# A brand-new Data Service Business Model

# based on the multi-use of Ocean Rader System

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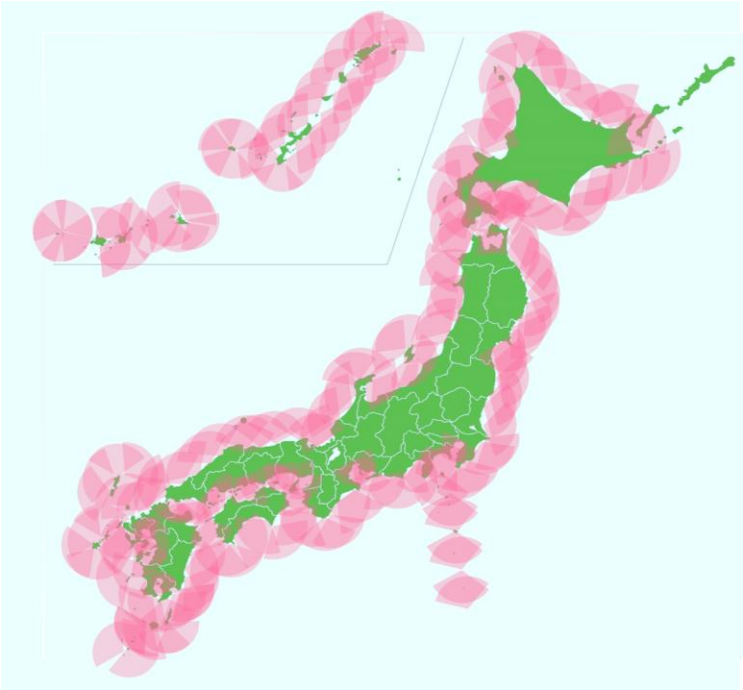
Chairman & CEO
ORNIS Corporation

# Background

- 200+ Ocean Radar facilities deployed through all the coastlines of the Japanese archipelago, which continuously monitor the sea surface currents and waves up to 100 km away from the costs, 24 hours a day and 365 days a year, will greatly contribute to the following.

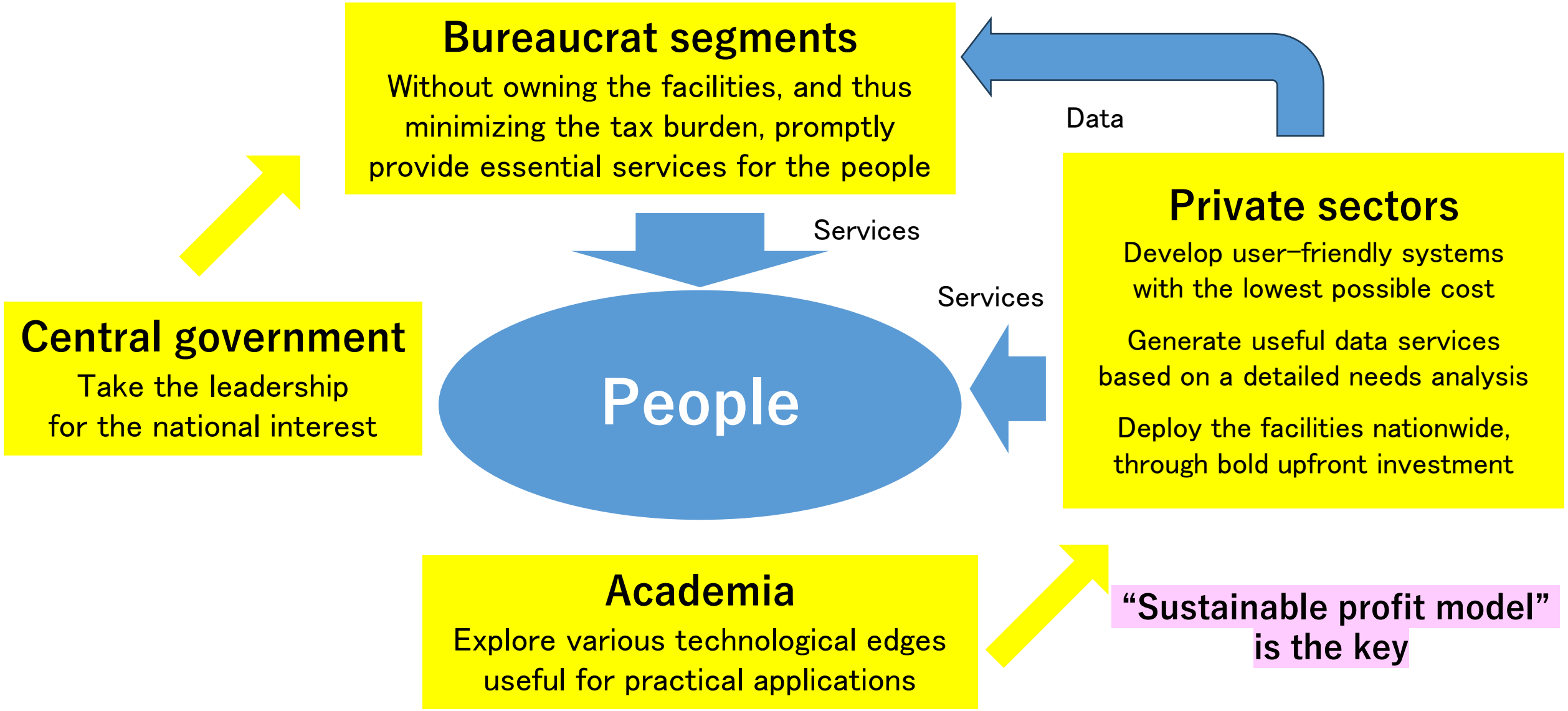
  - Assurance of maritime safety including rescue
  - Fisheries modernization
  - Tsunami countermeasures
  - Conservation of the marine environment
    (Collection of the floating objectives including oil spill)
  - Detection of suspicious ships and other artificial objectives.



- However, it has not been possible to make effective use of the technologies until now, because the benefits are so diverse, while the traditional vertically divided administrative organizations could not handle it.

- ORNIS was established to solve this problem and create the situation that the entire nation could enjoy the various benefits of the technologies at the minimum cost.

# Statesmen, Bureaucrats, Business executives and Academia should work together for the sake of the people.



# Business model

**Supporters**

- Universities Research Labs
- Manufacturers
- Information providers
- Municipal governments
- Local Business people

## ORNIS

### R&D
- Integration of existing research
- Filling up undeveloped fields
- product/service development
- Prediction technologies

### DaaS Sales
- Integration with the other services
- Approach to Public/Private sectors
- Monthly subscription/billing
- Reception by a vessel in transit

### Construction/Operation
- Site survey and construction
- Unmanned site operations
- Centralized Cloud Service
- Low-cost maintenance

**Clients**

### Japan Coast Guard
Coast guard activities including
- Detection of suspicious vessels
- Prevention of maritime accidents and rescue
- Environmental protection
  (the collection of floating objectives including oil spill)

### Ministry of Land, Infrastructure and Transport
### Japan Meteorological Agency
**Local governments**

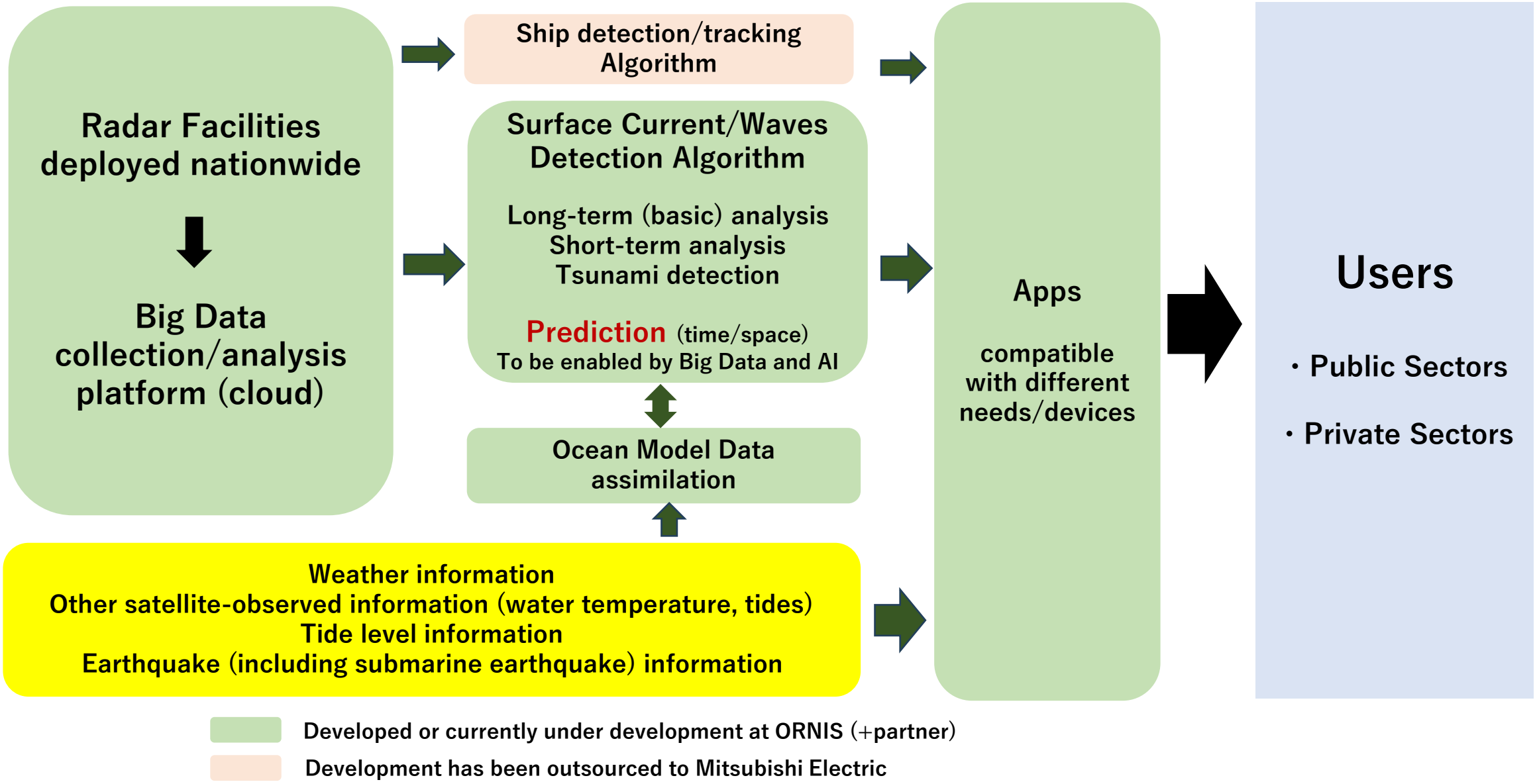
Protect people from **TSAUNAMI** and other disasters caused by the high tides

**Fisheries Agencies of Central/Local Governments**

### Fisheries industry
- Finding the best place to fish
- Decision to, or not to, sail out and/or place fishing nets
- Prediction of sudden rapid tides
- Management of Aquaculture

Electric power companies, Shipping companies,
Tourism/Marine Leisure service companies
Offshore windmill power generation companies, etc.

# Data flows


Radar Facilities deployed nationwide
Big Data collection/analysis platform (cloud)
Ship detection/tracking Algorithm
Surface Current/Waves Detection Algorithm
Long-term (basic) analysis
Short-term analysis
Tsunami detection
Prediction (time/space)
To be enabled by Big Data and AI
Ocean Model Data assimilation
Weather information
Other satellite-observed information (water temperature, tides)
Tide level information
Earthquake (including submarine earthquake) information
Apps
compatible with different needs/devices
Users
・Public Sectors
・Private Sectors
Developed or currently under development at ORNIS (+partner)
Development has been outsourced to Mitsubishi Electric

# Management Team

At present, there are four directors listed below. All of them also serve as executive officers and are responsible for all of the company's operations.

| | | | |
|---|---|---|---|
|  | Tetsuzo Matsumoto | Chairman CEO | Former Executive Vice President and CSO of SoftBank Mobile<br>Former SVP of Qualcomm (Chairman/President of Japan Corporation)<br>Former GM of Telecommunications Division of ITOCHU Corporation |
|  | Dr. Satoshi Fujii | Vice Chairman CTO | Ph.D. (Engineering), HF radar research is his lifework.<br>Honorable Professor at the University of the Ryukyus and NICT. |
|  | Mitsuo Makino | President COO | During his time at the Development Bank of Japan and Mayor of Iida City (4 terms, 16 years), he launched various projects that could become national models. |
|  | Kazuo Nakamura | EVP & CFO | Served as CFO at multiple multinational companies including AOL Japan and OCC<br>Former U.S. certified public accountant with experience at an auditing firm (currently PwC) |

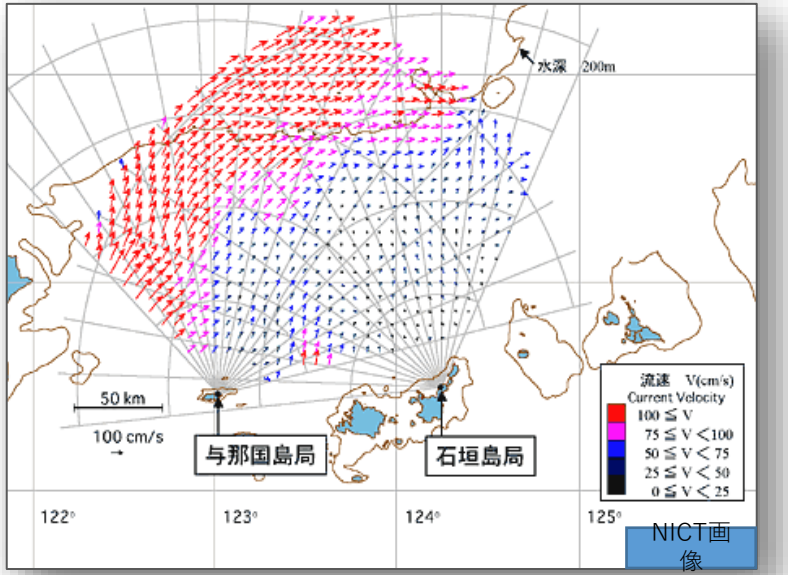
The Company has established a “Technical Advisory Council”. The members are;

Professor Hirofumi Hinata, Graduate School of Science and Engineering, Ehime University;
Professor Yoshihiro Okumura, Faculty of Social Safety, Kansai University;
Associate Professor Tsutomu Tokeshi, Faculty of Marine Bioresources, University of Fukui Prefecture University;
Associate Professor Tomoya Kataoka, Graduate School of Science and Engineering, Ehime University;
Associate Professor Yasunori Nagana, Semiconductor and Digital Research and Education, Kumamoto University..

All of them are senior researchers at the universities with which ORNIS have joint research agreements.

# Radar system, itself, is a well-known technology.
# But a lot of Data Analysis Algorism should be developed to serve the Users.

- Ocean Radar Systems, built on the coastline through the entire Japanese archipelago, dispatch a shortwave (13.5/24.5 MHz) radio to the ocean and receive its very minute echo carrying the Bragg-scattered Radio wave reflecting the Doppler effect caused by the moving water on the surface of the sea.
- By analyzing it, the speed of the surface current and the height of the wave can be detected. Vector Fusion calculation of the multiple different echoes created by multiple Radar Systems can detect the direction of the current.
- While the recent software radio technologies enabled a significant cost down of the system, the brand-new AI-based estimation technologies supported by the Big Data obtained from large-scale facility deployments are expected to increase the accuracy of the measurement and estimation.
- 10+ POCs have been successfully conducted over the past 10+ years, and a lot of academic papers have been published.



# Comparison of performance of each information acquisition system

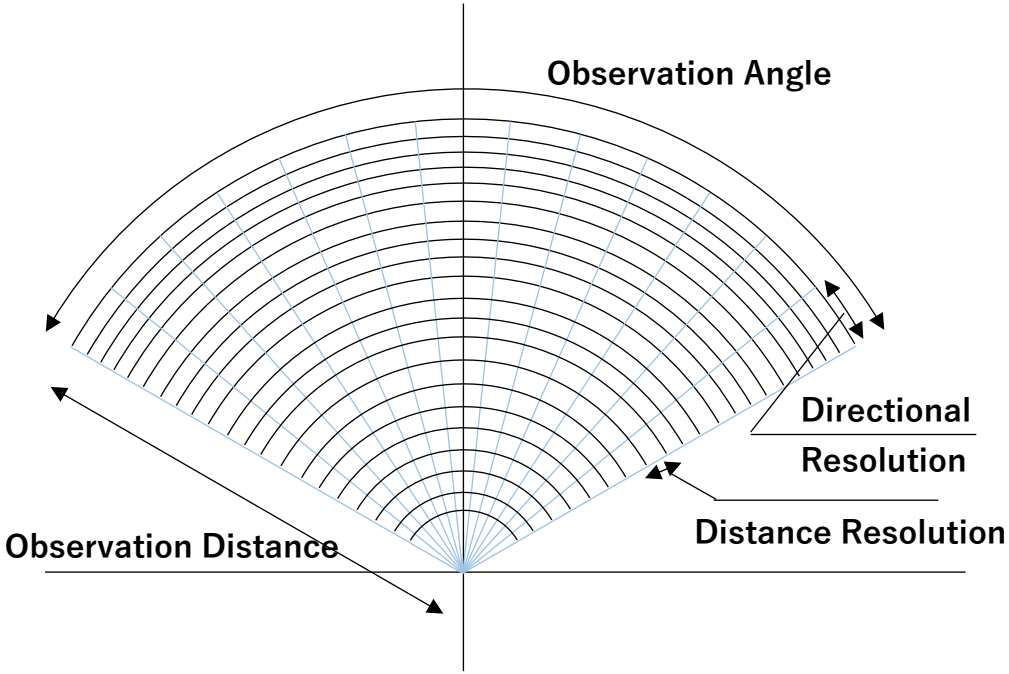
| Comparison items | | Marine radar | | Satellite (SAR) | | Aircraft and other flying objects | | Ship | | Offshore buoy | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Observation method | | — | Detects sea conditions, ships from radar reflected waves | — | Detecting ships, etc. from microwave reflection data | — | Visually<br>By camera<br>By sensor<br>By radar | — | Visually<br>By camera<br>By sensor<br>By radar | — | Observing ocean conditions with sensors |
| Real time | | ○ | 20 minutes (sea conditions)<br>10 minutes (object) | △ | After purchasing satellite images | ○ | Possible | ○ | Possible | ○ | Possible |
| Continuity | | ○ | Possible | △ | Regression interval *1 | △ | Only when flying | △ | Only during patrol | ○ | Possible |
| Range | | ○ | 100km (current direction)<br>50km (wave height)<br>45km (object) | ◎ | All of Japan *5 | ◎ | Approximately 120km (Note *4) (to the horizon) | △ | Approximately 15km (Note *3) (to the horizon) | △ | Surrounding several meters |
| Subject | Ocean current | ◎ | Quantitative | ○ | Kuroshio current | ○ | Qualitative | ○ | Qualitative | ○ | Only if a large number of drifting buoys are thrown away |
| | Waves | ◎ | Quantitative | — | | ○ | Qualitative | ○ | Qualitative | ◎ | |
| | Object | ◎ | Quantitative | — | | ○ | Qualitative | ○ | Qualitative | — | |
| | Water temperature | — | | ○ | | — | | ○ | | ◎ | |
| Weather conditions | | ◎ | No constraints | ◎ | No constraints | △ | Affected by clouds, dense fog, and heavy rain | △ | Affected by dense fog and heavy rain | △ | No constraints |

Notes *1; 14 days for ALOS4 (Daichi 4)　*2: When the antenna is installed at a height of 50m　*3: When the monitoring height is 15m　*4: When the flight altitude is 1000m　*5：In case of ALOS4, 100～200km

# Capability of the Radar System

Following figures are present expectation. Actual figures will eventually be known.

| | Capability | |
|---|---|---|
| Observation Distance | <100 km（current speed）<br><70 km（current direction）※1<br><50 km（wave height） | In case of 13.5MHz<br>※1：Multiple radar site is necessary. |
| Distance of Objective Detection | <45 km（objective size >100 F）<br><30 km（objective size> 25 F） | In case of 13.5MHz |
| Observation Cycle | >20 minutes（ocean phenomenon）<br>>10 minutes（vessels） | |
| Observation Angle | <120deg | |
| Distance Resolution | >3 km | In case of 13.5MHz |
| Directional Resolution | >7.5 deg（ocean phenomenon）<br>>10 deg（vessels） | |
| Speed Resolution | > 5 cm/s（current speed）<br>> 10 cm/s（vessels）※2 | ※2：If the speed is different, they are recognized as different objectives. |
| Number of objectives detected simultaneously | <20/site | |
| Number of objectives Chased simultaneously | <20/site | |
| Objective chasing through multiple sites | Yes | |



# Ocean Radar System helps the tasks of Japan Coast Guard

- **Maritime Rescue**
  - **Ocean Radar could have saved many lives of the victims of the marine accident in Shiretoko.**
- **Recovery of Flotsam including Heavy Oil Spill**
  - **Ocean Radar could have made a lot of contribution to the recent oil tanker accidents near Manila Bay.**
- **Detection and chasing of suspicious vessels not transmitting AIS signal.**
  - **Japan Coast Guard would be able to significantly increase the efficiency of the Sea Guardian Operations.**

1. 

2. 

3. 

出典：
1. 海上保安庁ホームページ https://www.kaiho.mlit.go.jp/mission/higashinihon/hyouryuu.html
2. 海上保安庁ホームページ https://www.kaiho.mlit.go.jp/info/topics/post-864.html
3. PR TIMES https://prtimes.jp/main/html/rd/p/000000009.000032724.html

# Ocean Radar can detect Tsunami and help people's countermeasures

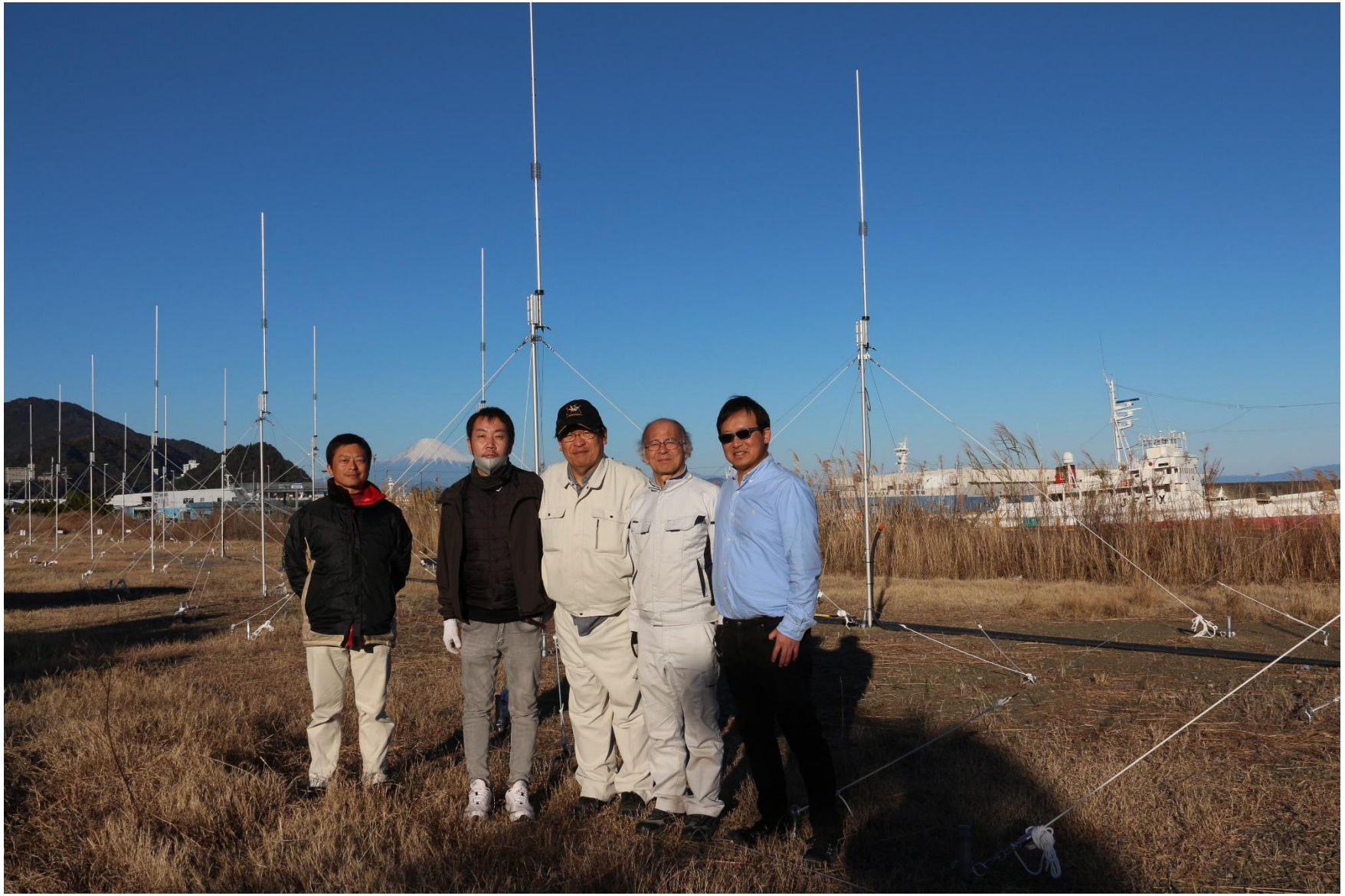
- **The traditional warning system has been counting on the assumptions based on the earthquake information.**
- **In the case of the Tsunami, which attacked north-east cost of Japan in March 2011, a signal received from a nearby ocean buoy helped. But it was only by luck. Wide-area deployment of such ocean buoys is not planned by anybody due to its very high cost.**
- **Recently, NIED** (National Research Institute for Earth Science and Disaster Resilience) **deployed the Submarine Earthquake and Water Pressure Detection System called "S-Net", "DONET" and "N-Net" in the pacific ocean side of Japan, and significantly enhanced the capability of early warning of Tsunami. But it cannot be deemed as sufficient by itself. Also, a lot of areas cannot be covered with such an expensive system.**

- **As Tsunami makes unpredictable changes when it approaches the land, it's important to observe it directly from the cost. Ocean Radar is only the tool to play such a roll.**
- **People will not react to any warning appropriately, unless they are psychologically urged. Ocean Radar System can make some contribution in this area.**
- **It's important to know exactly when the crisis is over, to enable rescue and recovery activities effectively. Ocean Radar System is only the tool to make it possible.**

# Ocean Radar will make a significant contribution for the modernization of Fishery Industry

- To do the offshore fishing smartly, it is extremely important to know not only the weather and water temperature but also the situation of the tide and wave remotely.
- It would save a lot of time and money (and even the lives of people), if fishermen could know the offshore situation of tide and wave accurately before sailing out. Ocean Radar systems can make it possible.
- Sudden Rapid Tide often causes a big loss destroying the nets and other fishery tools. Ocean Radar system can give a timely alert to prevent such disasters.
- Aquaculture Fishing is a big hope for the fishery industry globally. Observation and prediction of the tide enabled by Ocean Radar system will make a significant contribution to finding a good place and operating it smartly.

# 200+ Radar Facilities shall eventually be constructed through the entire Japanese coast



A new company, ORNIS Inc., was founded in September 2022.

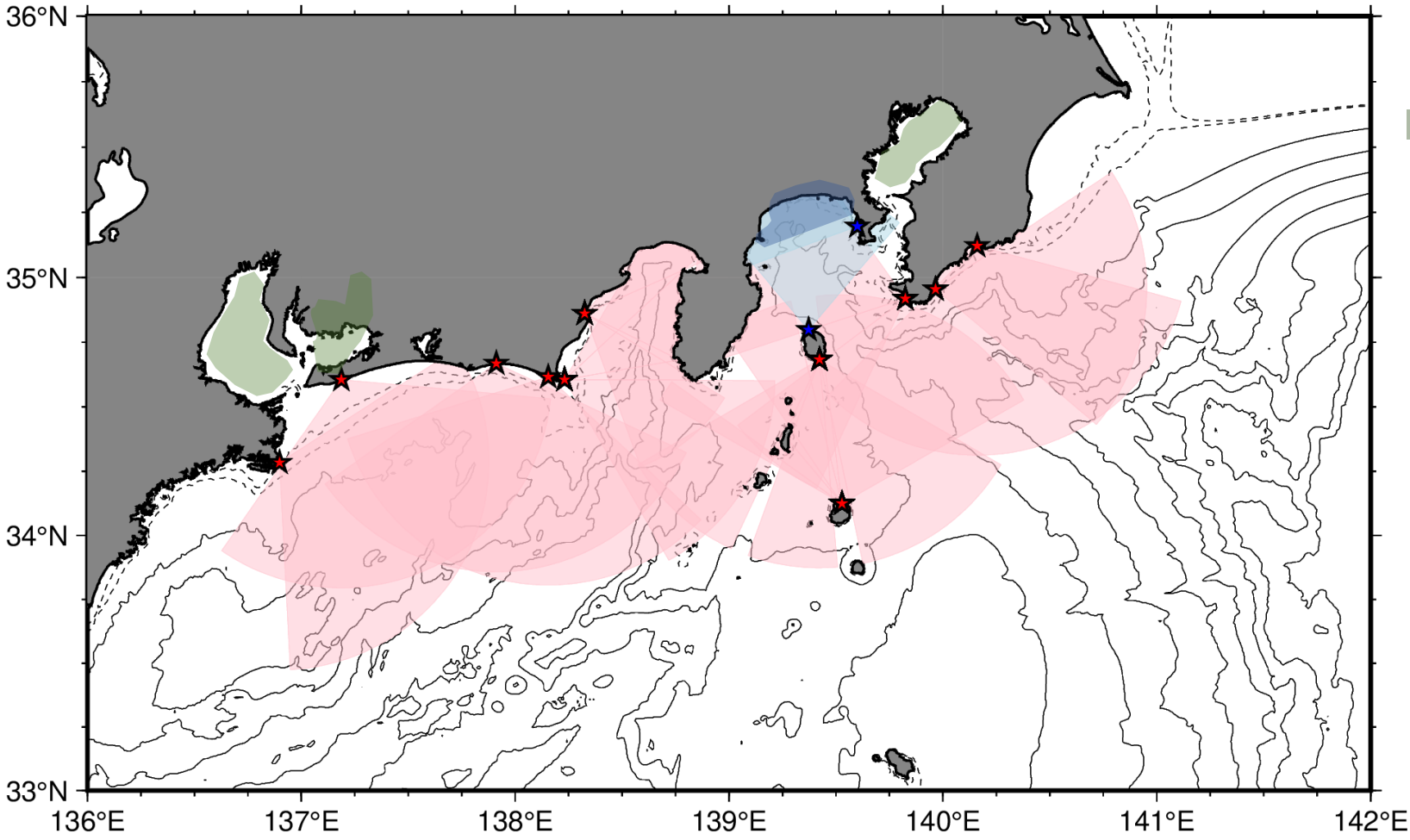
The company raised Yen 92 million in November 2022, and Yen 308 million in June 2024

The company constructed its first Radar facility in Yaizu city, Shizuoka, in July 2024, and started the test operation to cover the entire Suruga bay and Enshunada areas in September 2024 (with 4 Radar facilities).

The company is planning to complete the construction of the 200+ facilities throughout Japan in 3.5 years.

As every Radar facility should have many poles containing many array antenna elements, it requires the land as big as 10m x 100m (in case of 13.5MHz radio) or 10m x 60m (in case of 24.5 MHz). However, it would not be too difficult to find the palace, as good cooperation of the local governments can be expected everywhere.

# The area to be covered by ORNIS Service in early 2025




The areas, where Ministry of land, Infrastructure and Transport and Japan Coast Guard have already their own facilities and provide some services.

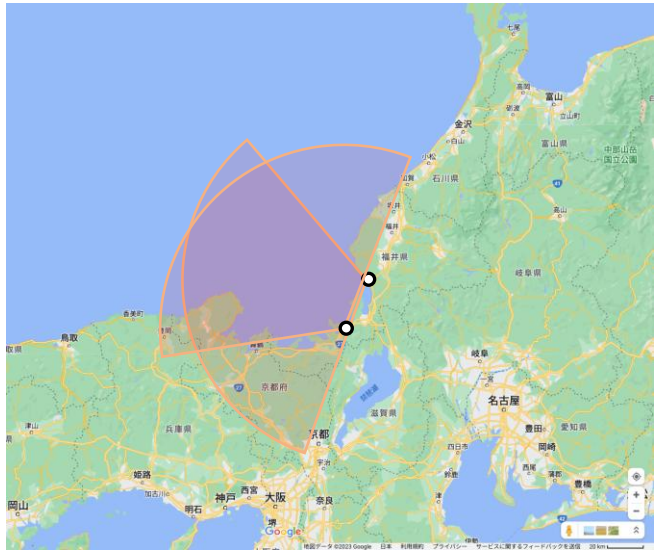
# Priority shall be given to the areas where Nuclear Power Plants exist

- **In 2025 and thereafter, ORNIS plans to construct 4-6 Radar sites every month. The priority of the location shall be decided basically according to the strength of the requirement of users, but the areas where Nuclear Power Plants exist shall be given priority.**

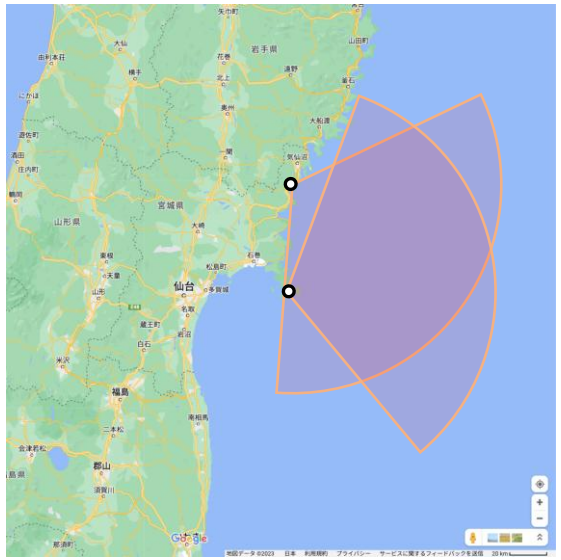
Chubu Denryoku's Hamaoka Power Plant

Kansai Denryoku's Ooi Power Plant

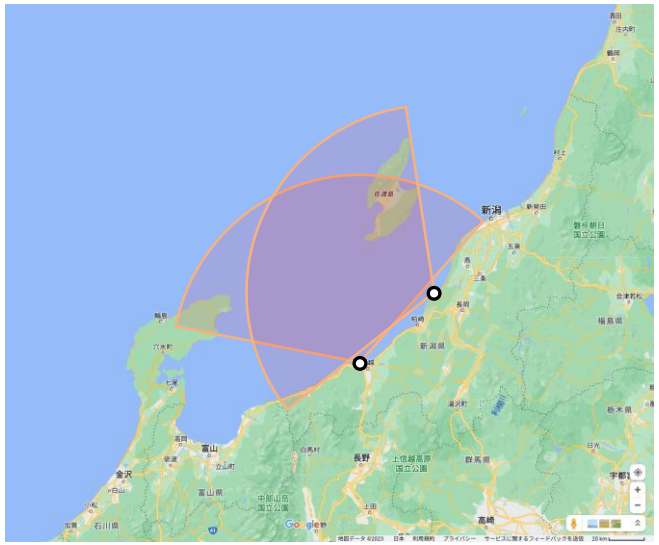
Wakasa Bay
(Fukui)



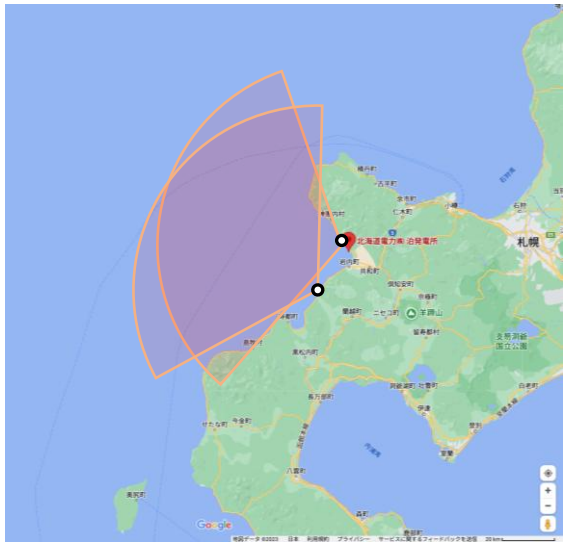

Onagawa
(Miyagi)



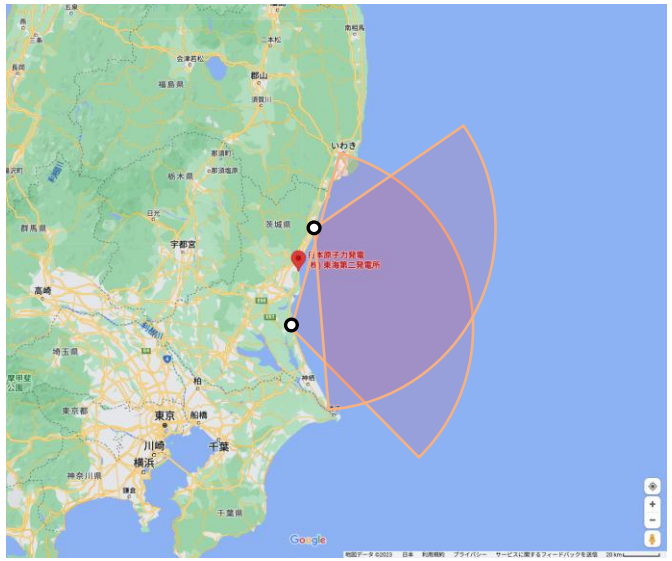

Kashiwazaki
(Niigfata)



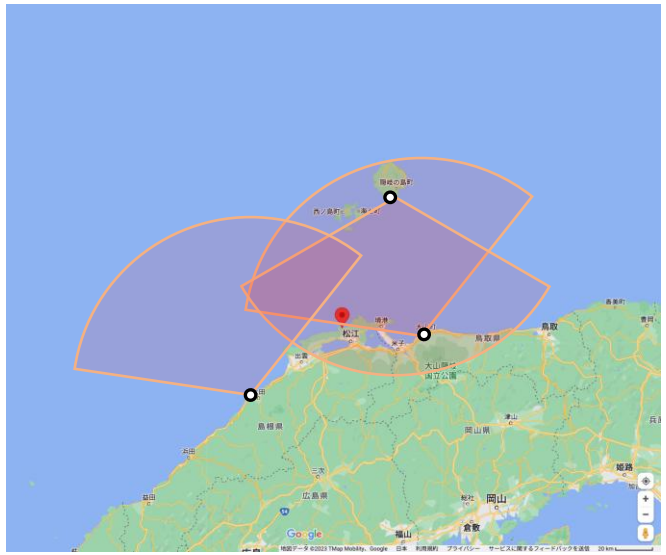

Tomari
(Hokkaido)



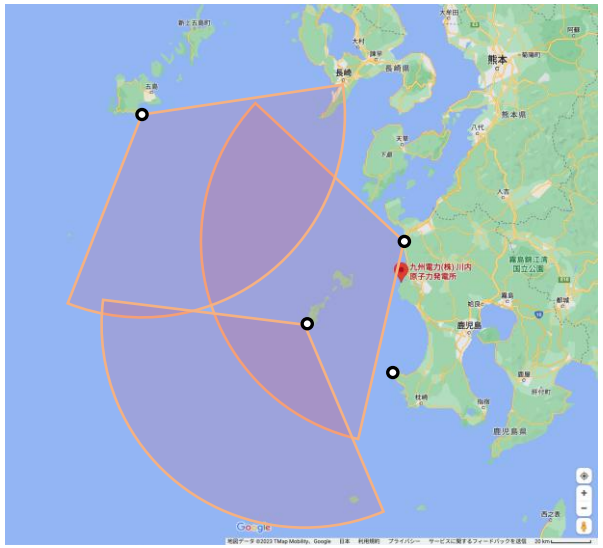
Tokai (Ibaraki)



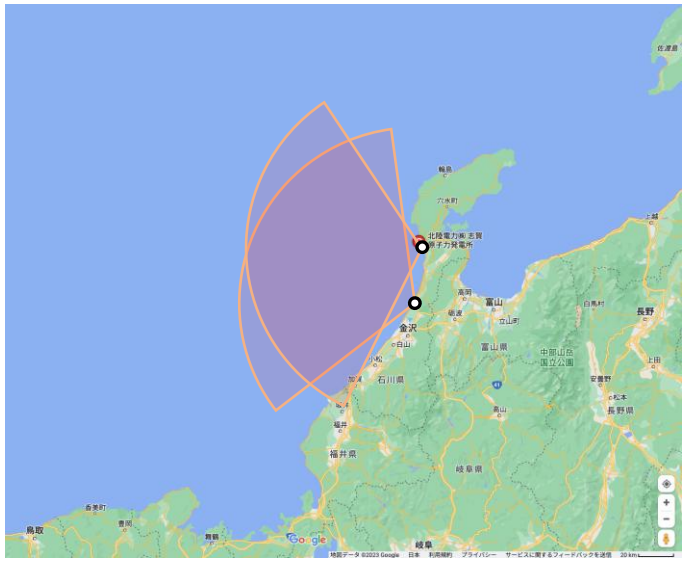
Shimane（Shimane）



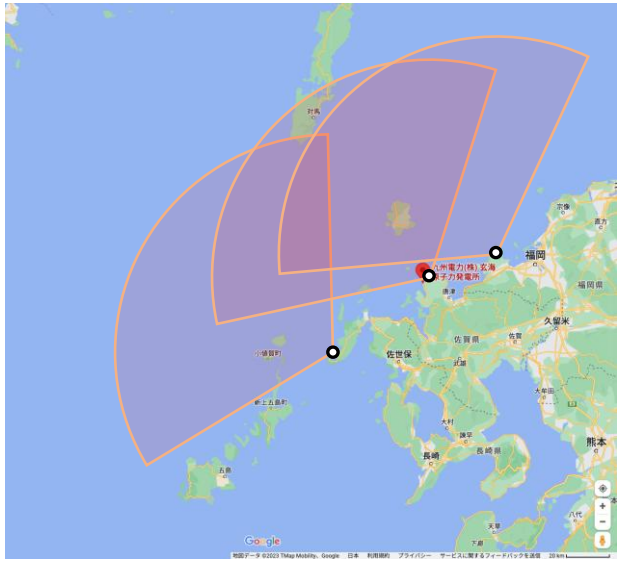
Sendai（Kagoshima）



Shiga
(Ishikawa)



Genkai
(Fukuoka)



# ORNIS will expand its activities to the overseas countries

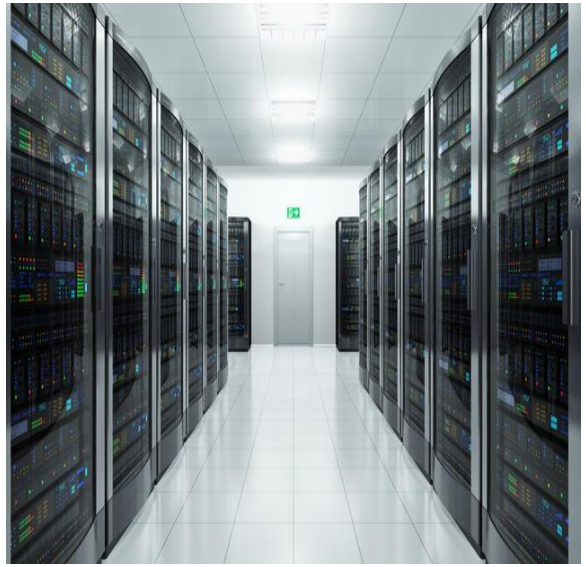
- ORNIS is the world's first private sector company to use the Ocean Radar technologies for multi-purpose.
- As the needs exist universally through the world, and there is no reason that only the people in one area of the world can enjoy that benefit, ORNIS is determined to expand its activities throughout the world.
- ASEAN countries, especially, the Philippines, Vietnam and Indonesia, are the initial targets. India, Bangladesh, Thailand and Malaysia shall follow.
- All those countries are concerned about the coast guard related issues, as well as the countermeasures against Tsunami.
- Fishery industry in many of these countries are far bigger than Japan and it is rapidly expanding. All of them are eager to modernize the industry as quickly as possible.
- ORNIS wishes to find a good partner in each countriy, and once such a partner is found, is willing to give them all the technologies and business know-how.

| Annual catch of the fishes (2021 unit: million tons) | | | | | |
|---|---|---|---|---|---|
| Rank | Country name | amount | Rank | Country name | amount |
| 1 | China | 86 | 11 | Japan | 4 |
| 2 | Indonesia | 22 | 12 | Chile | 4 |
| 3 | India | 14 | 13 | South Korea | 4 |
| 4 | Vietnam | 8 | 14 | Myanmar | 3 |
| 5 | Peru | 7 | 15 | Thailand | 2 |
| 6 | Russia | 5 | 16 | Egypt | 2 |
| 7 | USA | 5 | 17 | Mexico | 2 |
| 8 | Bangladesh | 5 | 18 | Ecuador | 2 |
| 9 | Norway | 4 | 19 | Malaysia | 2 |
| 10 | Philippines | 4 | 20 | Morocco | 1 |

# The future of ORNIS and its global partners is guaranteed. (1)

- The world started understanding the enormous value of ”Data”. Everything can be done more efficiently if they have useful data in advance.

  - Thus, “DaaS” business model is growing everywhere.
  - Data is stored in the Cloud, in a user–friendly format, and subscribers can get it at any time in any place.



- The public sector will count more on the initiative of the private sector.
  - Difficulty in securing the necessary human resources would be one of the important factors.

# The future of ORNIS and its global partners is guaranteed (2)

- The value of ORNIS exists in the Marriage of Facilities and Algorithms.
  - Scientists and engineers through the world will continuously challenge the development of new algorithms which will improve the accuracy of the measurement and analysis of the on-going phenomena and enable reliable future prediction based on them.
  - To do this, however, they need the facilities continuously providing a Big Data to play with and enabling the proofing of any hypothesis they made.
  - Accordingly, all these scientists and engineers will wish to work together with ORNIS, as they are only the company owning such facilities.
- The software development work can be done globally by the people closely united by joint-development and/or licensing agreements across the boarders.