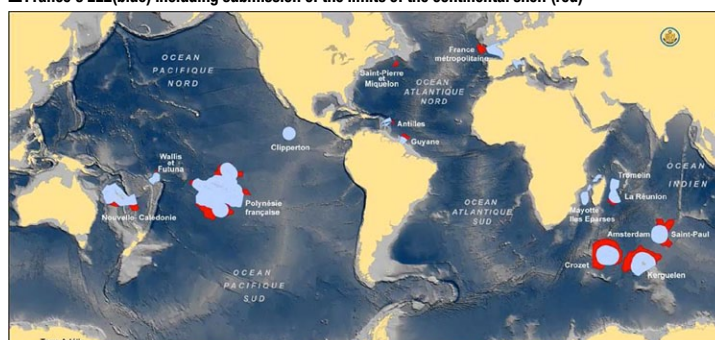
Thus, the notion of security as applied to a

maritime space is composed of the States' capacity, individually or collectively, to observe, analyze and predict evolutions of an essential region of the world in order to guarantee its stability, development and preservation in all aspects. This implicitly calls for the establishment of cooperative measures of prevention, protection, and intervention so as to guarantee a peaceful and sustainable maritime development, overcoming the risks and threats that are present in the oceans, while preserving the compatibility of national interests with the management of our 'common heritage of mankind' which is the ocean. Such is the challenge of national maritime policies as well as maritime foreign policies, requiring the development of integrated maritime policies.

In July 2007, Japan declared its interest in the development of a comprehensive maritime policy covering all sectors of government maritime activity, to be followed by the adoption by the Parliament (*Diet*) of the *Basic Act on Ocean Policy* (2008). This law laid the foundations for the Integrated Maritime Policy of Japan, and established the Headquarters for Ocean Policy (*HOP*) within the Cabinet Office as the directing organ of the inter-ministerial coordination⁴⁾.

Similarly, but limited to the State intervention at sea, France set up a coordination body, the Secretary General of the Sea (SG Sea) to efficiently respond to natural and man-made disasters that have heavily and increasingly hit its coastline. This organization is structured to coordinate

■ France's EEZ(blue) including submission of the limits of the continental shelf (red)



(Source: National strategy for the security of maritime areas, 2015)

	Superficie ZEE (SZ)	SZ + Superficie terrestre SZ + ST = SZT	Indice de maritimisation IdM % = SZ/SZT
USA	11,351,000 km ²	20,982,418 km ²	0,54 5
France	11,035,000 km ²	11,709,843 km ²	0,94 1
Australia	8,148,250 km ²	15,835,100 km ²	0,51 6
Russia	7,566,673 km ²	24,641,873 km ²	0,30 8
Canada	5,599,077 km ²	15,583,747 km ²	0,35 7
Japan	4,479,358 km ²	4,857,193 km ²	0,92 2
New Zealand	4,083,744 km ²	4,352,424 km ²	0,94 1
United Kingdom	3,973,760 km ²	4,217,370 km ²	0,94 1
Brazil	3,660,955 km ²	12,175,831 km ²	0,30 8
Chile	2,017,717 km ²	2,773,813 km ²	0,73 3
Portugal	1,727,408 km ²	1,819,799 km ²	0,94 1
India	1,641,514 km ²	5,559,733 km ²	0,30 8
Argentina	1,159,063 km ²	3,925,953 km ²	0,30 8
Madagascar	1,225,259 km ²	1,812,299 km ²	0,68 4
China	877,019 km ²	10,476,979 km ²	0,08 9

(Source: IFREMER Internal Report, Y.Henocque, 2011)

various administrations with capacity for response intervention (Navy, Customs, Maritime Affairs, National Police, National Gendarmerie and Civil Security) under the authority of a single government representative responsible for each maritime region: the *Prefet Maritime* (Maritime Prefect) on the continent and *Prefets or Hauts Commissaires* (Prefects or High Commissioners) in overseas territories. In metropolitan France, the maritime prefecture's functions are performed by Admirals double-hatted as operational controllers of the Navy assets assigned to their region (the Channel and the North Sea, Atlantic and the Mediterranean). Overseas, the Prefects or High Commissioners are assisted in this task by a Navy officer appointed as Maritime Area Commander.

In October 2015, the Inter-ministerial Committee of the Sea (CIMER) adopted the National Strategy for the Security of Maritime Areas⁵⁾, prepared under the coordination of SG Sea, towards an integrative maritime strategic vision and objectives as a common inter-ministerial framework to ensure the security of marine spaces in a coordinated manner.

COMPARATIVE TRENDS AND RECOMMENDATIONS

Under the growing effect of globalization on the economy and exchanges of all kinds, the strategic environment

of world powers has a tendency to team-up. This is especially the case for Japan and France. While their capitals are 12.000 km apart, the two countries face the same global challenges and security issues. Although the focus of their observations will vary in relation to their geographical location, both countries are aware that in the event of a serious crisis of any kind (be it environmental, health-related or having to do with conventional or non-traditional security) in either regional environment, the security of the other would be affected, whether it be in Europe, Africa, the Middle East or the Indo-Pacific area.

More specifically, surveillance of maritime spaces under the sovereignty of the two countries in the Asia Pacific region is perhaps the first accessible testing ground for maritime cooperation. Provided that both countries have similar maritime governing bodies and compatible maritime policy goals⁶⁾, they interestingly could investigate security issues and surveillance of specific maritime spaces on an axis connecting Tokyo to Noumea and Tahiti. Such an initiative could be supported by a dual national maritime expert network (Maritime Task Force) bringing together researchers from strategic research institutions like NIDS and IRSEM⁷⁾, think tanks like OPRI, administrative experts from ministries, Navy and Coast Guard staffs and forces as well as from structures dedicated to the coordination of inter-ministry activity responsible for maritime policy, maritime surveillance and national security.

Such a comprehensive and maritime approach, which has already been initiated with Australia and New-Zealand⁸⁾, should tightly link security, sustainable development, and socio-environmental issues such as maritime surveillance and ocean observation, small islands and climate change, renewable energies, deep sea mineral resources, marine litter or large marine protected areas, etc. A concrete but catalyst step could be made with the organization, by the end of 2017, of a Japan-France bilateral inter-agency maritime seminar, bringing together researchers and administrative experts. ■

● This article presents the personal views of the author and results from a study which was conducted from September 2014 to June 2015 as part of the National Institute Defense Studies auditors' strategic analysis work. It does not reflect either the official position of the French Ministry of Defense or of its Government.

1) http://japan.kantei.go.jp/96_abe/documents/2013/_icsFiles/afieldfile/2013/12/17/NSS.pdf

2) *France and Security in the Asia-Pacific, April 2014*: <http://www.defense.gouv.fr/dgris/reflexion-strategique/prospective-de-defense/rapport-la-france-et-la-securite-en-asie-pacifique> (to be updated in June 2016).

3) « *Pour une politique globale des espaces des espaces maritimes* », Christophe Pipolo, Revue de la Defense Nationale, aout-septembre 2009.

4) Virginie Saliou, « *Pour une strategie maritime internationale integree de la France* », note interne, avril 2015.

5) The National Strategy for the Security of Maritime Areas : http://www.gouvernement.fr/sites/default/files/contenu/piece-jointe/2016/01/strategie_nationale_de_surete_des_espaces_maritimes_en_national_strategy_for_the_security_of_maritime_areas.pdf

6) Yves Henocque: « *The crafting of integrated coastal management in Japan (East Asia) and France (Europe). A 3-year journey with the Ocean Policy Research Foundation in Japan (2009-2012)* » , final report, OPRF.

7) IRSEM: Institut de Recherche Strategique de l'Ecole Militaire, Paris.

8) France, Australia and New Zealand « *Maritime Surveillance Trilateral Seminar* », Noumea, 23 October 2015.

Significance of the Arbitral Award in the Arbitration Proceedings between the Philippines and China regarding the South China Sea

[KEYWORDS] nine-dash line / maritime dispute / United Nations Convention on the Law of the Sea

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(Ocean Newsletter No.386, September 5, 2016)

On July 12, 2016, the arbitral tribunal established under Annex VII of the United Nations Convention on the Law of the Sea (UNCLOS) rendered its award on the case between the dispute between the Philippines and China in the South China Sea. The Court ruled that Beijing's claim to historic rights within the so-called nine-dash line violates UNCLOS, and also that China's activities within those waters are in contravention of the Convention. China's reaction to the award, which recognized almost all of the Philippines' claims, requires attention.

China's claim in the South China Sea and the China-Philippines arbitration

The escalating tension between China and other States in the South China Sea has in recent years been drawing international attention. China's claim to historic rights in the waters encompassed by the "nine-dash line" has been suggested to be the basis for its assertive activities¹⁾. China's claim is that it has rights based on history, to a maritime area within nine dashed lines drawn so as to encompass the South China Sea. To date, Beijing has not provided any official account regarding concrete details of the claim. However, the nine-dash line increasingly attracted attention after China in 2009 attached a map depicting the nine-dash line to a verbal note in objection to the joint submission by Malaysia and Vietnam to the Commission on the Limits of the Continental Shelf²⁾.

UNCLOS contains a compulsory dispute settlement procedure that applies to disputes concerning interpretation and application of its provisions. As the dispute with China worsened, the Philippines resorted to this mechanism and in January 2013 unilaterally filed a case against China at the Arbitral Tribunal under Annex VII of UNCLOS. While China consistently refused to participate in the arbitral proceeding, it did not completely ignore the Tribunal, and published a 'Position Paper' in December 2014 arguing that the Tribunal does not have jurisdiction over this case³⁾.The

Court deemed this paper a formal objection to its jurisdiction, and began to examine this question. In October 2015, the Tribunal issued an award upholding its jurisdiction over some of the submissions. However, it decided that jurisdictional issues for other submissions will be considered together with its decision on the merits.

Outline of the award by the Arbitral Tribunal

While a variety of claims have been made by the Philippines in the arbitration proceedings, they can be divided into roughly three arguments. First, the Philippines argued that China's claim to historical rights within the waters encompassed by the nine-dash line violates UNCLOS. Second, it requested the Tribunal to determine the legal status of particular maritime features in the South China Sea. Third, it requested the Tribunal to rule that specific activities by China, such as construction of artificial islands and obstruction of activities by the Philippines, are illegal. The final award in the arbitration recognized most of the Philippines' claims.

With respect to China's nine-dash line, the Tribunal reasoned that rights over maritime areas are established under UNCLOS, and even if any historic rights over marine resources existed in the past, they ceased to do so under UNCLOS when it came into force. The Tribunal further pointed out that Chinese fishermen historically did no more than use the South China Sea freely as a high sea, and that there was no evidence that China exerted exclusive control or excluded other countries from using the resources there. In conclusion, it was decided that there was no legal basis for China's claim to historic rights.

Regarding the legal status of maritime features, the Tribunal reached the same conclusion as submitted by the Philippines, except for recognizing that features in McKennan Reef and part of the Gaven Reefs remain above water at high tide. Specifically, it was recognized that Scarborough Shoal, Johnson Reef, Cuarteron Reef, and Fiery Cross Reef remain above water during high tide, whereas Subi Reef, Hugh Reef, Mischief Reef, and Second Thomas Shoal are submerged at high tide in their natural condition. Moreover,



Arbitration proceedings over this dispute in the South China Sea
<http://www.pcacases.com/>



An artificial island in the South China Sea
© Asia Maritime Transparency Initiative

the Tribunal found that neither in these areas nor in the Spratly Islands are there any maritime features that generate a 200 nautical mile Exclusive Economic Zone (EEZ) or continental shelf. Paragraph 3, Article 121 of UNCLOS stipulates that “rocks which cannot sustain human habitation or economic life of their own shall have no exclusive economic zone or continental shelf.” After detailed examination of the interpretation of the provision, the award concluded that none of the maritime features satisfy these requirements.

The claims by the Philippines regarding the activities of China were also almost entirely upheld. It was recognized that China violated the rights of the Philippines over its EEZ and continental shelf through activities such as interfering with Philippines’ resource development and fisheries and constructing artificial islands and structures on Mischief Reef, and by failing to prevent operations by Chinese fishermen. Other Chinese violations of the convention recognized by the Tribunal included: the breach of duty to respect traditional fishing rights; the breach of the obligation to protect and conserve the marine environment by resorting to a large-scale reclamation and construction of artificial islands; neglecting to prevent, while being aware of, massive hunting and collection of endangered sea turtles, corals, and giant clams; and violation of the rules for avoiding maritime collisions during law enforcement by Chinese government vessels.

The arbitral award and prospects for the South China Sea dispute

The arbitral award eliminated the basis for any Chinese claim over most of the South China Sea. Even if its claims based on the nine-dash line were denied, China could have

still claimed that most part of the South China Sea is an undelimited area, where the 200 nautical mile zones from Chinese islands and the main islands of the Philippines overlap, if it were decided that a relatively large island in the Spratlys has an EEZ and a continental shelf. However, the Arbitral Tribunal went further and denied the existence of any islands capable of generating an EEZ or continental shelf. This meant that China, whose mainland lies far in the north, was denied its legal foothold in the South China Sea.

The arbitral proceeding only dealt with claims over ocean space, and territorial claims over islands in the South China Sea remain to be resolved. To put it the other way around, however, as long as the award is followed, the dispute between the Philippines and China is now limited to rocks and the territorial waters extending 12 nautical miles around them. In this respect, the award has significantly reduced the scope of the dispute and will contribute towards its resolution.

Of course, the most crucial question is whether China will comply with the award or not. The award was the worst possible scenario for China, and it is unlikely that China will accept it entirely, as the it had consistently declared its resolve to ignore the ruling by the tribunal even before the award was rendered. However, the choice whether or not to respect the award is a direct test of China’s willingness to act within existing legal frameworks as a responsible global power. States should unite and continue to convince China to respect the ruling. ■

1) “Increasing Tension in the South China Sea – On the US military’s ‘Freedom of Navigation Operation,’” Shigeki Sakamoto, in the 376 issue of this newsletter. Click to read.
2) Regarding the application system for the Commission on the Limits of the Continental Shelf, refer to “Continental Shelf Extension,” Shin Tani, in the 287 issue of this newsletter. Click to read.
3) Position Paper of the Government of the People’s Republic of China on the Matter of Jurisdiction in the South China Sea Arbitration Initiated by the Republic of the Philippines, http://www.fmprc.gov.cn/mfa_eng/zxxx_662805/t1217147.shtml

The Ocean and Our Future

[KEYWORDS] knowing more about the oceans / ocean observation / US-Japan ocean partnerships

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The Global Earth Observing System of Systems (GEOSS) is the instrumentation infrastructure needed for earth scientists of all specialties around the world to discover and document the knowledge necessary for a sustainable human presence on earth. The Japan Agency for Marine-Earth Science and Technology (JAMSTEC) and the National Oceanic and Atmospheric Administration (NOAA) of the USA have cooperated on the Tropical Pacific Observing System, a part of GEOSS, but continuous monitoring is needed for prediction of weather change and variability around the world, and, furthermore, it is important to develop new systems, including for observation of biogeochemical variability.

The Need to Know More About the Oceans

The Ocean remains a source of wonder and amazement to humans around the globe. In addition to covering 72% of our “blue” planet’s surface, the Ocean produces our oxygen and vast quantities of food, thus serving as a major source and sustainer of life on earth. Yet, even with these impressive credentials, we remain far from truly understanding everything required to sustain a healthy Ocean and in turn create a truly sustainable planet.

Surprisingly, we know much more about the surface of the Moon and Mars than we know about the bottom of the Ocean. What we do understand is derived mostly from six satellites that circle the earth providing sea surface topography from which an approximation of the bottom topography is inferred. While detailing the physical characteristics of the Ocean are important, we are far less knowledgeable in comprehending the full range of ocean chemistry and biology that sustains life in the ocean and on earth.

Earth’s population rise over the last 50 years has been astonishing, and future projections are clearly beyond anything ever seen in the years of our planet’s existence. How can we support the extra billions of humans projected to be on the planet by 2100? How can we effectively resolve the many large-scale issues that hinder us even today such as

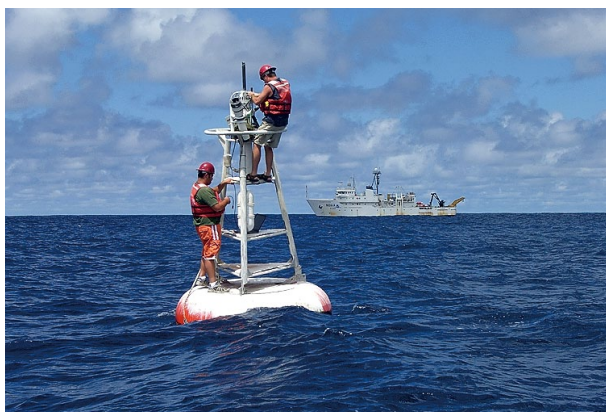
climate change, ocean degradation, and adequate supplies of food, water, and clean energy? Increasing the global priority dedicated to understanding how our planet truly functions is a critical first step!

It should be recognized that Earth is a system of systems — systems that affect and are coupled with each other in ways that create the rhythms of life. Large scale understanding of the systems individually is necessary but not sufficient to understand the complexities of global life and processes. Instruments and studies within and across the boundaries of solid earth, ocean, and atmosphere are necessary to reveal detailed knowledge of the physical, chemical and biological connections and interconnections.

Large-scale multi-disciplinary studies have become critical for understanding the components that can support a sustainable human presence on Earth. At this level, the full involvement of governments and large organizations, both commercial and philanthropic, are required to support and maintain current observing systems as well as to move ahead with new technically advanced instrumentation.

US-Japan Ocean Partnerships

As a Pacific sailor having spent significant time both on the Ocean and in the nations surrounding this Pacific por-



TRITON buoy (Japan)





JAMSTEC RV Kaiyo servicing NOAA TAO

tion of the Ocean, I much appreciate the interest and support of all who have invested in knowing more about the Ocean. I particularly respect and applaud the close cooperation and mutual partnerships that Japan and the United States have both initiated and sustained over decades of work together. Both are sea faring nations whose overall commerce and economies depend critically on the health and sustainable use of the Ocean.

Japan and the United States were founding partners of the Group on Earth Observations (GEO), a multinational organization comprised now of 100 nations and an equal number of supporting organizations collocated with the World Meteorological Organization (WMO) in Geneva. This ministerial level organization is dedicated to international coordination and cooperation in developing the Global Earth Observing System of Systems (GEOSS), the instrumentation infrastructure needed for earth scientists of all specialties around the world to discover and document the knowledge necessary for a sustainable human presence on earth.

At the business end of the GEOSS concept, Japan, employing the skills of the Japan Agency for Marine-Earth Science and Technology (JAMSTEC), and the United States, through the National Oceanic and Atmospheric Administration (NOAA), arguably have been the two most generous sponsors of the current tropical Pacific observing system which spans thousands of miles across the entire Pacific and whose centerpiece is known as the TAO/TRITON array. JAMSTEC has organized and maintained the western Pacific portion since its inception.

This system has resulted in understanding one of the basic patterns of earth's coupled atmosphere and ocean, known in scientific circles as the El Nino Southern Oscillation (ENSO), or "El Nino". Weather patterns around the world have now been correlated to ENSO conditions and

provide advance notice of seasonal temperature and moisture patterns on all continents. Additionally, it has been established that similar and complementary patterns exist in the Indian and Atlantic Oceans, providing the world a valuable expanded window on future global weather patterns.

Continuous Ocean Observation over the Long-term

As with all man made instrumentation, the TAO/TRITON system is aging and requires both continued maintenance and replenishment. Fortunately, there is an international initiative in development to modernize the TAO/TRITON system with more maintainable and advanced instrumentation. The Tropical Pacific Observing System 2020 (TPOS 2020), as it is named, is an international project under the Global Ocean Observing System (GOOS) sponsored by the Intergovernmental Oceanographic Commission (IOC), a member of the United Nations Educational, Scientific and Cultural Organization (UNESCO) and a supporting organization of GEO.

Japan and the United States have a major role in the planning and development of this new system, which will include not only physical measurements, but chemical and biological instruments, a major advance in delivering key observing resources for the GEOSS. Detailed understanding of tropical biogeochemical variability and predictability would be a major step forward for informing the decisions needed for creating a sustainable planet. Once again, the United States and Japan are working together along with other Pacific nations to increase the global understanding needed by the global leaders who will be making these decisions.

I urge continued strong support from both nations. While funding for the future, such as for TPOS 2020, remains vital, continued operational funding today is also urgently needed. Planetary scale observing systems are not short term experiments but rather long term investments that must be maintained into the future. Just as we have thermometers in our homes to monitor and adjust the temperature, similar continuous monitoring of critical planetary variables is essential. For example, we cannot risk premature loss of the worldwide benefits of the current TAO/TRITON ocean observations now underpinning ocean and atmospheric weather prediction systems around the world. The long-term support of nations and large-scale commercial and philanthropic organizations is necessary to achieve the scope of knowledge of our planet and also to maintain the monitoring required for a sustainable future! ■

Voyage Data and Ship Data Center (ShipDC)

[KEYWORDS] big data / ship-to-land communication / IoT

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(Ocean Newsletter No.390, November 5, 2016)

Ship Data Center Co., Ltd. (ShipDC) was established by Nippon Kaiji Kyokai (NK) to collect and provide voyage data in a neutral manner. The effective use of big data had been hampered by the specific nature of ships until the situation began to improve recently. This article describes the current state of data application involving ships, and presents the background and goals for establishing ShipDC.

Effective use of big data related to ships

In recent years, the existence of various kinds of “big data” has been garnering attention. Reported cases of application include a new business model to monitor gas turbines mounted on aircraft, based on data collected via the Internet of Things (IoT),¹⁾ as well as failure prediction and optimal maintenance of plants and construction machinery. One after another, ideas for new, cross-industry business models to effectively use big data are being covered by the media.

With respect to data application in maritime transport, changes began with the introduction in the 1970s of ships with engine rooms that are unmanned during the night. Since then, sensors have been mounted on equipment on an increasing number of ships in order to monitor data obtained by them. Ships setting out on an international voyage are now required to mount a voyage data recorder for investigating the cause of accidents at sea, but in many cases these data are being used for other purposes. The appearance of very small aperture terminals (VSAT) is reducing the cost of ship-to-land communication. Presently, the main focus of ships’ big data usage is the data generated by ships (voyage data). In the past, not only the operation managers, but also manufacturers of ships and shipboard equipment found it difficult to keep track of their performance during voyage. Effective application of voyage data is expected to enable swift and appropriate support from onshore, as well as to enhance the performance and reliability of ships and equipment by redesigning based on the accumulated data and to reduce operating costs.

The voyage data use environment

Today, VDRs and data loggers are most commonly used for obtaining voyage data through ship-to-land communication. VDRs are connected to, for example, GPS, autopilots, engine telegraphs, and radar to collect data of ship position, speed, course, depth, rudder angle and engine orders.

Data loggers record data from equipment in engine rooms. Types of collected data are determined mainly by ship owners, but they are mostly related to important data from the main engines. A ship sailing through the ocean cannot easily seek external assistance, which is why naviga-

tion should never be affected by any failure of equipment. Conventionally, with the exception of the main engine, each piece of equipment was backed up by another unit to ensure safety. However, that practice undermined the incentive to prevent damage to equipment through costly monitoring of data, resulting in shipboard sensors and data usage being used in only a limited number of cases. Going forward, it is expected that sensors will be mounted not only to main engines, but also to other equipment for effective use of data aimed at reducing the burden on crews, keeping track of performance of equipment during voyages, and achieving autonomous operation of ships.

Path toward effective data use by the maritime industry

The use of voyage data for optimal navigation is already common practice. Reduced fuel consumption and other benefits are provided by proposing an optimal course and speed while taking predicted weather into account. There is also a new practice aimed at reducing international logistics costs by tracking deterioration of equipment to select replacement parts to be carried on a ship for maintenance in short port calls during long voyages.

Versatile and reliable results can be obtained as application and cross-sectional analysis of big data is carried out on larger scales. However, it is difficult for companies with conflicting interests to exchange data. As such, each company installs equipment for collecting voyage data and transmitting this information to land. In order to provide services and carry out research, each company stores data in its own destination according to their respective specifications and procedures.

The effective application of big data is expected to be difficult if such practices continue in the maritime industry with its large number of market players. In fact, quite a lot of stakeholders have called for early establishment of a neutrally operated data center that transcends the boundaries between companies. But such an idea faces many challenges. For instance, there is a need to guarantee security by making the database much more robust compared to ordinary ones so that multiple stakeholders can safely enter and

output data. Also, user cost needs to be kept at a minimum so that various related companies are encouraged to use the data.

Against this backdrop, the Ship Data Center Co., Ltd. (ShipDC) was established by Nippon Kaiji Kyokai (NK) in December 2015 as an industry-wide common data platform. The move was in response to the recommendation made by the maritime industry for NK to take on the task, as it is one of the world's leading classification societies²⁾ renowned for its neutrality. Data accumulated by ShipDC are expected to provide the means for improving the designs of ships, as mentioned earlier, as well as to effectively address the EU-MRV regulation³⁾ and other environmental regulations.

Current operation of ShipDC and its prospects

ShipDC accepts voyage data from various ships regardless of their data format and names. This data is converted and compiled in accordance with the ISO standards pursued by the Smart Navigation System Research Group of JSMEA (see "Using Big Data from Ships – introducing activities of the Smart Navigation System Research Group" by Hiroshi Morono in the 371st issue of the Ocean Newsletter⁴⁾). Data is provided through an API (an Application Programming Interface based on regulations to specify routines and structures for using data retrieved from external programs) so that only data within the scope approved by ship owners can be provided to users authorized by ship owners (see Figure).

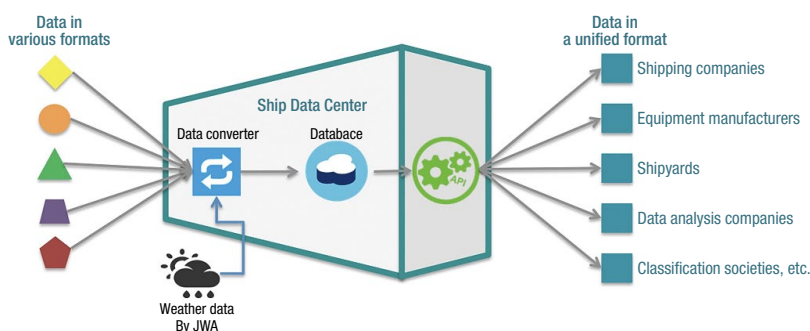
A trial data transmission from an operating ship was carried out with the cooperation of two major Japanese ship-

ping companies. The data was received and compiled successfully along with the completion of the API. This year, the Ministry of Land, Infrastructure, Transport and Tourism began projects for providing assistance for research and development of Advanced Safe Vessel Technologies. Some of the eligible projects in fiscal year 2016 aimed at developing vessels by effective use of data from ship-to-land communication and ship-to-ship communication decided to use data from ShipDC.

Meanwhile, NK is pushing to streamline classification survey by effectively using data compiled by ShipDC. With this prospect in mind, application providers that are planning to store data at ShipDC are developing their business plans accordingly.

Current operations are still far short of the collection of data on a large scale for application by a large number of users, and the pursuit of effective use of data by maritime clusters has just begun. Nevertheless, ShipDC strives to boost the competitiveness of the Japanese maritime industry in keeping pace with international practices to effectively mobilize IoT and big data. ■

■ Function of the ship data center



- 1) Internet of things (IoT) allows various objects to communicate directly among themselves or via the Internet so they can perform automatic recognition, automatic control, remote measurement, and so forth.
- 2) Classification societies are non-governmental organizations that set forth technical standards for ships and shipboard equipment; inspect them during the design process, construction, and commissioning; and guarantee that they satisfy the standards by repeating inspections after the commissioning. Inspections are sometimes requested by the ship's country of registration. Such inspections are carried out not only in accordance with the rules of the classification society in charge, but also the laws of that country. Lloyd's Register was established in 1760 as the first classification society in the world. Nippon Kaiji Kyokai was established in 1899.
- 3) EU-MRV regulation consists of the Regulation (EU) 2015/757 of the European Parliament and of the Council on the monitoring, reporting and verification of carbon dioxide emissions from maritime transport, and amending Directive 2009/16/EC. It is intended to keep track of CO₂ emissions from ships.
- 4) URL of the Ocean Policy Research Institute for reference
https://www.spf.org/opri-j/projects/information/newsletter/backnumber/2016/371_2.html