

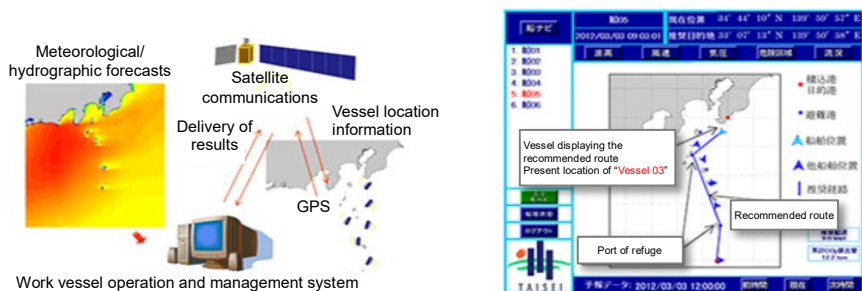
Support system for the operation and management of work vessels for which meteorological and hydrographic conditions are taken into account



Period: From 2018
 Organization: Taisei Corporation

Taisei Corporation has developed an operation and management support system for vessels working on marine construction projects. This system functions by aggregating meteorological and hydrographic forecasts and performance and positional information for each vessel and then providing optimal navigational routes to each vessel.

The provision of detailed information to help set navigational routes, determine whether a vessel should be operated in stormy weather, and decide on ports of refuge – matters conventionally subject to experience-based decisions made by captains – in accordance with the situation affecting each vessel and taking into account meteorological and hydrographic spatial-temporal information, the location of the vessel, and the state of port congestion in each case, has made it possible to support a captain's ability to made situational decisions, improve the efficiency of vessel operations, and ensure safety. Enabling the state of operations and making the expected dates on which cargo will be loaded and unloaded ascertainable for all applicable vessels also helps improve productivity through the streamlining of work processes.



Outline of support system

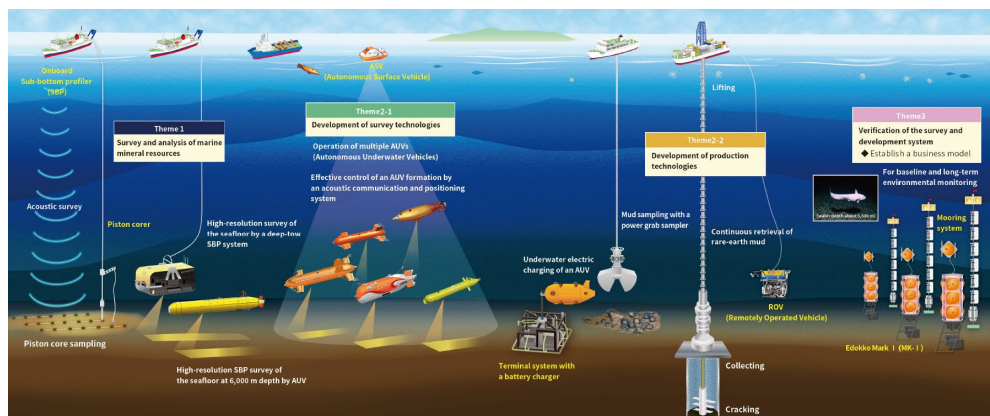
Example of navigation display screen (suggested route is displayed)

Source: Development of T-I Operation Vessel Navigation, a system for supporting the operation and management of work vessels for which meteorological and hydrographic conditions are taken into account (Taisei Corporation, https://www.taisei.co.jp/about_us/wm/2018/180720_4396.html)

Column

SIP Developing Innovative Technologies for Exploration of Deep Sea Resources

The Strategic Innovation Promotion Program (SIP) for Developing Innovative Technologies for Exploration of Deep Sea Resources is an ambitious national project spearheaded by the Cabinet Office to meet challenging development goals in terms of everything from basic research to industrialization in a manner that transcends the limitations of any given ministry or agency over a five-year period beginning in fiscal year 2018. Based on the results of the first phase of this program, which begun in fiscal year 2014, the aim is to progressively establish and demonstrate survey and production technologies related to rare earth sediment and other mineral resources and pave the way for formulating a business model toward the future.



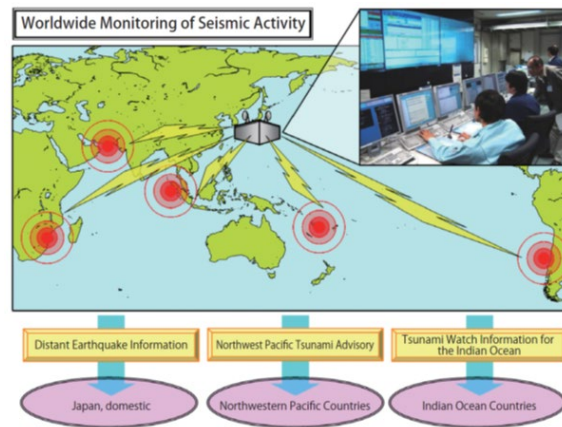
Outline of the SIP Developing Innovative Technologies for Exploration of Deep Sea Resources
 (Source: <https://www.jamstec.go.jp/sip2/e/>)

Northwest Pacific Tsunami Information Center



Period: From 2005
 Organization: Japan Meteorological Agency

A giant earthquake that struck Chile in 1960 triggered tsunamis that spread across the Pacific Ocean and caused mass amounts of casualties in faraway Hawaii and Japan. In response to the lack of any exchange or sharing among countries of information that could have been used to predict and warn of the approach of a tsunami at the time, the development of a monitoring system was pursued under the direction of the Intergovernmental Oceanographic Commission (IOC) of UNESCO beginning in the mid-1960s. The Japan Meteorological Agency has contributed to international efforts to monitor tsunamis through the operations of the Northwest Pacific Tsunami Information Center.



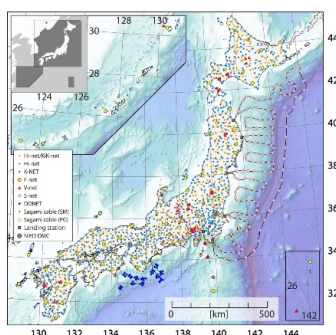
Worldwide Monitoring of Seismic Activity
 Source: Japan Meteorological Agency

Monitoring of Waves on Land and Seafloor (MOWLAS)



Period: From 2017
 Organization: National Research Institute for Earth Science and Disaster Resilience (NIED)

The National Research Institute for Earth Science and Disaster Resilience amalgamated a land-based seismic observation network established in the wake of the Great Hanshin-Awaji Earthquake Disaster of 1995 and a sea-based observation network established after the Great East Japan Earthquake of 2011 to create a network known as the MOWLAS (Monitoring of Waves on Land and Seafloor) network, whose operations were launched in November 2017. The high-quality data obtained from this large-scale and dense observation network contribute significantly to the creation of academic research results that collectively serve as an excellent research base; are used for the monitoring of seismic activity, long-term evaluation of earthquake occurrences, and prompt issuance of emergency earthquake reports and tsunami warnings by the Japan Meteorological Agency; and are being used to demonstrably benefit society, such as through links with private-sector operators to make sure that bullet trains are properly controlled in a disaster. MOWLAS observational data and dramatic advancements in real-time data processing technology in recent years are making it possible to directly mitigate ongoing earthquake disasters.



Distribution of observation points for the MOWLAS (Monitoring of Waves on Land and Seafloor) network

The network comprises over 2100 observation points.

Source: Aoi S. et al., MOWLAS: NIED observation network for earthquake, tsunami and volcano. Earth, Planets and Space, 72, 126 (2020)

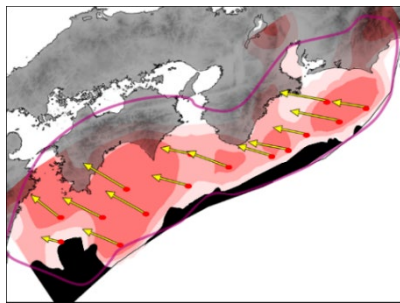
Reference: Network Center for Earthquake, Tsunami, and Volcano, NIED (<https://www.mowlas.bosai.go.jp/>)

Seafloor geodetic observation to elucidate the mechanism of megathrust earthquakes

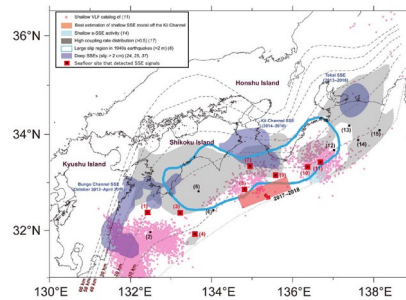


Period: From 2000
Organizations: Japan Coast Guard, University of Tokyo

Seafloor geodetic observation by combining the Global Navigation Satellite System (GNSS) and underwater acoustic ranging technology enables the measurement of precise movements at seafloor benchmarks installed along the Japan Trench and the Nankai Trough. This will contribute to the elucidation of the mechanism of megathrust earthquakes that repeatedly occur along tectonic plate boundaries near Japan.



Interplate coupling model along the Nankai Trough¹⁾



Detection of a slow-slip event in the south of the Kii Channel²⁾

Sources: 1) Yokota Y. et al., Seafloor geodetic constraints on interplate coupling of the Nankai Trough megathrust zone. *Nature*, 534, 374-377 (2016) doi:10.1038/nature17632
2) Yokota Y. and Ishikawa T., Shallow slow slip events along the Nankai Trough detected by GNSS-A. *Science Advances*, 6, 3 (2020) doi:10.1126/sciadv.aay5786

Realizing a safe ocean through research and development on seismic and volcanic activities in ocean areas



Period: From 2020
Organization: Japan Agency for Marine-Earth Science and Technology (JAMSTEC)

In preparation for the next imminent giant Great Nankai Trough Earthquake, JAMSTEC is contributing towards disaster-prevention and mitigation by enhancing predictions of crustal movements, and providing research results and data including those improving long-term evaluations of earthquakes to national government, etc. In order to obtain necessary observational and crustal structure data for estimation of interplate coupling and its time sequence, following research and development will be carried out:

- Deployment of ocean-bottom observation equipment to enable accurate and real-time observation of crustal movement in many areas.
- Development of earthquake generation model and advanced calculation method based on high-resolution three-dimensional seismic survey data obtained by R/V KAIMEI.

In addition, JAMSTEC will contribute to understanding current state and history of volcanic activities through the development of new ways of observation, surveys for internal structure of oceanic crust, sample analysis, etc. in ocean areas where conducting surveys was challenging in the past.



Deployment plan for observations of changes in the ocean crust



Wide-area seafloor research vessel *Kaimei*
(Courtesy of JAMSTEC)

Reference: *Research Institute for Marine Geodynamics*, JAMSTEC (<http://www.jamstec.go.jp/rimg/j/>)



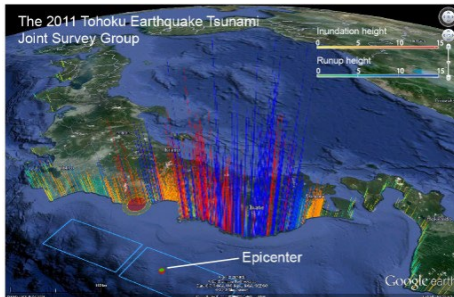
Academic research on the Great East Japan Earthquake and Tsunami



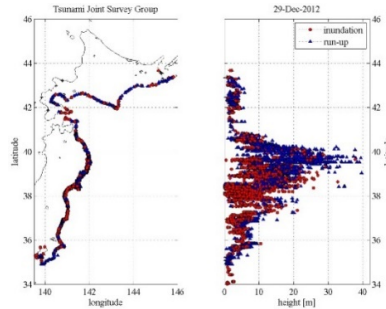
Period: March 2011 to March 2012

Organization: International joint survey group organized with the Japan Society of Civil Engineers playing a leading role

A detailed scientific survey of the Great East Japan Earthquake and Tsunami of March 2011 was conducted, which allowed us to investigate a full picture of the mega-tsunami. This survey promoted academic studies on the topic to be advanced and various plans for recovery and reconstruction to be formulated. The importance of tsunami disaster reduction has been reconfirmed around the world, leading to the establishment of World Tsunami Awareness Day (November 5).



Tsunami tracing survey
(seeing East Japan from the Pacific Ocean)



Projection in a latitudinal direction
(where blue corresponds to the run-up height and red corresponds to the inundation height)

Reference: *Information on the Tohoku Region Pacific Coast Earthquake and Tsunami*

(Joint Survey Group of the Tohoku Region Pacific Coast Earthquake and Tsunami, <https://coastal.jp/tjt/>)

Contributing to coastal disaster prevention with the provision of detailed information on ocean currents and seawater temperatures

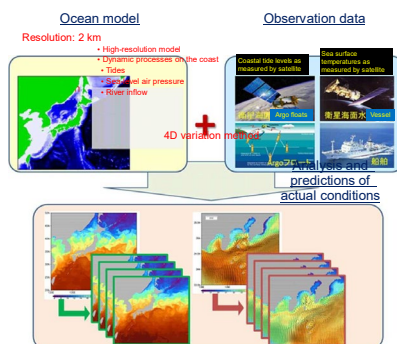


Period: From 2020

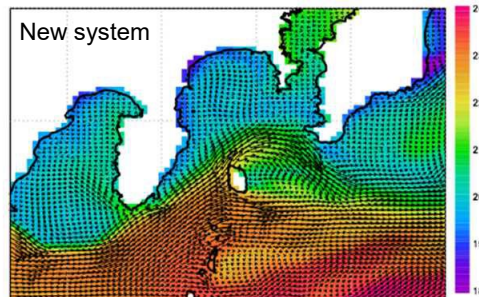
Organization: Japan Meteorological Agency

The Japan Meteorological Agency developed a new operational system for monitoring and forecasting coastal and open-ocean states around Japan (MOVE/MRI.COM-JPN (JPN System)) in order to provide more detailed ocean current and seawater temperature in coastal areas and open-ocean. Whereas predictions of ocean currents and sea temperatures used to be made with a ten-kilometer grid, the JPN System allows for predictions to be made at a higher resolution of two kilometers. The ability to make detailed predictions of changes in ocean currents and sea temperatures in coastal areas around Japan now makes it possible to predict changes in coastal tide levels caused by ocean conditions.

In conjunction with the start of the operations of the JPN System, the Japan Meteorological Agency will work to improve information concerning unusually high sea level and provide information to facilitate the use of detailed data on currents and sea temperatures.



Schematic diagram of the system



It is now possible to distribute sea surface temperatures in detail

Reference: *Surface Water Temperatures and Actual Current Conditions* (Japan Meteorological Agency, https://www.data.jma.go.jp/gmd/kaikyou/kaikyou/tile/jp/index_subsant.html)



Predicting the occurrence of red tides through the use of satellite images

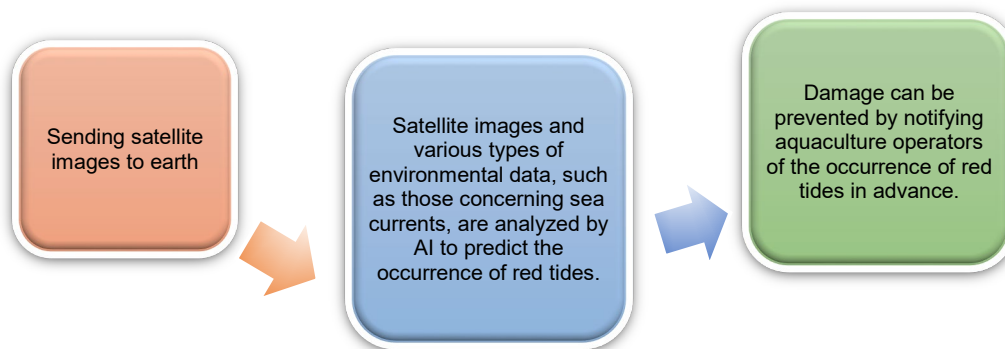


Period: From 2020

Organizations: Tokio Marine Holdings, Inc., Hiroshima University, Axelspace Corporation, Hydro Technology Institute Co., Ltd.

As the importance of aquaculture farming increases from the standpoint of sustainability, it is said that the occurrence of red tides could impede the growth of the aquaculture industry. The mechanisms by which red tides occur are not yet fully understood, which makes it difficult to predict outbreaks.

In this connection, the organizations involved are engaging in research and development work to predict the occurrence of red tides by combining various environmental data obtained from satellites, leading edge AI, and simulators for predicting environmental data. Success in this area could lead to the development of a service for providing notice of the occurrence of red tides to aquaculture operators in advance and a service for preventing and mitigating damage caused by red tides.



Flow of steps for predicting red tides using satellites and AI

Column

Holding a workshop to study the contents of the implementation of the United Nations Decade of Ocean Science in Tokyo

A workshop for which Japan served as the host nation for the North Pacific and marginal sea areas around the North Pacific was held from July 31 to August 2, 2019, in order to study the contents of specific activities for each sea area in advance of the commencement of the United Nations Decade of Ocean Science for Sustainable Development in 2021. This workshop was attended by approximately 160 participants, including ocean scientists, policy makers, industry officials, and NPO/NGO representatives, mainly from Intergovernmental Oceanographic Commission (IOC) of UNESCO member countries whose territories face the North Pacific or marginal sea areas around the North Pacific. An implementation plan was finalized at this workshop.



Operations of the Japan Oceanographic Data Center

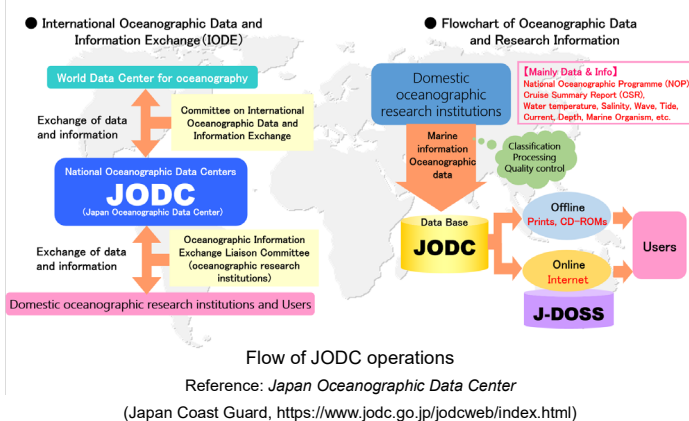


Period: From 1965

Organizations: Japan Coast Guard, Fisheries Agency, Geospatial Information Authority of Japan, Japan Meteorological Agency, Ministry of the Environment, regional development bureaus, local governments, National Institute of Maritime, Port and Aviation Technology, Japan Agency for Marine-Earth Science and Technology, universities, and others

The Japan Oceanographic Data Center (JODC) is representative in Japan as the National Oceanographic Data Center of the International Oceanographic Data and Information Exchange (IODE) system promoted by the Intergovernmental Oceanographic Commission (IOC) of UNESCO. As the comprehensive oceanographic data bank for Japan, JODC unitarily collects, manages, and provides oceanographic data observed by various domestic oceanographic survey organizations. JODC has contributed to global environmental research by managing and providing ocean observation data collected in Japan for international joint research projects, such as WOCE, which aim to solve problems of global warming.

Also, with the improved capacity in oceanographic data management in countries participating in the IOC Sub-Commission for the Western Pacific (WESTPAC) program, oceanographic data management training and workshops have been held for staff members of ocean-related organizations in the region to promote the development of the IODE system.



Hydrographic observations along the 137°E meridian

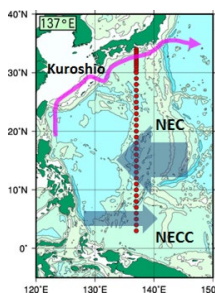


Period: From 1967

Organization: Japan Meteorological Agency

Hydrographic observations along the 137°E meridian have been taken continuously for over five decades since the Japan Meteorological Agency began operations in 1967. Nowhere else in the world have repeat hydrographic section been taken on a continuous basis for this long of a period of time. The availability of all data obtained since observations began to all researchers has been met with a very positive reception by ocean-related parties both in Japan and overseas.

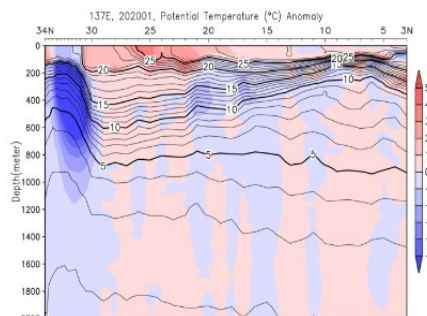
In order to clarify changes in the carbon cycle, which is vital for earth system models to predict global warming, observations are also being made of carbon dioxide-related underwater carbonate parameters (total carbonate, alkalinity, and hydrogen ion concentration (pH)) and chlorofluorocarbons.



Observation stations along meridian 137° east



Marine meteorological observations vessel Ryofu Maru II



Cross-sectional representation of water temperatures along meridian 137° east

Source: Oceanographic Section Time-series Dataset for the 137°E Meridian

(Japan Meteorological Agency, https://www.data.jma.go.jp/gmd/kaiyou/db/mar_env/results/OI/137E_OI_e.html)

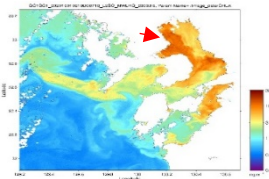
Satellite observation of the ocean environment and the release of observation data



Global Change Observation Mission-Climate satellite *Shikisai* (GCOM-C)

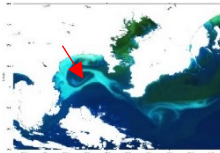
Period: Launched in December 2017; currently operating
Organization: Japan Aerospace Exploration Agency (JAXA)

Mounted on the *Shikisai* satellite, a multi-wavelength optical radiometer can observe concentrations of chlorophyll-a, concentrations of suspended solids, colored dissolved organic matter, the temperature of the water at the sea surface, drifting algae, and more with 250-m spatial resolution and 19 observation wavelength bands. Observational data obtained are generally published for free and contribute to the monitoring of changes in the distribution of phytoplankton, eutrophication, and the distribution of high-water temperature areas due to climate change and more accurate predictions of the ocean environment through comparison and assimilation with numerical models.



Distribution of chlorophyll-a concentrations at 250-meter resolution in the southwest section of Kyushu on October 1, 2020, as captured by multi-wavelength optical radiometer SGLI aboard the *Shikisai* satellite

At the time, red tides were reported in the northwestern part of the Ariake Sea (<https://akashiwo.jp/>); concentrations of chlorophyll-a can be seen to be high in the corresponding area of the sea (red arrow).



An RGB composite image for the area around Sagami Bay on May 17, 2020, which was produced in accordance with atmospherically corrected sea surface reflectance values for red, green, and blue wavelengths as obtained by multi-wavelength optical radiometer SGLI, which is mounted aboard the *Shikisai* satellite

White areas correspond to land and clouds. The distribution of white tides that appeared in Sagami Bay at the beginning of May was captured (light-blue area indicated with the red arrow). The image data were made available to researchers and the general public and also covered by newspapers and other media outlets.

Reference: *Shikisai Portal* (Satellite Applications and Operations Center of the Japan Aerospace Exploration Agency, <https://shikisai.jaxa.jp/>)



Global Change Observation Mission-Water satellite *Shizuku* (GCOM-W) and the Advanced Microwave Scanning Radiometer (AMSR) series

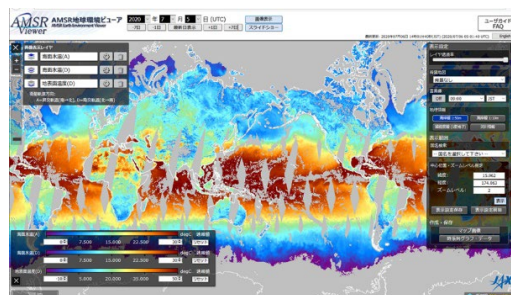
Period: From June 2002; currently operating
Organization: Japan Aerospace Exploration Agency (JAXA)

Mounted on the *Shizuku* satellite, Advanced Microwave Scanning Radiometer 2 (AMSR2) has continued to carry out observations as part of the AMSR series since the launch of the AMSR-E in June 2002. Boasting the world's highest spatial resolution among microwave scanning radiometers, the AMSR2 is notable for its ability to observe the surface of the earth and the surface of the ocean through clouds and is capable of observing, among other variables, sea surface temperatures, sea ice concentration levels, precipitation amounts, amounts of accumulated water vapor, snow depths, and moisture content in soil. Obtained observation data are publicly released free of charge, are used by meteorological agencies in countries around the world, and contribute to the monitoring of changes in sea ice caused by climate change, the monitoring of ocean conditions, the monitoring of fishing grounds, and the enhancement of the accuracy of predictions concerning the ocean environment through comparisons and assimilation with numerical models. The AMSR3, successor to the currently operating AMSR2, is under development for a launch set to take place in fiscal year 2023.



Sea ice distribution at the North Pole on September 13, 2020, as captured by AMSR2 aboard the *Shizuku* satellite

The minimum extent of sea ice coverage in 2020 (3.55 million square kilometers) was recorded on this date and a press release jointly held by JAXA and the National Institute of Polar Research. This annual minimum value was the second-lowest minimum value observed by a satellite in history after a minimum value that was likewise observed by AMSR2 in September 2012. Changes in polar sea ice coverage is an important benchmark for global warming. Microwave scanning radiometers, which can observe through clouds and around the clock, are an observation tool that is essential for polar research.



An example of a display as provided by the AMSR Earth Environment Viewer, a tool to visualize observation data obtained by the AMSR series

Offers various functions to enable a user to, among other options, superimpose multiple physical quantities, zoom in and out, display data in pixels, and display time series.

Reference: Global Change Observation Mission-Water (GCOM-W1) satellite (Satellite Applications and Operations Center of the Japan Aerospace Exploration Agency, https://suzaku.eorc.jaxa.jp/GCOM_W/index_j.html)

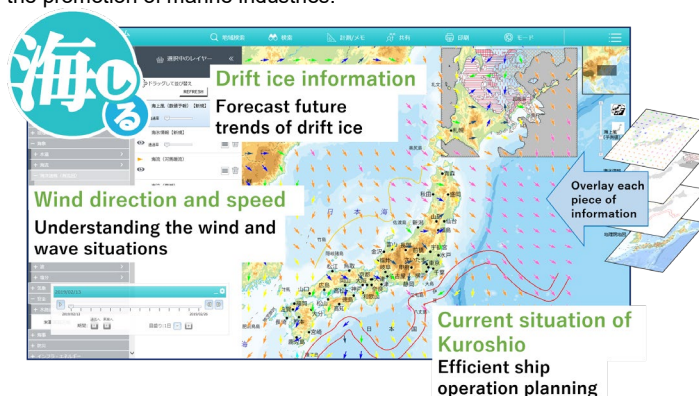
Effective operation and improving the function of MDA Situational Indication Linkages (MSIL)



Period: From 2019

Organizations: Cabinet Secretariat, Cabinet Office, Ministry of Education, Culture, Sports, Science and Technology, Ministry of Economy, Trade and Industry, Ministry of Land, Infrastructure, Transport and Tourism, Ministry of the Environment, Ministry of Defense, National Research Institute for Earth Science and Disaster Resilience (NIED), Japan Aerospace Exploration Agency (JAXA), Japan Agency for Marine-Earth Science and Technology (JAMSTEC), National Institute of Polar Research, and others

Developed within a framework of general coordination provided by the Cabinet Office, this is an information service designed to aggregate various types of ocean-related information held by relevant ministries and agencies as well as governmental organizations and display them on a map with the aim of enabling their use in different fields, such as in maritime safety, measures to deal with natural disasters, conservation of the ocean environment, and the promotion of marine industries.



This service makes available not just information from sea areas around Japan but also information from a wider area, inclusive of satellite data. It also provides real-time information, such as meteorological and oceanographic information. Use is expected for various applications, including the management of vessel operation, fisheries, disaster prevention, and marine development.

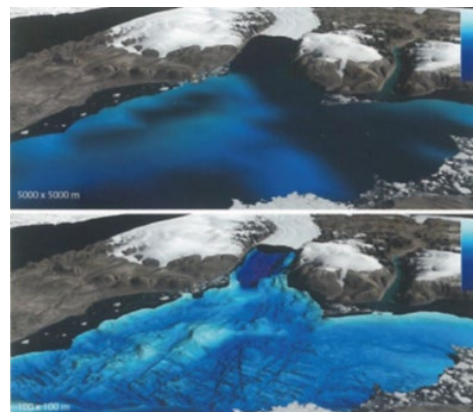
Reference: MDA Situational Indication Linkages (MSIL) (<https://www.msil.go.jp/>)

Column

The Nippon Foundation-GEBCO Seabed 2030 Project

The Nippon Foundation-GEBCO Seabed 2030 Project is a collaborative project between The Nippon Foundation and the General Bathymetric Chart of the Oceans (GEBCO) to complete the map of the world's ocean floor by 2030.

Information about the topography of the ocean floor is useful in a wide range of fields including prediction of currents and tsunamis, safety of navigation, prediction of rise in sea levels, and monitoring of marine organisms. However, in 2017 when the Seabed 2030 project started, only 6% of the world's ocean floor had been mapped according to modern standards. With the establishment of the Global and Regional Data Centers in different parts of the world and cooperation from governments, international organizations, academic institutions and corporations, the project had managed to increase the percentage of the world's ocean floor that is mapped to 19% by 2020. It is hoped that mapping of yet unexplored parts of the world could be facilitated through the establishment of new partners across different disciplines.



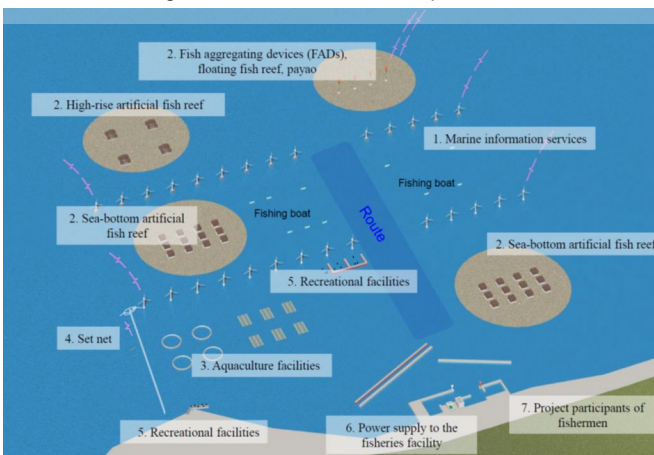
Seabed topography around a fjord in different resolutions. Finding out about the details of seafloor topography around a fjord helps to determine the effect of the ocean current on the melting of the fjord. (Comparison in terms of resolution between 5,000 m x 5,000 m (top) and 100 m x 100 m (bottom))

Developing and promoting cross-sectoral synergy-creating wind farm technology

Period: From 2013

Organizations: Research Institute for Ocean Economics and others

This is a concrete initiative designed to realize a nexus approach at sea, as emphasized in the SDGs. The development of technologies for the creation of synergies between ocean energy development projects through offshore wind power generation and activities in other sectors, including the conservation of fishery resources, the promotion of aquaculture operations, the reduction and absorption of greenhouse gases, the monitoring of the ocean environment, sea surveillance, and the promotion of ocean-related leisure and education, is proposed. These technologies will be exceedingly useful for Asian-Pacific countries, coastal countries in Africa, and other countries and regions where fisheries are important in terms of food culture and the structure of employment.



Overall Image of the Fisheries-Harmonious Offshore Wind Farm
Source: Research Institute for Ocean Economics (<https://www.rio.or.jp/>)

Utilizing and conserving coastal and remote island sea areas through next-generation oceanic mobility

Period: From 2020

Organizations: Ministry of Land, Infrastructure, Transport and Tourism, Fisheries Agency, Ministry of the Environment, and others

With the aim of solving problems pertaining to the use and conservation of coastal sea areas in Japan through the application of new technologies, initiatives are being carried out in hopes of promoting the use of *nextgeneration mobility* at sea, namely autonomous surface vehicles (ASVs) as well as autonomous underwater vehicles (AUVs) and ROVs (remotely operated vehicles), which are expected to be used as so-called ocean drones.

In fiscal year 2020, a meeting among industry, academia and government officials was held to promote the development of an environment for the use of next-generation mobility at sea. At this meeting, information was exchanged to facilitate the matching of technology seeds with needs. Based on the discussions that were held at this meeting, work to enable these options to be implemented in society as soon as possible, such as by launching a pilot project for societal implementation, will be carried out from fiscal year 2021.



ASV (autonomous surface vehicle)



AUV (autonomous underwater vehicle)



ROV (remotely operated vehicles)

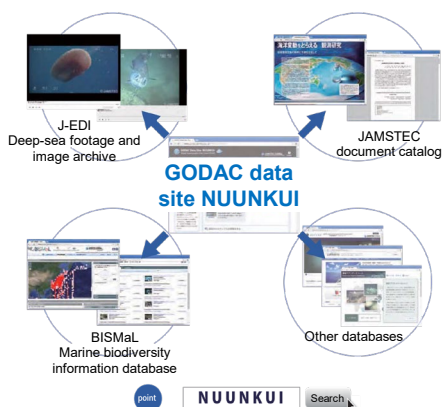
Source: *Promoting the Use of Next-Generation Mobility at Sea*
(https://www.mlit.go.jp/sogoseisaku/ocean_policy/content/001371247.pdf)

Accumulating and disseminating research data at the Global Oceanographic Data Center (GODAC)

Period: Opened in 2001

Organization: Japan Agency for Marine-Earth Science and Technology (JAMSTEC)

GODAC serves as a hub for accumulating and disseminating various research data held by JAMSTEC. For the purpose of developing capacity of young generation and serving the local community, GODAC also promotes various activities to increase awareness and to deepen the understanding of marine science and technology. For the local community, GODAC collaborates with "ALL yanbaru manabi no machi" project and holds marine-related education lessons. GODAC maintains digital archives, including various deep-sea images taken by manned submersibles and remotely-operated vehicles and disseminates these online for scientific and academic purpose.



Disseminating research information from various databases to the world

Reference: *Global Oceanographic Data Center (GODAC)* (<http://www.godac.jp/index.html>)



GODAC and its activities

Marine research facilities along the Japanese coast: marine biological laboratories, fisheries research stations, and more

Period: From 1887

Organizations: National, public, and private universities

Japan has one of the highest number of coastal facilities in the world. Of these, 21 national university seaside and lakeside research stations belong to the Directors-Council of National Marine and Inland Biological Stations and 36 fisheries research stations affiliated with national, public, and private universities belong to the National Council of Directors of University Fisheries Research Stations. While research in the areas of marine biology and fisheries science is being pursued, observational data on ocean conditions in coastal areas will be accumulated. Human resources will be cultivated and contributions to local communities will be promoted by holding onshore training sessions and nature observation meetings.



Onshore training, Marine Biological Station, Sado Island Center for Ecological Sustainability



Seaside and lakeside research stations nationwide



University fisheries research stations nationwide

Reference: *Directors-Council of National Marine and Inland Biological Stations* (<http://www.research.kobe-u.ac.jp/rcis-kurcis/station/syotyoto.html>)

National Council of Directors of University Fisheries Research Stations (<http://jikkensho.sakura.ne.jp/index.php>)

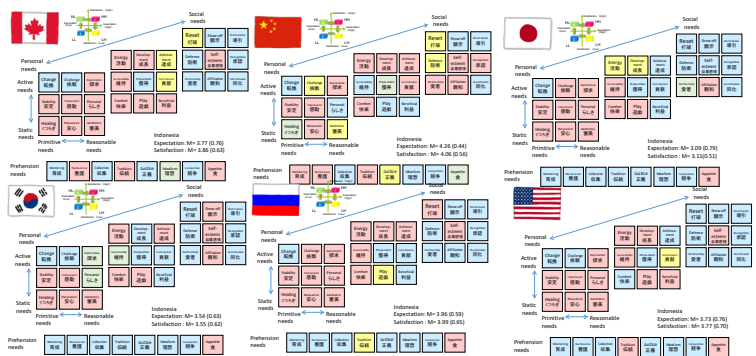
Comparative research on wellbeing as derived from the ocean in six north Pacific countries



Period: 2012-2017
 Organization: North Pacific Marine Science Organization (PICES)

The ideal image of the ocean and the wellbeing that can be obtained from it differ from country to country, region to region, and culture to culture. To verify this, a comparative analysis of the six member countries of PICES (Canada, China, Japan, Korea, Russia and United States) was conducted. This analysis revealed that the basic structure of the wellbeing that can be derived from the ocean is the same across all six countries but that the weight accorded to this structure differs from country to country. For example, emphasis is placed on safety in Russia and Canada (perhaps due to the fact that the harsh natural environment in these countries results in many accidents) while Russia is notable for emphasizing health (perhaps due to the shorter average lifespan). It is possible that these differences are directly linked to differences in terms of the objectives of ocean policy.

During the UN Decade of Ocean Science, these national differences should be compiled in a scientific way and initiatives for respecting diversity in these terms need to be pursued.



Psychological cube by Hori and Makino (2017)

Differences in wellbeing derived from the ocean from country to country
 Source: Makino, M. and Perry, R.I. (Eds.) 2017. Marine Ecosystems and Human Well-being: The PICES-Japan MAFF MarWeB Project. PICES Sci. Rep. No. 52, 235 pp.
 Hori J, Makino M (2018) The structure of human well-being related to ecosystem services in coastal areas: A comparison among the six North Pacific countries. Marine Policy, 95: 221-226

Marine Open Innovation Project (MaOI Project)



Period: (Study) From fiscal year 2018; (implementation) from fiscal year 2019
 Organizations: Shizuoka Prefecture, Marine Open Innovation Institute

By harnessing the unique ocean environment in such places as Suruga Bay, Japan's deepest bay, and such resources as the diverse ocean life that inhabits these locations, innovation centered on marine biotechnology and other leading-edge examples of marine technology is promoted. The aim is to create a world-class center for the promotion of marine industry and the conservation of the ocean environment in Shizuoka Prefecture.

Save the Sea of Shizuoka is an organization that is run as part of the MaOI Project. The Project for Developing Ocean Forests is also carried out as an initiative through which support is provided for the restoration of underwater forests that sustain marine life.



Reference: Website of MaOI (<https://maoi-i.jp/>)



Association for the Future of Shizuoka's Beautiful and Bountiful Sea



Cultivating human resources in the field of ocean science



Sasakawa Scientific Research Grant

Period: From 1988
Organization: The Japan Science Society (JSS)

This program has been continuously operated for more than three decades in accordance with a policy of providing research grants to young researchers in possession of novel ideas, originality, or budding potential, including generous grants in fields of basic research that might otherwise escape attention. More than 300 young researchers in total receive over 200 million yen in grants that cover research costs each year. In each of five different categories of general scientific research as well as the field of practical research, a special division for ocean-related research has been established to help promote research in the area of ocean science in Japan. Even after a researcher receives a grant, he or she continues to be supported for presenting research results at overseas academic conferences, introducing research results to private companies and publishing general books on research results.

Science Mentor Program

Period: From 2013
Organization: The Japan Science Society (JSS)

Junior high school and high school students from across Japan who are interested in engaging freely in scientific research (both individuals and groups) are invited to submit plans for research they wish to conduct, which will be subject to document evaluations and an initial interview process carried out by professional scientists. Students (mentees) passed receive guidance from professional scientists specializing in applicable fields (from universities and research institutes). After research plans are completed and a second interview is carried out, the pool of prospective plans is whittled down to around twenty projects. Mentors are provided research guidance for at least six months (according to requests of the mentee) and the fundamentals of scientific research are taught. Each year, multiple research plans in the marine field are adopted.

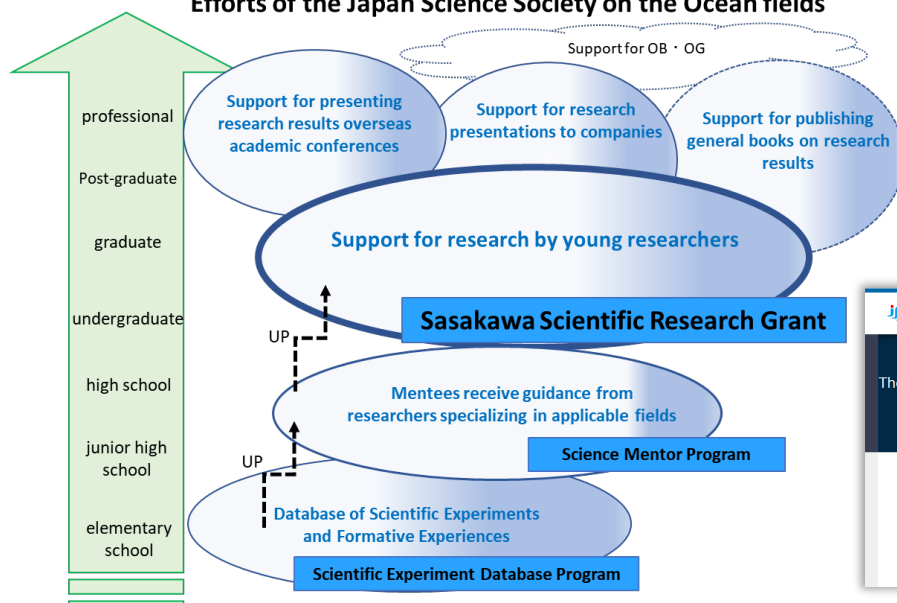
Scientific Experiment Database Program

Period: From 2002
Organization: The Japan Science Society (JSS)

Information related to scientific phenomena in our daily lives and to nature or culture are disseminated online as "Scientific Experiments Data" and the "Formative Experiences Column" to encourage pupils and students to pursue science for themselves. Information on the ocean is also included.



Efforts of the Japan Science Society on the Ocean fields



Website of the Japan Science Society (JSS)
(<https://www.jss.or.jp/en/>)

UNESCO Associated Schools



Period: -

Organization: Ministry of Education, Culture, Sports, Science and Technology/ Japanese National Commission for UNESCO

UNESCO Associated Schools actively pursue peace and international cooperation in order to realize the UNESCO principles as set forth in the Constitution of UNESCO. Presently, there are over 11,000 UNESCO- associated schools in over 180 countries and regions around the world. As of November 2019, there are 1,120 member schools in Japan, which is a higher number than for any other country in the world. The Ministry of Education, Culture, Sports, Science and Technology (MEXT) and the Japanese National Commission for UNESCO regard UNESCO Associated Schools as base for promoting Education for Sustainable Development (ESD). As ESD is a key enabler for all seventeen Sustainable Development Goals (SDGs), UNESCO Associated Schools in Japan are engaged in the provision of ocean education and various other initiatives through not only SDG 4 (education) but also other SDGs, including SDG 6 (water), SDG 13 (climate change), SDG 14 (marine resources), and SDG 15 (terrestrial resources). Since 2009, National Conferences for UNESCO Associated Schools Network in Japan have been held annually to promote ESD in the context of school education and share good practices, such as those concerning interactions between schools and students and teachers both in Japan and overseas.



Kids take in a lesson at Miike Port, a part of the World Cultural Heritage Site known as the Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding and Coal Mining.



Observation of a tidal flat

Ocean Education Pioneer School Program



Period: From 2016

Organizations: The Nippon Foundation, Center for Ocean Literacy and Education of the University of Tokyo, Ocean Policy Research Institute of the Sasakawa Peace Foundation

There is a desire to enable children to become more familiar with and gain a deeper understanding of the ocean and acquire the tools to protect the ocean on their own. The Ocean Education Pioneer School Program is a program designed to support the activities of schools and teachers seeking to encourage children to learn about the ocean in a new approach with substantial potential for future learning and one that operators would like to see spread to schools throughout Japan. This program was launched in fiscal year 2016 with three parties acting in collaboration with one another: The Nippon Foundation, Center for Ocean Literacy and Education of the University of Tokyo, and the Ocean Policy Research Institute of The Sasakawa Peace Foundation. In fiscal year 2019, aid was provided to 195 schools for initiatives on ocean education.



Various activities of ocean education by participating schools of the Ocean Education Pioneer School Program

Website of the Ocean Education Pioneer School Program
(<https://www.spf.org/pioneerschool/>)

Organizing a project for the formation of ocean education research centers and holding the National Ocean Literacy and Education Summit



Period: From 2013

Organizations: Center for Ocean Literacy and Education (Graduate School of Education, the University of Tokyo) and The Nippon Foundation

The University of Tokyo and local governments across Japan concluded an agreement and are collaborating to develop education for marine literacy in the context of primary and secondary education. As an example, a systematic curriculum applicable to everything from pre-school education to high school education is being developed as part of the education policy for Kesennuma City in Miyagi Prefecture while Taketomi Town in Okinawa Prefecture is formulating a basic plan for ocean education as part of its own education policy. In these and other ways, systems for entire regions are being created. Ultimately, the aim is to improve marine literacy at the local level. There are presently four ocean education research centers nationwide, including the two noted above.

In addition, an event at which approximately 500 ocean education practitioners, researchers, pupils, students, and other people from across Japan gather together under one roof to discuss ocean education is held once a year. By presenting practical case studies and research projects in which they are involved, interacting with one another on relevant topics, and exchanging opinions on a range of questions and issues at this summit, participants work to promote ocean education and build networks.



7th National Ocean Literacy and Education Summit (February 15, 2020)

Reference: Website of the Center for Ocean Literacy and Education (Graduate School of Education, the University of Tokyo) (<https://www.cole.p.u-tokyo.ac.jp/>)



Column

Project for women active at sea

Women are rather under-represented in ocean-related workplaces in Japan and especially under-represented in jobs that entail going out to sea. Opportunities for women to work and be active in such workplaces are being bolstered through the Ministry of Land, Infrastructure, Transport and Tourism's *Shine bright, Funejo!* program, the Fisheries Agency's *Treasures of the Sea for Energetic Fisherwomen* project, the Coast Guard's efforts to expand job categories for women and increase the number of female officers, and the Japan Agency for Marine-Earth Science and Technology's efforts to appoint more women to management positions.



MLIT booklet



Fisheries Agency website



Japan Coast Guard School website

Reference: Ministry of Land, Infrastructure, Transport and Tourism (https://www.mlit.go.jp/maritime/maritime_tk5_000060.html)

Fisheries Agency (<https://www.jfa.maff.go.jp/kenkyu/suisanjoshi/181213.html>)

Japan Coast Guard (https://www.kaiho.mlit.go.jp/school/elements/sub_women/women.html)



PDF file is also available
from URL below

https://oceanpolicy.jp/decade/case_e.html



2021
2030 United Nations Decade
of Ocean Science
for Sustainable Development