THE SASAKAWA PEACE FOUNDATION

THE OCEAN POLICY RESEARCH INSTITUTE

Dialogues between scientists and stakeholders on making ocean acidification a policy focus in Japan

Tomohiko Tsunoda

ECCWO 4th International Symposium
Hilton Washington, Washington DC
5 May 2018

Outline of OPRI-SPF

THE SASAKAWA PEACE FOUNDATION

THE OCEAN POLICY RESEARCH INSTITUTE

Since 2000, the Ocean Policy Research Institute has worked as a think tank which aims for a harmonious relationship between mankind and the oceans through ocean policy research, policy recommendations and publication of information.

Maritime Security

- Promoting Maritime Security Cooperation
- Maritime Security Information Report
- Collection and dissemination of information on Island Studies

Conservation of the Ocean Environment

- Marine biodiversity conservation and resource use
- Research on adaptation measures for global warming and ocean acidification

Publicizing information on the Oceans

- Publication of Ocean News Letter
- Hosting of Ocean Forum
- Publication of White Papers on the Oceans

Comprehensive Ocean Policies

- Research project on compiling and promoting comprehensive ocean policies※

Islands and their Surrounding Ocean Areas※

- Support to IO Net Implementation

Integrated Coastal Management (ICM)※

- Enforcement of model si projects on Integrate Coastal Management

Ocean Education※

- Project for enhancing ocean education in the Japanese school system

Human Resource Development for Maritime Fields※

- Promotion of International Cooperation in Ocean Related Fields (WMU)

Arctic Ocean※

- Study on Effective International Cooperation to Arctic Governance

Japan's Basic Act on Ocean Policy and Scientific Knowledge

Earth Summit(1992, Rio)

WSSD(2002, Johannesburg)

Rio+20(2012, Rio)

SDGs(2015),
UN Ocean Conference(2017)…

We contributed to the enactment of the 2007 Basic Act on Ocean Policy under the concept of sustainable use of the Ocean.

Basic Act on Ocean Policy (2007)

Basic Plan on Ocean Policy (2008)

The Plan is revised every five years, with the latest revision was in May, 2018.

Basic Act on Ocean Policy (2007)

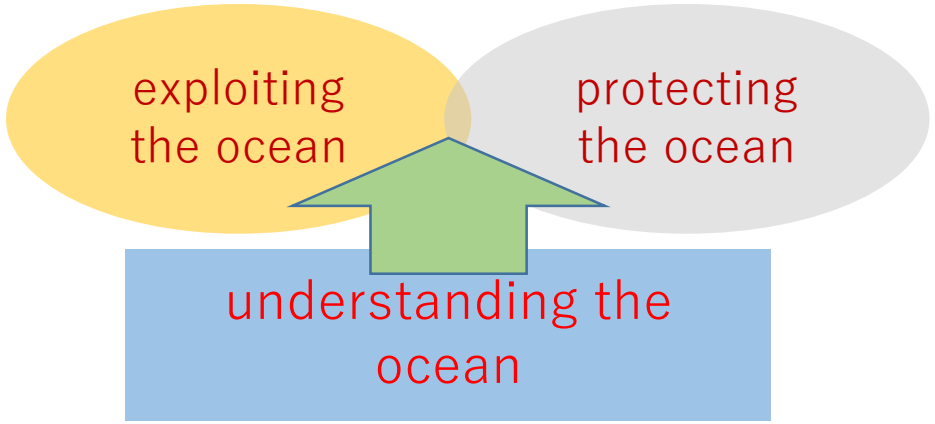
Article 4 (Improvement of Scientific Knowledge of the Oceans)
In consideration of the fact that scientific knowledge of the oceans is indispensable for the proper development and use of the oceans and conservation of the marine environment, while many scientifically unsolved fields remain with regard to the oceans, the scientific knowledge of the oceans shall be improved.

Basic Plan on Ocean Policy 2008 and Scientific Knowledge

General Remarks
（３）Goals and period of this plan

In promoting ocean policy, it is important to give due considerations to the balance and collaboration between the ideas of "**understanding** the sea," "**protecting** the sea" and "**exploiting** the sea," by deepening knowledge on the sea, reflecting the results as necessary on measures for realizing sustainable use of the sea and thereby further enhancing these measures. Based on such recognition, the Basic Act on Ocean Policy stipulates the following six basic principles.

(i) Harmonization of the development and use of the sea with the preservation of the marine environment
(ii) Securing the safety and security of the sea
(iii) Enhancement of scientific knowledge of the sea
(iv) Sound development of marine industries
(v) Comprehensive governance of the sea
(vi) International partnership with regard to the sea



5-year Program on Ocean Acidification(OA)

OPRI-SPF launched a 5-year program of research on ocean acidification in 2015 to observe and analyze the changing situation. Through this program, we aim to raise awareness regarding ocean risks and develop policy recommendations in order to fill the perception gaps between the increasingly serious situation and current levels of understanding.

International Symposium in 2016

International Conference in 2017

2015
- Launched a 5-year program and held an International symposium

2016
- Held an International conference and set up the "Marine Crisis Watch(MCW)" website.

2017
- Submit policy proposals on the promotion of related policy measures and open the MCW website.

↓ Strengthening network, hosting workshops

2019
- Will hold international symposium and submit a policy proposals on specialized countermeasures.

Main scope of our study is "Dialogues between scientists and stakeholders "

Comparison of the Uncertainty between CFCs and OA

CFCs A science/policy success story

Prediction

Ozone depletion…

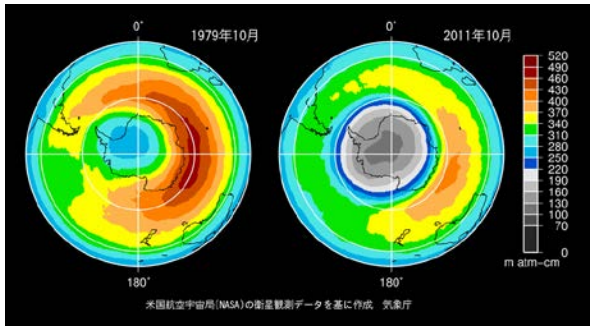
Countermeasures

CFC substitutes…

Effects

Effects on Human Health…

Montreal Protocol on Substances that Deplete the Ozone Layer (1987)



Distribution of ozone in southern hemisphere (Japan Meteorological Agency)

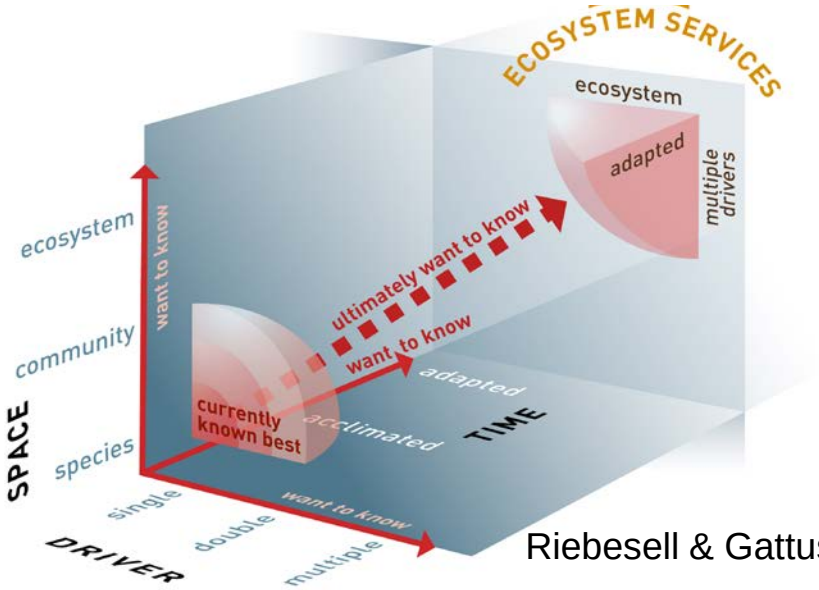
OA Reduction of uncertainties is necessary to be a science/policy success story

Uncertainty of Prediction

Other factors, such as pollution, Lack of Observations …

Uncertainty of Effects

Effects of multiple drivers, Effects on the ecosystem…



Riebesell & Gattuso (2015)

Countermeasures

Mitigation
(CCS, Blue Carbon, etc.)
Adaptation
(Assist Evolution, etc.)

1) Measures under the precautionary approach.

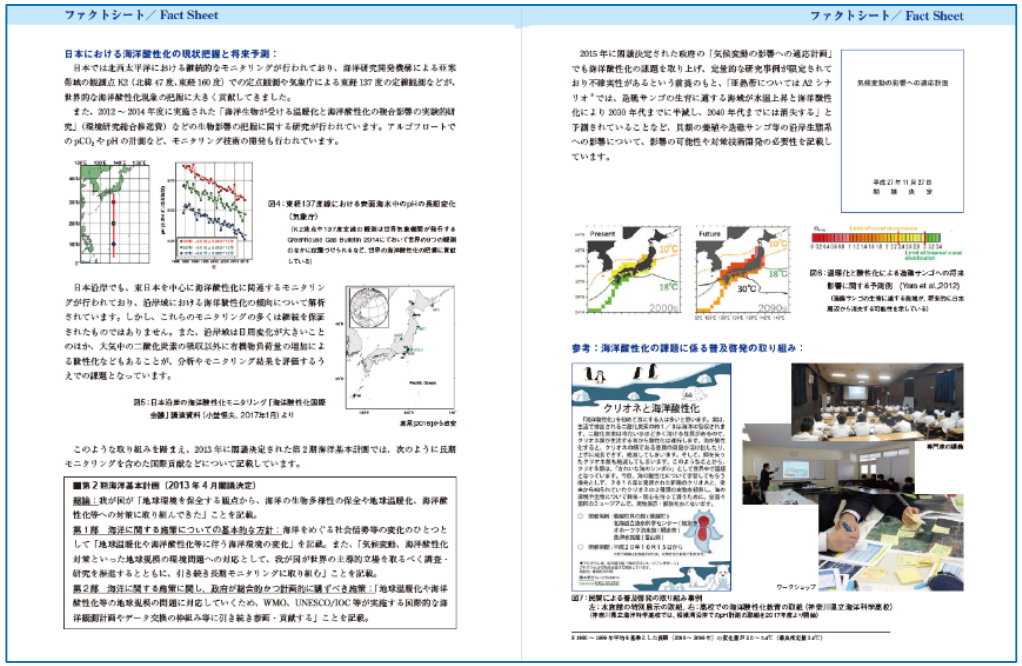
2)Expansion of scientific knowledge is indispensable.

We emphasized these two countermeasures, because clear effects on OA is not seen around Japan.

Proposals toward Japan's Basic Plan on Ocean Policy

OPRI-SPF submitted proposals on OA issues for inclusion in Japan's next Basic Plan on Ocean Policy on 31st August 2017.

1: Promotion of understanding based on scientific knowledge and consideration of countermeasures
2: Increase international contributions
3: Promotion of emission reduction measures of carbon dioxide (Promote Mitigation Measures)
4: Promotion of Public Awareness Activities


ファクトシート／Fact Sheet

日本における海洋酸性化の現状把握と将来予測：

日本では北西太平洋における継続的なモニタリングが行われており、海洋研究開発機構による特定海域の観測点K2（北緯47度、東経160度）での定点観測や気象庁による東経137度の定線観測などが、世界的な海洋酸性化現象の把握に大きく貢献してきました。

また、2012～2014年度に実施された「海洋生物が受ける温暖化と海洋酸性化の複合影響の実験的研究」（環境研究総合推進費）などの生物影響の把握に関する研究が行われています。アルゴフロートでのpCO2や pH の計測など、モニタリング技術の開発も行われています。

図4：東経137度線における表面海水中のpHの長期変化（気象庁）

日本沿岸でも、東日本を中心に海洋酸性化に関連するモニタリングが行われており、沿岸域における海洋酸性化の傾向について解析されています。しかし、これらのモニタリングの多くは継続を保証されたものではありません。また、沿岸域は日間変化が大きいことのほか、大気中の二酸化炭素の吸収以外に有機物負荷量の増加による酸性化などもあることが、分析やモニタリング結果を評価するうえでの課題となっています。

図5：日本沿岸の海洋酸性化モニタリング（「海洋酸性化国際会議」講演資料（小埜恒夫、2017年1月）より）

このような取り組みを踏まえ、2013年に閣議決定された第２期海洋基本計画では、次のように長期モニタリングを含めた国際貢献などについて記載しています。

■第２期海洋基本計画（2013年４月閣議決定）

総論：我が国が「地球環境を保全する観点から、海洋の生物多様性の保全や地球温暖化、海洋酸性化等への対策に取り組んできた」ことを記載。

第１部　海洋に関する施策についての基本的な方針：海洋をめぐる社会情勢等の変化のひとつとして「地球温暖化や海洋酸性化等に伴う海洋環境の変化」を記載。また、「気候変動、海洋酸性化対策といった地球規模の環境問題への対応として、我が国が世界の主導的立場を取るべく調査・研究を推進するとともに、引き続き長期モニタリングに取り組む」ことを記載。

第２部　海洋に関する施策に関し、政府が総合的かつ計画的に講ずべき施策：「地球温暖化や海洋酸性化等の地球規模の問題に対応していくため、WMO、UNESCO/IOC等が実施する国際的な海洋観測計画やデータ交換の仲組み等に引き続き参画・貢献する」ことを記載。

ファクトシート／Fact Sheet

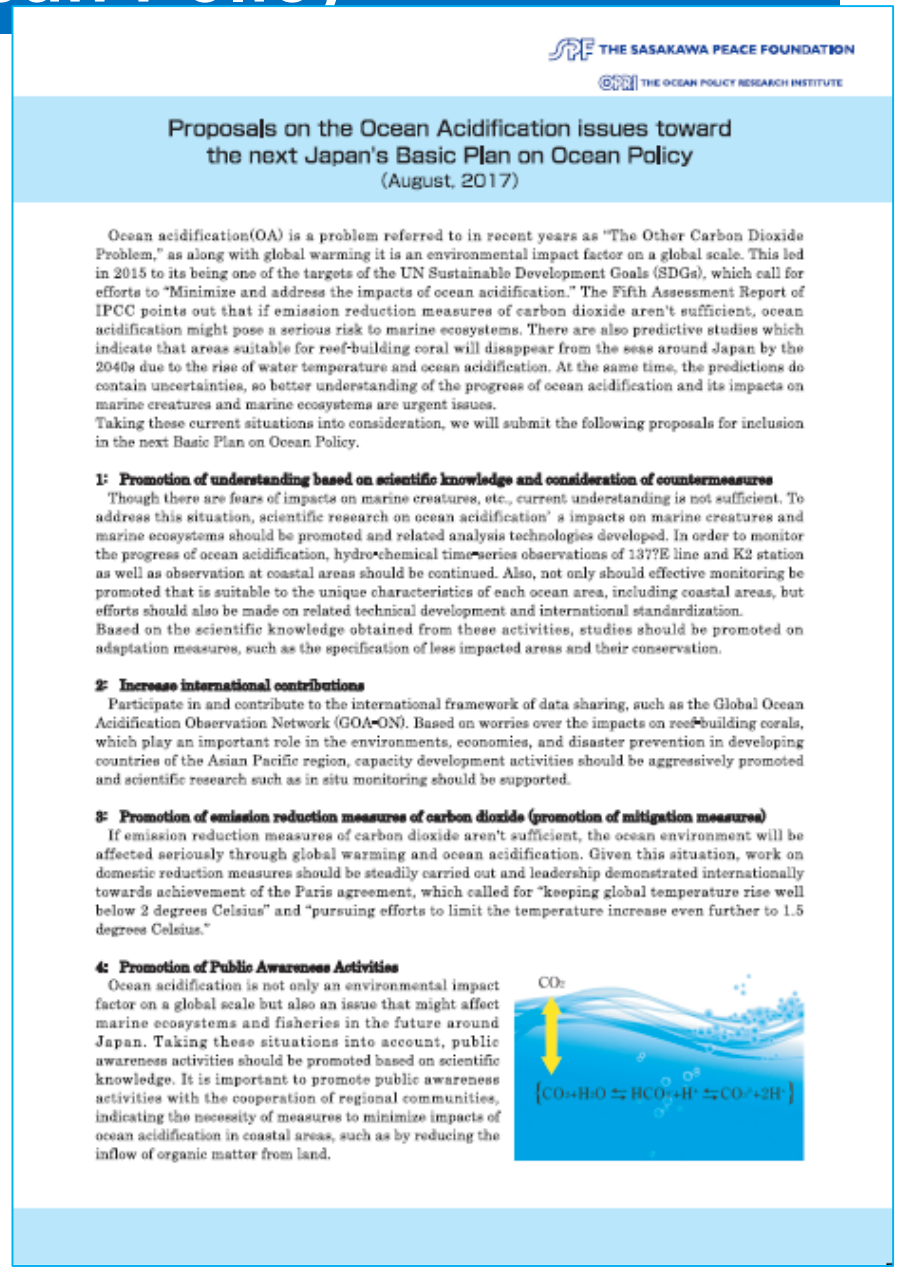
2015年に閣議決定された政府の「気候変動の影響への適応計画」でも海洋酸性化の課題を取り上げ、定量的な研究事例が限定されており不確実性があるという前提のもと、「緩和策については A2 シナリオ*では、造礁サンゴの生育に適する海域が水温上昇と海洋酸性化により2030年代までに半減し、2040年代までには消失する」と予測されていることなど、貝類の漁獲や造礁サンゴ等の沿岸生態系への影響について、影響の可能性や対策技術開発の必要性を記載しています。

図6：温暖化と酸性化による造礁サンゴへの環境影響に関する予測例（Yara et al.,2012）

参考：海洋酸性化の課題に係る普及啓発の取り組み：

国内民間による普及啓発の取り組み事例

“Fact Sheets(4 Pages)” were attached to the Proposal to enhance the understanding of the stakeholders.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Proposals on the Ocean Acidification issues toward the next Japan's Basic Plan on Ocean Policy
(August, 2017)

Ocean acidification(OA) is a problem referred to in recent years as "The Other Carbon Dioxide Problem," as along with global warming it is an environmental impact factor on a global scale. This led in 2015 to its being one of the targets of the UN Sustainable Development Goals (SDGs), which call for efforts to "Minimize and address the impacts of ocean acidification." The Fifth Assessment Report of IPCC points out that if emission reduction measures of carbon dioxide aren't sufficient, ocean acidification might pose a serious risk to marine ecosystems. There are also predictive studies which indicate that areas suitable for reef-building coral will disappear from the seas around Japan by the 2040s due to the rise of water temperature and ocean acidification. At the same time, the predictions do contain uncertainties, so better understanding of the progress of ocean acidification and its impacts on marine creatures and marine ecosystems are urgent issues.
Taking these current situations into consideration, we will submit the following proposals for inclusion in the next Basic Plan on Ocean Policy.

1: Promotion of understanding based on scientific knowledge and consideration of countermeasures

Though there are fears of impacts on marine creatures, etc., current understanding is not sufficient. To address this situation, scientific research on ocean acidification' s impacts on marine creatures and marine ecosystems should be promoted and related analysis technologies developed. In order to monitor the progress of ocean acidification, hydro-chemical time-series observations of 137?E line and K2 station as well as observation at coastal areas should be continued. Also, not only should effective monitoring be promoted that is suitable to the unique characteristics of each ocean area, including coastal areas, but efforts should also be made on related technical development and international standardization.
Based on the scientific knowledge obtained from these activities, studies should be promoted on adaptation measures, such as the specification of less impacted areas and their conservation.

2: Increase international contributions

Participate in and contribute to the international framework of data sharing, such as the Global Ocean Acidification Observation Network (GOA-ON). Based on worries over the impacts on reef-building corals, which play an important role in the environments, economies, and disaster prevention in developing countries of the Asian Pacific region, capacity development activities should be aggressively promoted and scientific research such as in situ monitoring should be supported.

3: Promotion of emission reduction measures of carbon dioxide (promotion of mitigation measures)

If emission reduction measures of carbon dioxide aren't sufficient, the ocean environment will be affected seriously through global warming and ocean acidification. Given this situation, work on domestic reduction measures should be steadily carried out and leadership demonstrated internationally towards achievement of the Paris agreement, which called for "keeping global temperature rise well below 2 degrees Celsius" and "pursuing efforts to limit the temperature increase even further to 1.5 degrees Celsius."

4: Promotion of Public Awareness Activities

Ocean acidification is not only an environmental impact factor on a global scale but also an issue that might affect marine ecosystems and fisheries in the future around Japan. Taking these situations into account, public awareness activities should be promoted based on scientific knowledge. It is important to promote public awareness activities with the cooperation of regional communities, indicating the necessity of measures to minimize impacts of ocean acidification in coastal areas, such as by reducing the inflow of organic matter from land.

Proposals toward Japan's Basic Plan on Ocean Policy

Cabinet decision adopting the latest Basic Plan on Ocean Policy was made on 15th May. It includes most items which we proposed.

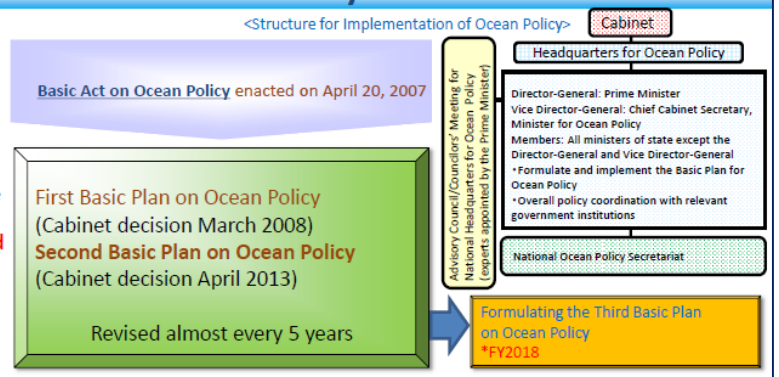
The Third Basic Plan on Ocean Policy (Provisional Translation)

The measures on the ocean around Japan are **promoted in a comprehensive and prudent manner based on the Basic Act on Ocean Policy and the Basic Plan on Ocean Policy.**
The Second Basic Plan on Ocean Policy was formulated in April 2013 and covered five years to April 2018.

* The Basic Act on Ocean Policy states, "the Government shall review the Basic Plan on Ocean Policy almost every five years, and shall make necessary changes."

In May 15, 2018, the Third Basic Plan on Ocean Policy was approved by the Meeting of the Headquarters for Ocean Policy, followed by Cabinet decision.

The main points of the Third Basic Plan are outlined below.



Third Basic Plan: Points

(1) Introduction: Evaluation and Current Situation Awareness
Recap of progress from the enactment of the Basic Act on Ocean Policy until today and current situation

(2) Chapter 1
General Remarks (philosophy for ocean policy, policy direction, basic policy for measures)
"The challenge toward a new oceanic state" is positioned as the policy direction for the Basic Plan on Ocean Policy to aim for the goal of the Basic Act on Ocean Policy, which is to realize a new oceanic state.
The following is a concise summary of the policy direction in point (1) above
(a) Toward open and stable seas. Protect the nation and its citizens.
(b) Use seas to make the nation prosper. Pass on abundant sea to posterity.
(c) Challenge unknown seas. Improve technology and enhance awareness of sea.
(d) Take the lead to realize peace. Create world standards for seas.
(e) Familiarize people with seas. Develop human resources with knowledge of ocean
(3) Based on a broad understanding of ocean policy from the perspective of maritime security, the plan clearly states that the whole government shall come together to promote Comprehensive Maritime Security, which cover not only the core maritime security measures, but also the ocean measures that could contribute to maritime security.

(4) Main measures other than "Comprehensive Maritime Security," based on the change of the situation in ocean:
(a) Use ocean more for the purpose of industries
(b) Maintain and protect the maritime environment
(c) Improve scientific knowledge
(d) Promote Arctic policy
(e) International collaboration and cooperation
(f) Develop human resources with knowledge of ocean and to advance citizens' understanding
This is the first time for the plan to state the policy for the Arctic as one of the main measures.

(3) Chapter 2: Detailed Exposition (Specific Measures)
(1) List for measures approx. 370 items
(2) To secure the effective implementation of the ocean measures, the plan clearly states the name of the implementing ministry or agency for each measure.
(3) Strengthening the capacity of Maritime Domain Awareness (MDA) is treated as an independent item in this Chapter.

(4) Chapter 3: Required Matters for Implementation
(1) The Headquarters for Ocean Policy will promote ocean policies by carrying out a control tower function for the government, together with the National Ocean Policy Secretariat.
(2) Describes the PDCA cycle and process management using indicators to gain a panoramic and quantitative understanding for the purpose of better understanding and evaluating the progress of each measure as well as securing the systematic and comprehensive implementation.

1

Photo; Meeting before a cabinet decision (Cabinet Office of Japan)

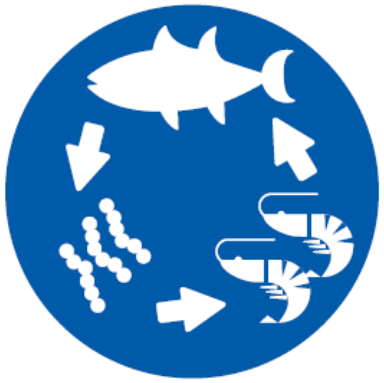
Main reason;
-Ocean Acidification which is referenced in **SDGs** is an important issue to tackle with.
- Paris Agreement

Points of the Third Basic Plan
http://www8.cao.go.jp/ocean/english/plan/pdf/plan03_gaiyou_e.pdf

Proposals toward Japan's Basic Plan on Ocean Policy

SDG14 : Conserve and sustainably use the oceans, seas and marine resources for sustainable development

14.1 Prevent and significantly reduce marine pollution



14.2 Sustainably manage and protect marine and coastal ecosystems

14.3 Minimize and address impacts of ocean acidification

14.4 End overfishing, IUU fishing, and destructive fishing practices

14.5 Conserve coastal and marine areas

14.6 End subsidies contributing to overcapacity, overfishing and IUU fishing

14.7 Increase economic benefits to SIDS and LDCs

14.a
Increase scientific knowledge, develop research capacities and transfer marine technology

14.b
Improve access of small-scale artisanal fishers to marine resources and markets

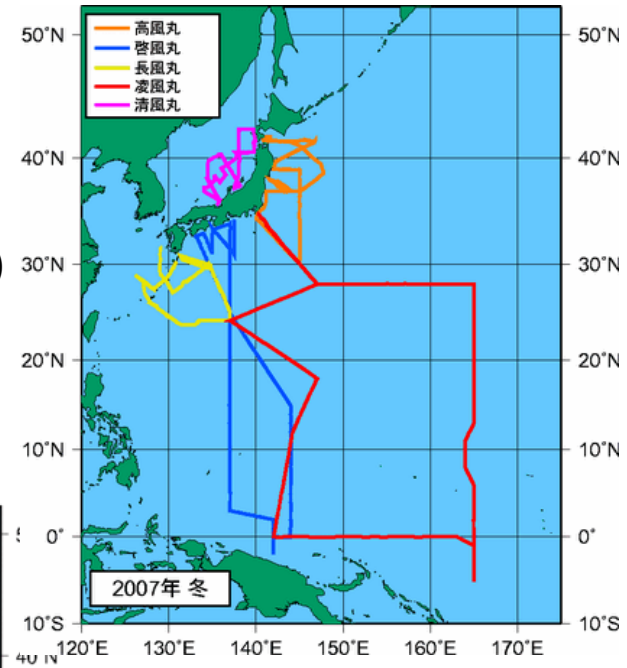
14.c
Enhance conservation and sustainable use of oceans and their resources by implementing international law

Proposals toward Japan's Basic Plan on Ocean Policy

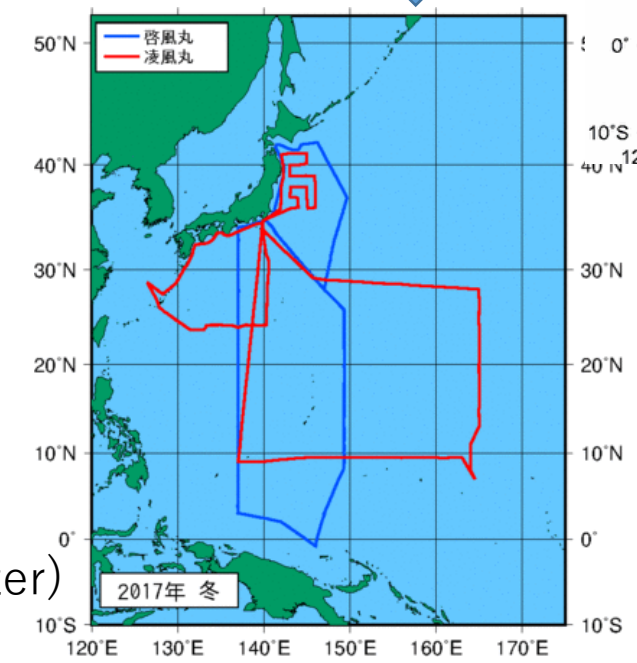
1: Promotion of understanding based on scientific knowledge and consideration of countermeasures

-**Scientific research** on ocean acidification's impacts on marine creatures and marine ecosystems should be promoted.
-In order to monitor the progress of ocean acidification, hydro-chemical **time-series observations** should be continued.
-Efforts should be made on related **technical development** and international standardization.
-Studies should be promoted on adaptation measures.

2007 (winter)



2017 (winter)



For example, JMA's Oceanographic Observations by Research Vessels significantly decreased for ten years. (https://www.jma.go.jp)

Proposals toward Japan's Basic Plan on Ocean Policy

Potential reasons for which our proposal was included

①：Inclusion of scientists in the decision making process.
→3 out of 9 members of Ocean Environment Project Team under the Councilors' Meeting of the Headquarters for Ocean Policy was related to our study.

②：Ocean Acidification is a issue which is cooperative with Oceanographic Observations by Research Vessels.
→Certain experts wanted to stop the decline of research vessels.

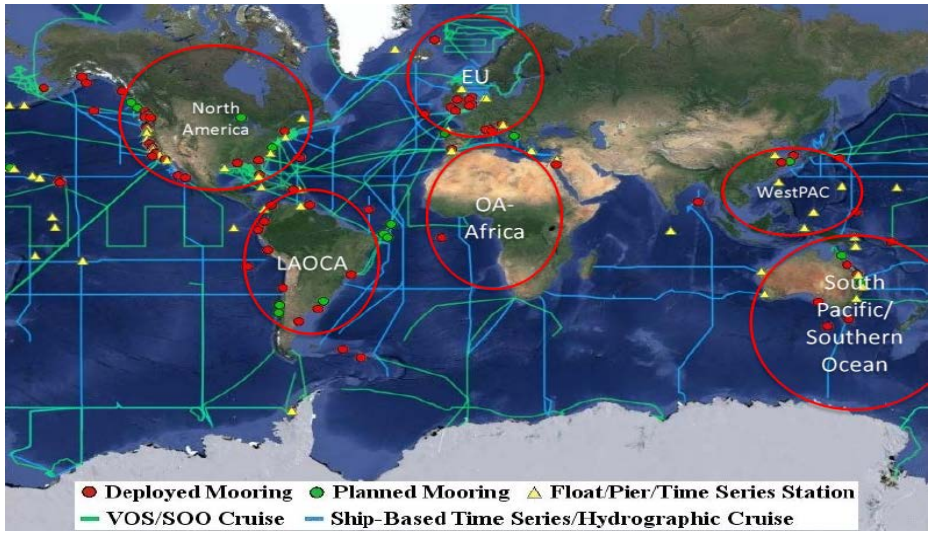
③：Inclusion of the future budget reduction utilizing the technological innovation
→Technological innovation is necessary for automatic monitoring of Ocean Acidification and it has possibilities of future new markets.

Proposals toward Japan's Basic Plan on Ocean Policy

2: Increase international contributions

-Participate in and contribute to the international framework of data sharing.
-Support to developing countries in the Asia Pacific region.

→Take initiatives to broaden “Rule of Law” and “Policies based on Scientific Knowledge” as universal principles in the field of ocean policy for the world
(Third Basic Plan on Ocean Policy, Chap.5 ”International collaboration and cooperation”)



Libby Jewett/ICP2018, 2018.5

3: Promote Mitigation Measures

-If emission reduction measures of carbon dioxide aren't sufficient, the ocean environment will be affected seriously through global warming and ocean acidification.

→Work on reduction measures towards achievement of the Paris agreement.
(Third Basic Plan on Ocean Policy, Chap.5 ”International collaboration and cooperation”)

Proposals toward Japan's next Basic Plan on Ocean Policy

4: Promotion of Public Awareness Activities

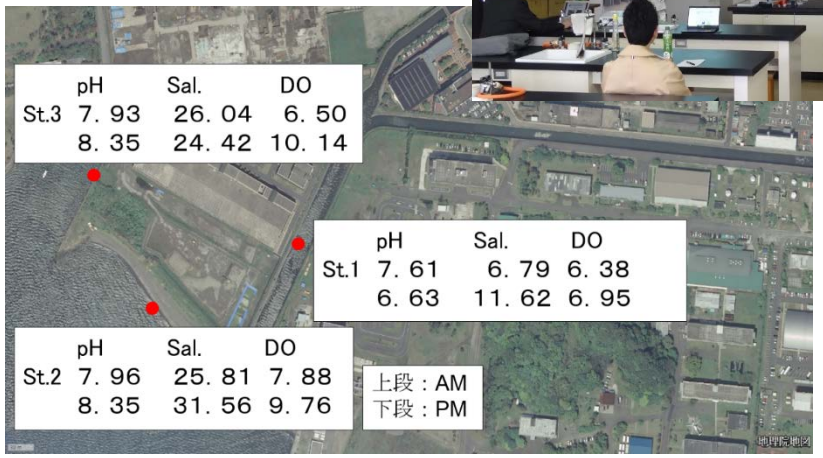
Lectures
(Oct. 2016)

Planning
(Mar. 2017)

As part of the efforts to raise public awareness on OA in Japan, OPRI-SPF has been coordinating guest lectures on the issue at Kanagawa Prefectural Marine Science High School since 2016. In August 2017, they started pH monitoring activities in areas near the school.

Monitoring (Aug. 2017–)

Mar. 2018



Reporting

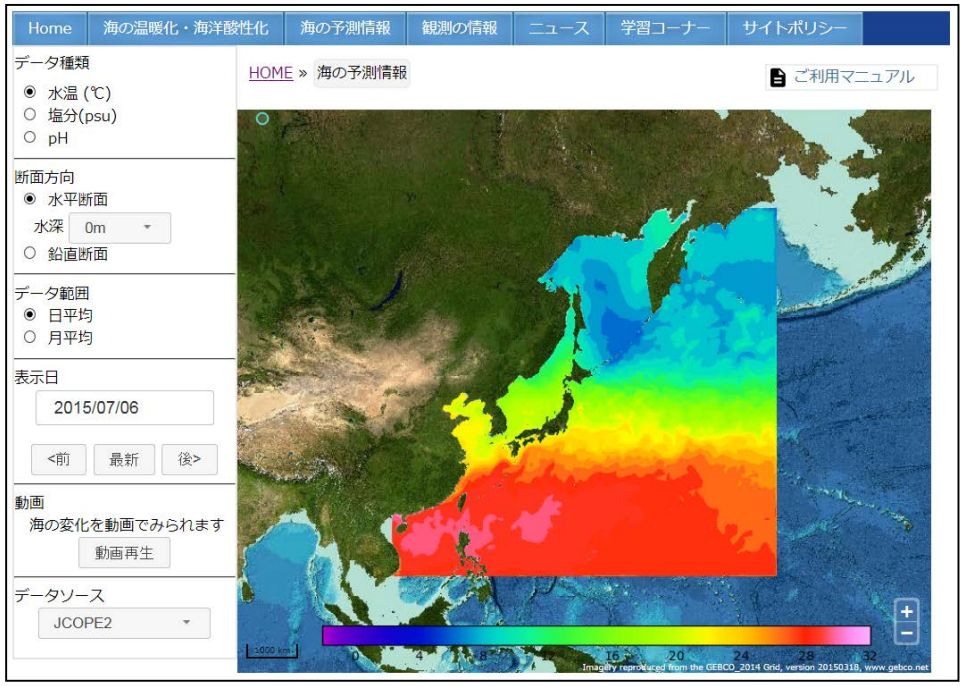
Proposals toward Japan's next Basic Plan on Ocean Policy

4: Promotion of Public Awareness Activities

We are also developing a website called “Marine Crisis Watch”, with the help of JAMSTEC.

Top page (Only Japanese)

Near real time forecast date



Marine Crisis Watch Since 2016

In order to address the issues of ocean warming and acidification, OPRI-SPF is developing the website “Marine Crisis Watch”.

Proposals toward Japan's next Basic Plan on Ocean Policy

4: Promotion of Public Awareness Activities

Sharing the information on Monitoring activities for general public

Marine Crisis Watch
Since 2016

In order to address the issues of ocean warming and acidification, OPRI-SPF is developing the website “Marine Crisis Watch”.

Proposals toward Japan's next Basic Plan on Ocean Policy

4: Promotion of Public Awareness Activities

News Article

Sharing videos on education content