

Cruise Summary

1. Cruise Information

Cruise number:

NT11-23

Ship name:

R/V NATSUSHIMA

Title of the cruise:

2011 Deep Sea Research

Research cruise with NATSUSHIMA

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:

S11-51

Thermal structure of forearc areas of the southwest Japan and Kanto subduction zones
and its relation to seismic activity

Cruise period:

December 16, 2011 – December 26, 2011

Port call:

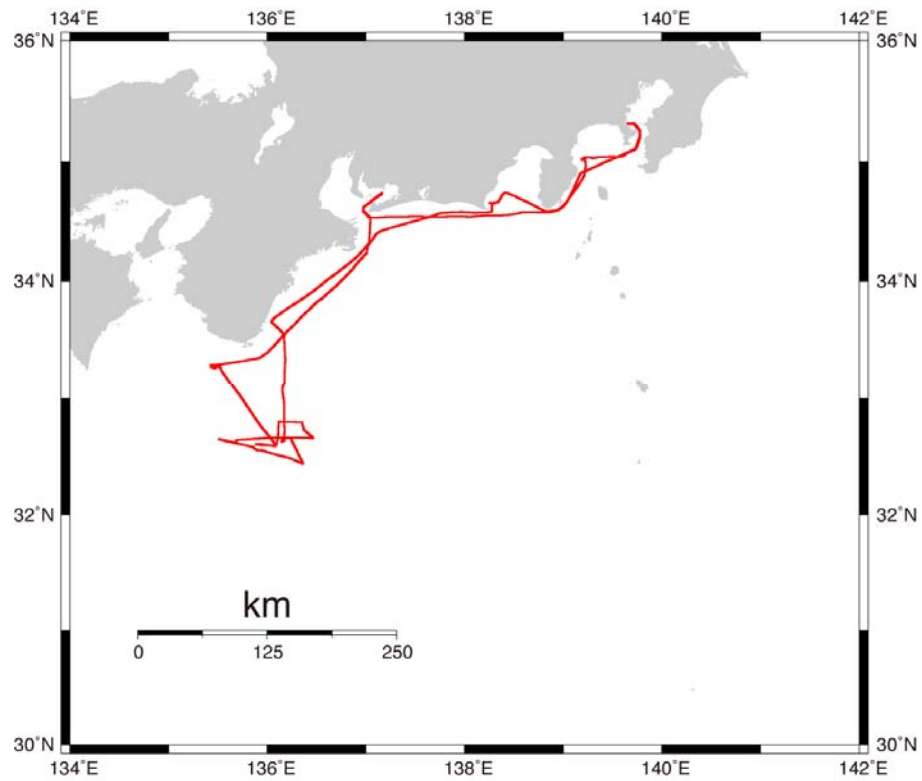
2011 Dec. 16 Dept. from Yokosuka (JAMSTEC)

Dec. 25 Arriv. at Yokosuka (JAMSTEC)

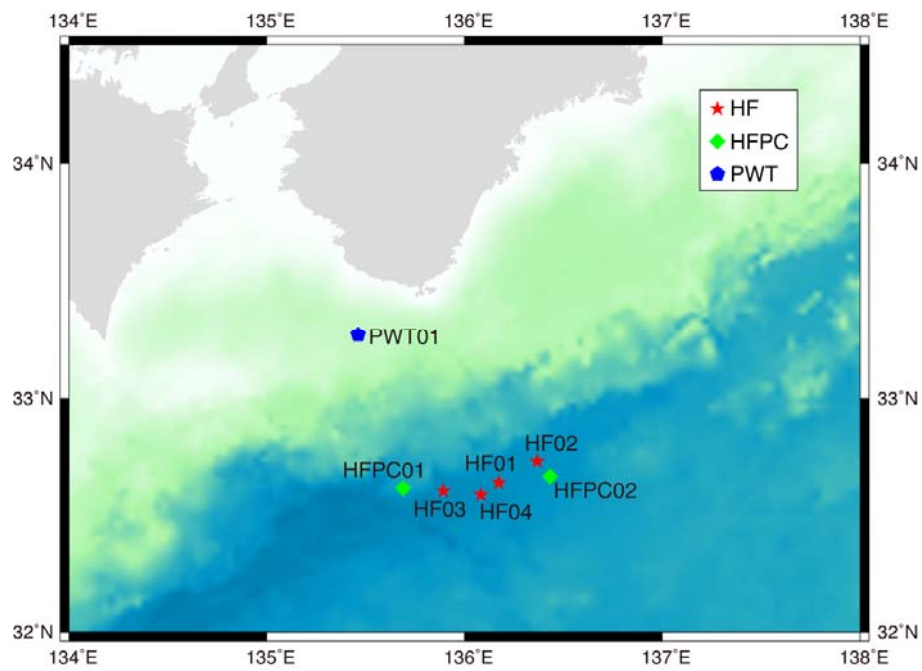
Research area:

Nankai Trough area

Research map:



Ship track of NT11-23 cruise



Measurement and sampling stations on NT11-23 cruise

2. Overview of Observation

Overview of observation

[Research objectives]

We conduct heat flow measurements in the Nankai Trough area south of the Kii Peninsula in order to know detailed heat flow distribution, especially transition of heat flow on the trough floor from high values off Muroto to normal values off Kumano. Based on the obtained data and through numerical modeling, we investigate along-arc variation in the temperature structure around the subduction plate interface (seismogenic zone) associated with variations in the age and crustal structure of the subducting Philippine Sea plate and examine its relation to seismic activity and deformation process.

Surveys in trench areas south of Kanto were also planned in the research proposal. On this cruise, however, we concentrated on surveys in the Nankai Trough area.

[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) Long-term temperature monitoring on the seafloor (PWT)

Long-term monitoring of the bottom water temperature using a pop-up type instrument for evaluation of influence of water temperature variation on heat flow measurement.

(3) 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.

(4) Bathymetry survey

Bathymetry mapping with a multi narrow beam system.

[Research results]

(1) Heat flow measurement

We carried out heat flow measurements at six sites, four with the deep-sea heat flow probe and two with the HFPC. All the sites were located on the floor of the Nankai Trough south of the Kii Peninsula. In measurements with the deep-sea heat flow probe, multiple penetrations were made for examining local variability of heat flow. At one site with HFPC, we could not obtain sediment temperature profile data since the corer fell down right after hitting the bottom. At the other five sites, heat flow probe or corer fully

penetrated into sediment and temperature gradient data of good quality were obtained.

(2) Long-term temperature monitoring on the seafloor

We deployed one pop-up water temperature measurement system (PWT), which continuously monitor water temperature just above the seafloor, at a station in a forearc basin between the Nankai Trough and the Kii Peninsula. The system will be recovered after temperature monitoring for about one year.

(3) Piston core sampling

Sediment core sampling was attempted at two stations on the Nankai Trough floor using the heat flow piston coring system, along the core barrel of which seven temperature recorders were mounted. We obtained a 181 cm long core sample at one station, whereas no sample was obtained at the other station. Visual description and photographing of the sample were conducted on board as well as measurements of physical properties (thermal conductivity/diffusivity and shear strength). Additional physical property measurements will be made on shore.