

# Cruise Summary

## 1. Cruise Information

Cruise number:

YK14-21

Ship name:

R/V YOKOSUKA

Title of the cruise:

2014 Deep Sea Research

Studies of fracturing and pore fluid circulation in the oceanic crust subducting along the Japan Trench through heat flow and electromagnetic surveys

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:

S14-27

Studies of fracturing and pore fluid circulation in the oceanic crust subducting along the Japan Trench through heat flow and electromagnetic surveys

Cruise period:

December 15, 2014 – December 24, 2014

Port call:

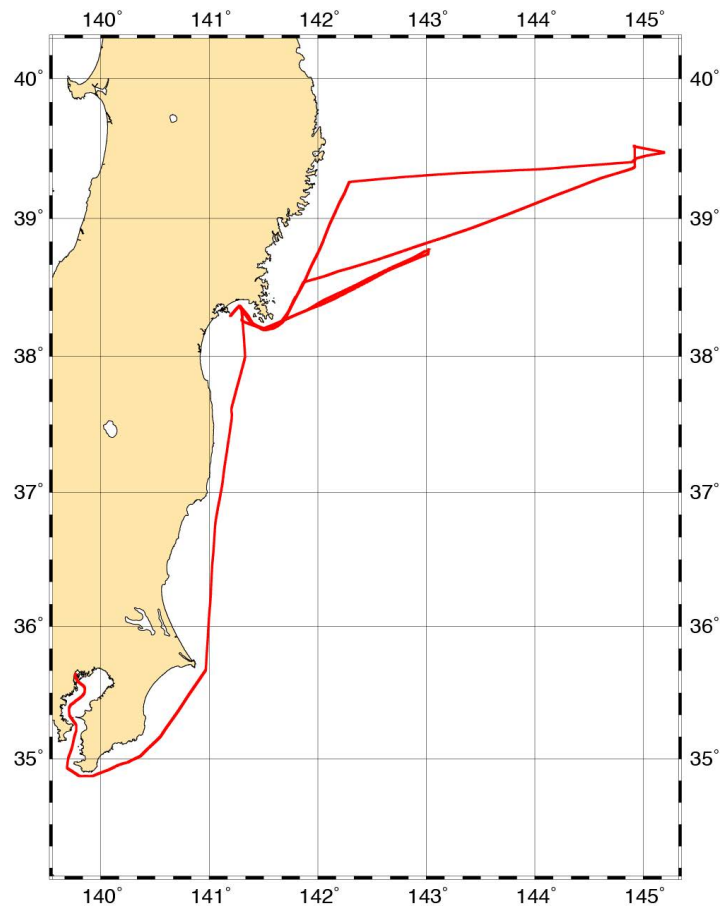
2014 Dec. 15 Dept. from Tokyo (Harumi)

Dec. 24 Arriv. at Sendai (Shiogama)

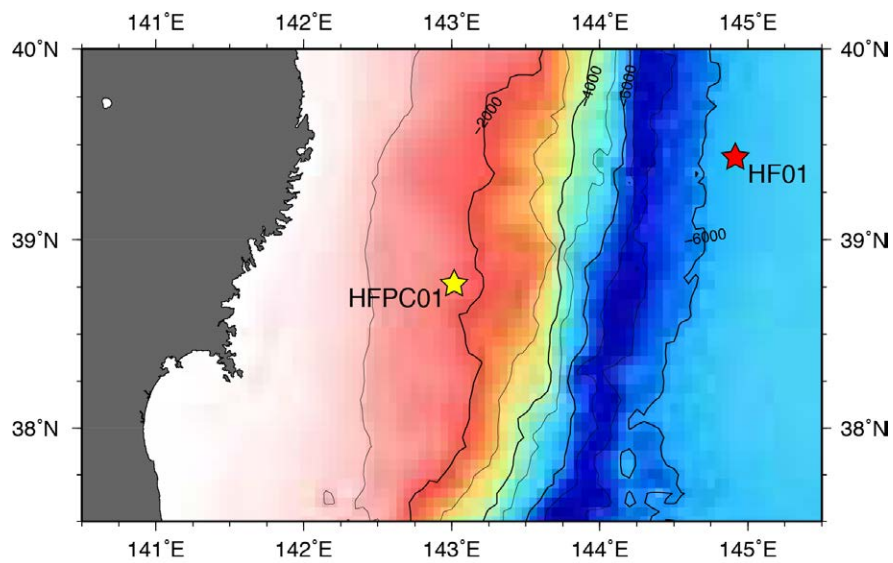
Research area:

Japan Trench area off Sanriku

Research maps:



Ship track of YK14-21 cruise



Measurement and sampling stations on YK14-21 cruise

## 2. Overview of Observation

### Overview of observation

#### [Research objectives]

We conduct heat flow measurements on the Pacific plate seaward of the Japan Trench for investigation of heat transport by pore fluid circulation in the oceanic crust fractured by plate bending, which may have yielded a broad high heat flow anomaly seaward of the trench found by previous studies. Heat flow data in areas to the east and to the west of the observed high values would delineate large-scale heat flow variation with the distance from the trench. Detailed measurements around the sites where local anomalies have been found would provide information on variations at a scale of several kilometers overlapping the large-scale anomaly.

Based on the obtained heat flow distributions and the electrical resistivity structures imaged through electromagnetic surveys, we will be able to reveal how fractures and pore fluid circulation develop seaward of the trench. Our final goal is evaluation of the influence of these processes on the thermal structure and water distribution around the plate interface, for which heat flow data on the landward side of the trench is also important.

#### [Research items]

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

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

##### (2) Sediment core sampling (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) Bathymetry and subbottom profiling surveys

Bathymetry mapping with a multi narrow beam system and surface sediment structure survey with a subbottom profiler.

#### [Research results]

##### (1) Heat flow measurement

We carried out heat flow measurements at two sites. At HF01 located on the upper part of the outer slope of the Japan Trench, measurements with the deep-sea heat flow probe was made twice at an interval of about 400 m. At HFPC01 located on the landward side of the trench, the HFPC (4-m long) fully penetrated into sediments but the obtained temperature profile was significantly disturbed by temporal variations in bottom water temperature.

(2) Sediment core sampling

We obtained a 175.5 cm long core sample with the piston coring system (HFPC) at HFPC01. Visual description and photographing of the sample were conducted on board as well as measurements of thermal properties. Detailed analyses and measurements of other physical properties will be made on shore.

(3) Bathymetry and subbottom profiling surveys

We conducted multi beam echo sounding and subbottom profiling surveys along three lines in small areas around HF01 and HFPC01.