## Organisms living in the ocean off the Tohoku Coast

**Broadbanded thornyhead**
(*Sebastolobus macrochir*)

*Sebastolobus macrochir* is generally known as "Kinki" in Japanese. It has a bright-red body with a black blotch at the center of its dorsal fin. It grows to approximately 30 cm in body length and is found at depths between 200 and 1500 m. It is a prized fish with delicious white-meat and plenty of fat.

**Snow crab**
(*Chionoecetes opilio*)

*Chionoecetes opilio* has a dark brown shell with a rounded triangular shape and is a representative of the edible crabs. Male snow crabs can grow to a shell width of 15 cm and females up to 8 cm. The life expectancy of the crabs can be as long as 15 years.

**Alaska pollack**
(*Theragra chalcogramma*)

*Theragra chalcogramma* is a species closely-related to Pacific cod and can grow up to 60 cm in total length. Its meat is used in the production of *kamaboko* and its ovaries are used for cod roe or salted cod roe spiced with red pepper. It is found in the North Pacific Ocean at depths of up to 500 m.

**Slime flounder**
(*Microstomus achne*)

*Microstomus achne* is a flatfish with a total length of up to 60 cm. The Japanese name for this fish, "Baba-garei," reminds us of an old woman. It is a white-meat fish often eaten boiled with soy sauce and sugar or broiled with salt. It is found in the Sea of Japan and areas north of Suruga Bay at depths between 50 and 400 m. In the Tohoku region, it is also known as "Nameta-garei."

**Commercial whelk**
(*Buccinum isaotakii*)

*Buccinum isaotakii* is a type of snail, commonly called a whelk. It is eaten raw or boiled with soy sauce and sugar. It can grow up to approximately 20 cm in size (shell length) and is found in the Pacific coastal areas from Kashima-Nada to Hokkaido at depths between 50 and 500 m.

**Pacific cod**
(*Gadus macrocephalus*)

*Gadus macrocephalus* is a large fish which can grow up to 1 m in total length. It is found in the North Pacific Ocean from the coast to a depth of 800 m. It is less oily than other fish and is often eaten by sauté and *Nabe* (cooking in a pot at the table).

**Japanese Flying Squid**
(*Todarodes pacificus*)

*Todarodes pacificus* grows up to 30 cm in body length, and can migrate long distances during its short life, typically only 1 year. It is found in the waters surrounding the Japanese Islands from the surface to a depth of up to 1000 m. It is one of the squids used in a variety of culinary dishes.

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MINISTRY OF EDUCATION, CULTURE, SPORTS, SCIENCE AND TECHNOLOGY-JAPAN

# TEAMS

Tohoku Ecosystem-Associated Marine Sciences, since FY2011

OFFICIAL SITE : http://www.i-teams.jp/

TOKAI UNIVERSITY


## JAMSTEC Japan Agency for Marine-Earth Science and Technology

**Yokosuka Headquarters**
2-15 Natsushima-cho, Yokosuka-city, Kanagawa 237-0061
☎ +81-46-866-3811

**Yokohama Institute for Earth Sciences (YES)**
3173-25 Showa-machi, Kanazawa-ku, Yokohama-city, Kanagawa 236-0001
☎ +81-45-778-3811


**TEAMS website in JAMSTEC**
http://www.jamstec.go.jp/teams/e/

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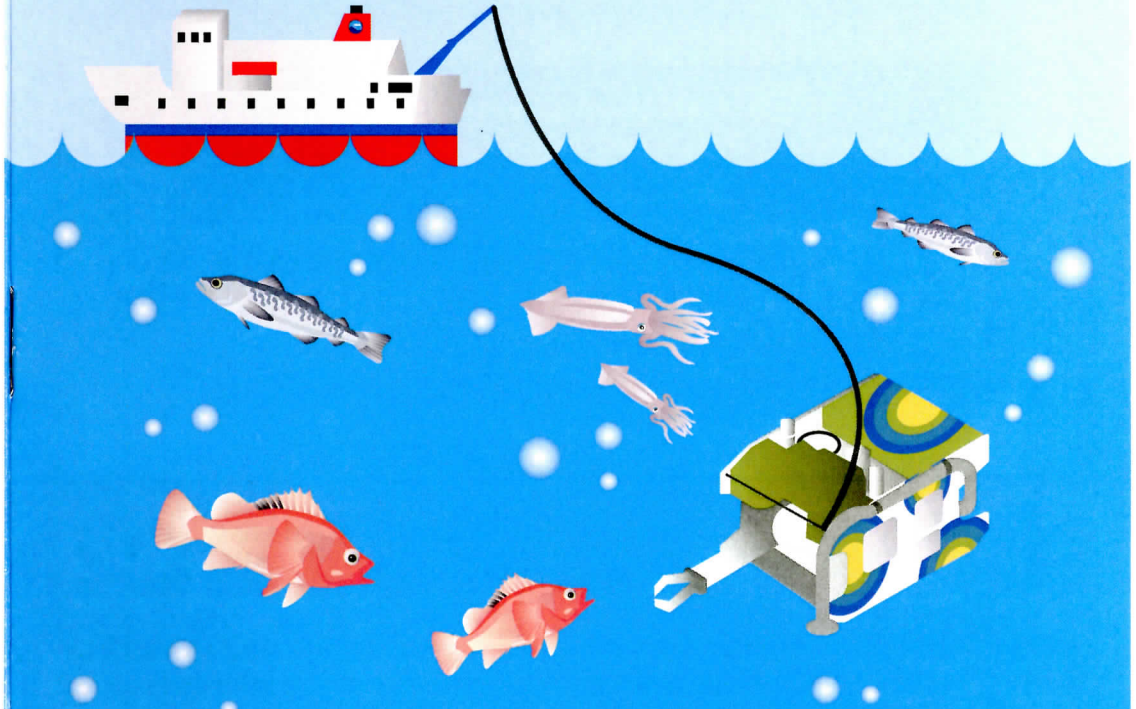
# How have the habitats of marine organisms changed?

—— We study organisms and environments off Sanriku post-earthquake and tsunami. ——



# What is TEAMS?

**The Great East Japan Earthquake** has drastically changed marine ecosystems and their surrounding environments, including fisheries grounds.

**Tohoku Ecosystem-Associated Marine Sciences (TEAMS)** is a research program aims to help understand and utilize marine ecosystems and fisheries. Led by JAMSTEC, Tohoku University, and the Atmosphere and Ocean Research Institute (AORI) of the University of Tokyo, TEAMS brings together marine science researchers to investigate the sea off Sanriku as a decadal program beginning in FY 2011.

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

TOKAI University

TASK

**1: Research on factors controlling open ocean benthopelagic ecosystem dynamics**

Off Sanriku

**2: Data sharing and publication by the development and maintenance of information technology systems for TEAMS**

## Tohoku University

(Representative bodies)

Kitasato University

TASK

**Studies on ecological succession in fisheries grounds**

The southern part of the Sanriku coast

TEAMS

## Atmosphere and Ocean Research Institute, The University of Tokyo

Iwate University

Tokyo University of Marine Science and Technology

TASK

**Research on factors controlling marine ecosystem dynamics**

The northern part of the Sanriku coast to the offing

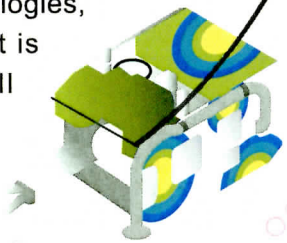
# We are JAMSTEC!

**Japan Agency for Marine-Earth Science and Technology (JAMSTEC)** carries out many scientific investigations and a considerable amount of research to elucidate the mysteries of the oceans and the Earth. It has become clear that the vast ocean accounts for about 70% of the Earth's surface and contains diverse ecosystems with various environments encompassing them. To understand the ocean in more detail, we perform investigations and research using advanced equipment and devices.

# We want to help monitor, assess and reinvigorate the fishery grounds off the Sanriku coast.

## JAMSTEC's activities

JAMSTEC carries out investigations and research mainly in offshore waters using a range of tools and equipment, such as research ships and a new remotely operated vehicle - the ROV *CRAMBON*. Through accumulating knowledge with such technologies, we endeavor to answer questions such as "what is happening beneath the waves?" and "what will happen in the ocean going forward?" and inform the public of the information we obtain.



▲ CRAMBON

### Research on mapping and decomposition of debris in fisheries grounds

The seafloor is topologically diverse, with undersea valleys, mountains and plains. The sea floor, where many species of fish, crabs and other life occur, was changed by the large tsunami tidal wave caused by the 2011 off the Pacific coast of Tohoku Earthquake.

Although we cannot see the seafloor directly because light and electromagnetic waves cannot penetrate far in sea water, we are able to use sound to survey the current topography and seafloor conditions, e.g. multi beam echo sounders, side scan sonar and sub-bottom profilers.

**We investigate current seafloor conditions using acoustic instruments.**

**Contribution point**

**We make seafloor maps to reveal the current condition of the seafloor.**

### Research on mapping and decomposition of debris in fisheries grounds

Debris swept away by the massive tsunami has remained on the seafloor and has greatly affected the submarine ecosystems and fisheries. Piles of debris block fishing trawls, but they may provide refuges to many organisms.

We investigate where and how much debris is distributed across the seafloor and make debris maps using this information. We also investigate what types of organisms facilitate the decomposition of debris, how long decomposition of debris takes, and how much debris will be decomposed.

**We investigate the distribution and the decomposition processes of debris.**

**Contribution point**

**We estimate the influence of debris on ecosystems and fisheries.**

### Research on distribution, behavior and population structure of biological resources

**We investigate the location and types of organisms that live on the seafloor in offshore areas.**

Deep waters off Sanriku where Broadbanded thornyheads (*Sebastolobus macrochir*) and Alaska pollack (*Theragra chalcogramma*) are living have been affected by the earthquake and tsunami.

We investigate the influence of the earthquake and tsunami on organisms by observing the behavior of organisms using a robot, measuring the movement of organisms with bio-logging and tracking techniques, and examining the diversity and dispersal of organisms using molecular methods.

**Contribution point**

**We reveal the ecology of organisms living on the seafloor in offshore areas.**

## Long-term monitoring of the physico-chemical environment in fisheries grounds

### We assess the environment of the seafloor in offshore areas.

The seafloor off Sanriku is home to a variety of fishes, such as cod. The earthquake disturbed and transported sediments across the seafloor.
We investigate how the seafloor has changed and how organisms, such as cod, have been affected. We also continuously monitor the environment of the seafloor in offshore areas to clarify the restoration process of habitats for species in this region.

**Contribution point**

We explain how the seafloor environment will change.

## Trophic position and bioaccumulation studies in marine organisms

### We measure the chemical substances found in organisms.

Many organic pollutants have accumulated in organisms through the food chain. Polychlorinated biphenyl (PCB), in particular, is a notorious substance that has a high toxicity to humans. Old PCB-containing electrical appliances that had been stored in the Sanriku coastal areas were washed away by the tsunami, and may now pose a hazard in the sea.
We monitor levels of PCB in seafloor sediments and edible fishes, and follow the state of pollution in the sea.

**Contribution point**

We reveal the state of pollution in the sea by monitoring levels of PCB.

## Habitat and ecosystem mapping

### We make maps to visualize environmental variations and species distributions.

To have an overview of the state of the ocean, all information obtained through our investigations needs to be gathered together.
To visualize and convey the current state of the sea and marine organisms off Sanriku, we collect records of organisms using images and videos taken underwater, data on sounds reflected from the seafloor, and results of the chemical analysis of matter in the sea. We then make maps to visualize the organisms and their environments.

**Contribution point**

We assemble various kinds of data to make a map showing the current state of the sea and the organisms it contains.

## Data sharing and publication by the development and maintenance of information technology systems for TEAMS

### We make the results open to the public.

A considerable amount of information on marine organisms, their habitats and the general environment is collected from TEAMS investigations and ongoing research.
We make such information available through TEAMS website. We also inform the public of the details of future investigations and upcoming events.

**Contribution point**

We make our activities and results known to the public.