

# Cruise Summary

## 1. Cruise Information

Cruise number:

KY12-14

Ship name:

R/V KAIYO

Title of the cruise:

2012 Deep Sea Research

Thermal structure of the Philippine Sea plate subducting along the Nankai Trough and its relation to seismic activity

Chief Scientist:

Makoto YAMANO Earthquake Research Institute, University of Tokyo

Representative of Science Party:

Makoto YAMANO Earthquake Research Institute, University of Tokyo

Title of proposal:

S12-57

Thermal structure of the Philippine Sea plate subducting along the Nankai Trough and its relation to seismic activity

Cruise period:

December 3, 2012 – December 8, 2012

Port call:

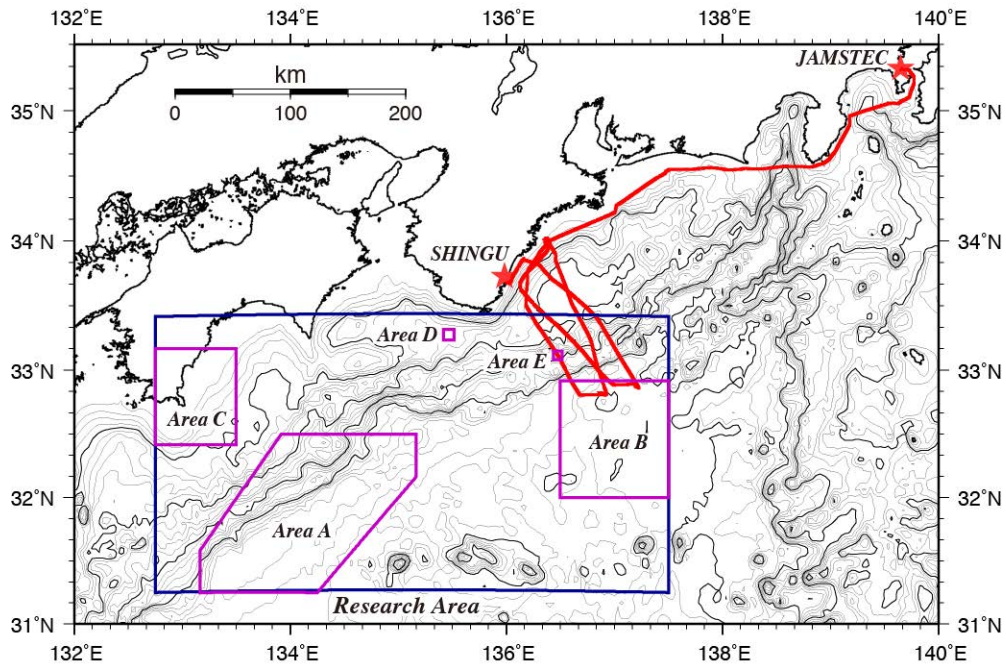
2012 Dec. 3 Dept. from Yokosuka (JAMSTEC)

Dec. 8 Arriv. at Shingu

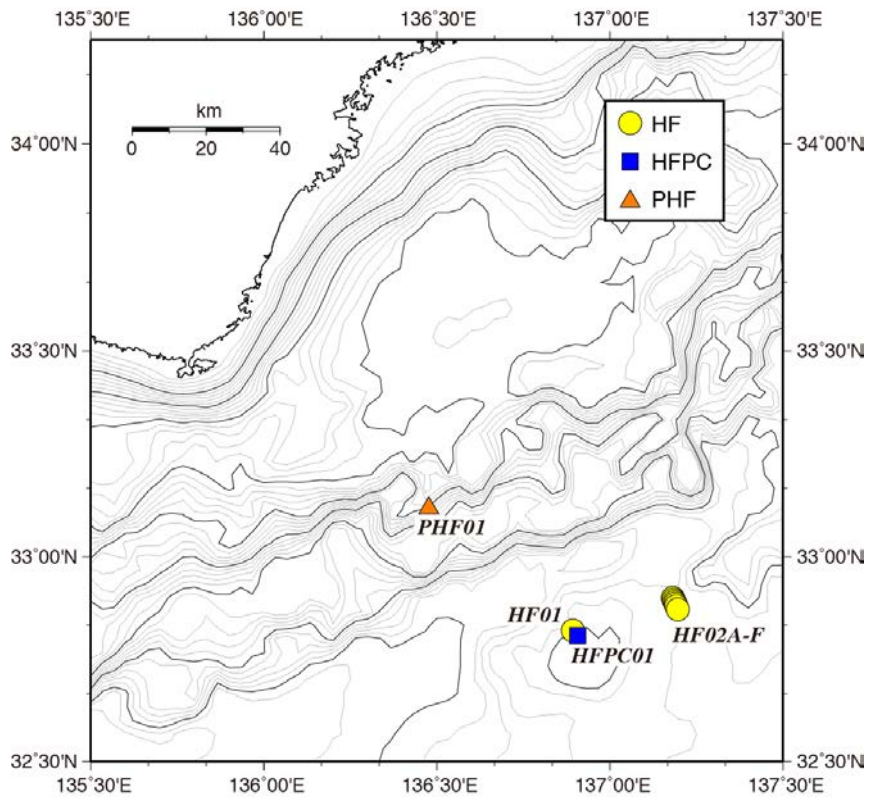
Research area:

Nankai Trough and Shikoku Basin

Research maps:



Research area and ship track of KY12-14 cruise



Measurement and sampling stations on KY12-14 cruise

## 2. Overview of Observation

### Overview of observation

#### [Research objectives]

We conduct heat flow measurements in the Nankai Trough off Shikoku and the Kii Peninsula and in the northernmost part of the Shikoku Basin. Detailed measurements on the floor of the Nankai Trough allow us to delineate the extent of the high heat flow anomaly observed offshore Muroto, which may be related to the structure of the subducting Shikoku Basin crust. In the Shikoku Basin, heat flow variation with the distance from the trough axis is examined for evaluation of influence of advective heat transfer by pore fluid flow in the uppermost part of the oceanic crust. Based on the obtained data, we investigate how seismic activity and deformation process in the Nankai subduction zone is related to the temperature structure around the subductio plate interface, which may be controlled by the structure of the subducting plate. Sediment core samples taken for thermal property measurements are used for studies on the past variation of the Kuroshio current as well.

#### [Research items]

##### (1) Heat flow measurement (HF)

Measurement of temperature profiles in surface sediment with ordinary deep-sea heat flow probes for determination of terrestrial heat flow.

##### (2) Sediment core sampling with heat flow measurement (HFPC)

Sampling of surface sediments with a piston corer and heat flow measurement at the same site using small temperature recorders mounted on the core barrel.

##### (3) Status check of long-term monitoring instrument

Checking the status of a long-term temperature monitoring instrument deployed in 2011 through acoustic communication.

##### (4) Bathymetry survey

Bathymetry mapping with a multi narrow beam system (not conducted due to rough sea condition).

#### [Research results]

##### (1) Heat flow measurement

We carried out heat flow measurements at three sites, two with the deep-sea heat flow probe and one with the HFPC. All the sites were located in the northernmost part of the Shikoku Basin to southeast of the Kii Peninsula. In measurements with the deep-sea heat

flow probe, multiple penetrations were made for examination of local variability in heat flow. The probe or the core barrel successfully penetrated into sediment eight times in total and we could obtain temperature gradient data of good quality.

(2) Piston core sampling

Sediment core sampling was attempted at one station in the Shikoku Basin using the heat flow piston coring system, along the core barrel of which seven temperature recorders were mounted. We obtained a 230 cm long core sample. Visual description and photographing of the sample were conducted on board as well as measurements of thermal properties and color reflectance. Geochemical and micropaleontological analyses will be made on shore.

(3) Status check of long-term monitoring instrument

We checked the status of a pop-up heat flow instrument (PHF), which was deployed on the landward slope of the Nankai Trough offshore the Kii Peninsula in November 2011. The instrument was active and responded to an acoustic signal sent from the ship.