



R/V Mirai “Cruise Report”
MR19-01

R/V Mirai Performance check test
Kumano trough, Izu • Ogasawara Sea region, Kii
Peninsula southwest offshore, North Sea area of Nankai
Trough, Sagami Bay

May.9, 2019-May.15, 2019

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

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1. Cruise Information

Cruise ID: MR19-01

Name of vessel: R/V Mirai

Title of the cruise : R/V Mirai Performance check test

Cruise period: May 9th, 2019—May 15th, 2019

Ports of departure: Yura(Wakayama)/ arrival: Shimizu(Shizuoka)

Research area: Kumano trough, Izu-Ogasawara sea region, Kii Peninsula southwest offshore, North Sea area of Nankai Trough, Sagami Bay

Research Map

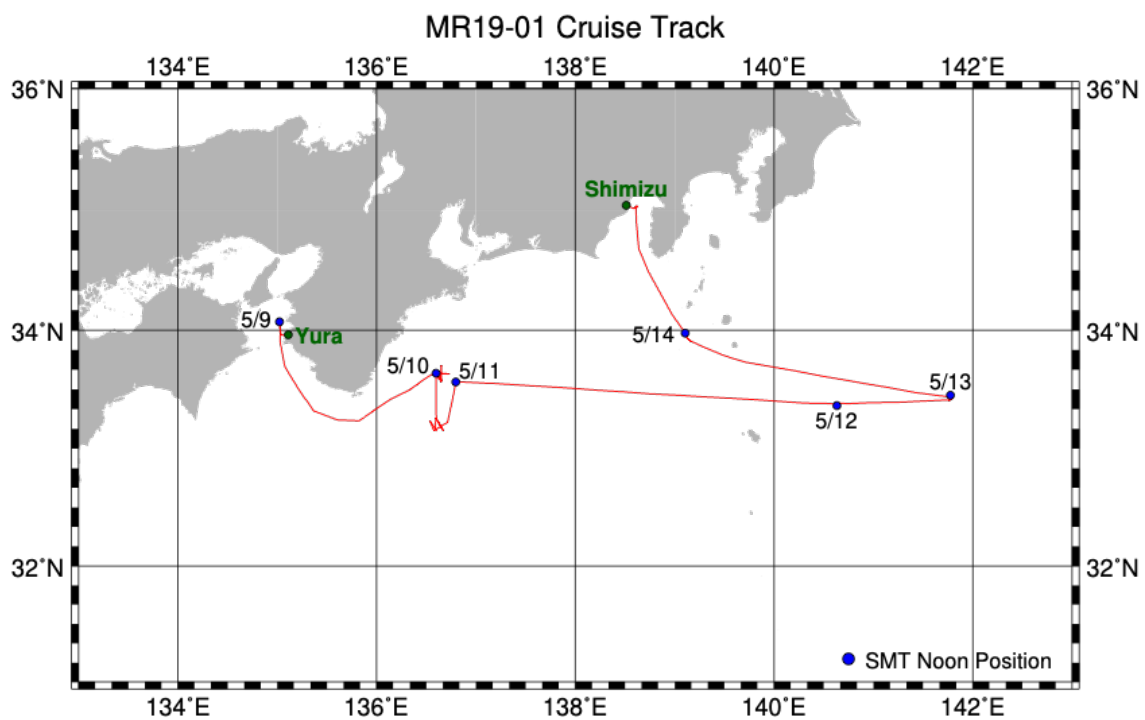


Figure 1-1. Ship track during the cruise MR19-01.

2. Researchers

Chief scientist Junya Niikura Jamstec

Onboard Researchers

Scientist	Yuta Yamamuro	JAMSTEC
Scientist	Natsumi Okutsu	JAMSTEC
Scientist	Masanori Naito	Electronics Management Systems, Ltd.
Marine Technician	Masanori Murakami	Nippon Marine Enterprises, Ltd.
Marine Technician	Shinya Okumra	Nippon Marine Enterprises, Ltd.
Marine Technician	Wataru Tokunaga	Nippon Marine Enterprises, Ltd.
Marine Technician	Kazuho Yoshida	Nippon Marine Enterprises, Ltd.
Marine Technician	Ryo Oyama	Nippon Marine Enterprises, Ltd.
Marine Technician	Yutaro Murakami	Nippon Marine Enterprises, Ltd.
Marine Technician	Koki Kuno	Nippon Marine Enterprises, Ltd.
Marine Technician	Satomi Ogawa	Nippon Marine Enterprises, Ltd.
Marine Technician	Ayumi Sumikawa	Nippon Marine Enterprises, Ltd.
Marine Technician	Jun Matsuoka	Marine Works Japan, Ltd.
Marine Technician	Akira Sou	Marine Works Japan, Ltd.
Marine Technician	Tomoyuki Tanaka	Marine Works Japan, Ltd.
Marine Technician	Mikio Kitada	Marine Works Japan, Ltd.
Marine Technician	Hironori Sato	Marine Works Japan, Ltd.
Marine Technician	Shinsuke Toyoda	Marine Works Japan, Ltd.
Marine Technician	Hiroki Ushiromura	Marine Works Japan, Ltd.
Marine Technician	Keisuke Takeda	Marine Works Japan, Ltd.
Marine Technician	Rio Kobayashi	Marine Works Japan, Ltd.
Marine Technician	Katsunori Sagishima	Marine Works Japan, Ltd.
Marine Technician	Masanori Enoki	Marine Works Japan, Ltd.
Marine Technician	Yasuhiro Arii	Marine Works Japan, Ltd.
Marine Technician	Shinichiro Yokokawa	Marine Works Japan, Ltd.
Marine Technician	Hiroshi Hoshino	Marine Works Japan, Ltd.
Marine Technician	Keitaro Matsumoto	Marine Works Japan, Ltd.
Marine Technician	Masahiro Orui	Marine Works Japan, Ltd.
Marine Technician	Atsushi Ono	Marine Works Japan, Ltd.
Marine Technician	Erii Irie	Marine Works Japan, Ltd.
Marine Technician	Yuko Miyoshi	Marine Works Japan, Ltd.
Marine Technician	Takefumi Kishira	Marine Works Japan, Ltd.

Representative of the Science Party Scientist Hiroshi Uchida JAMSTEC

3. Observation

3.1 Cruise Objectives

- (1) Performance check of Engine and Observation tools.
- (2) Evaluation of the pressure characteristic for the oceanographic sensors

3.2 Activities

(1)Cruise Log

2019/5/8

Scientists board a vessel

15:30 Briefing about ship's life and safety

2019/5/9 Thu. Kumano trough

9:00 Departure
14:30 Started to drive pump for TSG
15:30 Safety training
16:15 Meeting with marine technician and shipboard crew
21:00 Commenced towing the Cesium magnetometer
23:53 Released XBT

2019/5/10 Fri.

0:09-0:45 Carried out eight figure turn
0:58-9:46 Carried out MBES roll bias test
9:45-10:16 Carried out eight figure turn
10:27-10:47 Recovered Cesium magnetometer
13:08-14:25 Carried out CTD winch free fall(2,000 m)
15:23 Started CTD shallow cast operation
15:40 (CTD shallow cast) Error occurred, started to hoist
15:44 CTD on deck
19:03 Released XBT
19:16 Started MBES pitch heading bias and

2019/5/11 Sat. Kumano trough

04:57 Ended MBES pitch heading bias and comprehensive test
06:47-08:11 MBES alignment test
09:29-10:12 CTD shallow cast operation
10:55-11:56 CTD shallow cast operation
13:30-14:04 CTD shallow cast operation
15:11-15:42 CTD shallow cast operation
16:42-17:33 CTD shallow cast operation

2019/5/12 Sun. Izu-Ogasawara sea region

08:00 Released mooring system
08:25 Started ANS test
10:00 Meeting with MWJ, EMS about CTD trouble
15:00 Mooring system on deck
15:30 Started CTD bottom attack(1,300m) operation
16:33 CTD landed on the sea bottom(D=1,319 m)
17:15 Ended CTD bottom attack operation

2019/5/13 Mon. Izu-Ogasawara sea region

06:07-09:41 Carried out CTD winch free fall(6,000 m)
- measured conductor residence during the operation
10:19 Started No.12 winch free fall
12:00 Started cutting and reprocessing the CTD winch cable
13:17 Load testing of winch cable

15:00	Ended reprocessing the CTD winch cable
16:01-20:18	CTD deep cast operation(6,000 m)
2019/5/14 Tue. Izu-Ogasawara sea region	
07:30	Started ADCP testing
10:01-11:33	CTD shallow cast operation(1,000 m)
13:40-14:40	CTD shallow cast operation
15:20-16:50	CTD shallow cast operation
2019/5/15 Wed.	
9:00	Arrived at Shimizu port

(2) List of observation equipment

Oxygen sensor:

RINKO-III [serial no. 0024, 0037], JFE Advantech Co., Ltd., Nishinomiya, Hyogo, Japan

Temperature and pressure logger:

Duet T.D. deep [serial no. 95974], RBR Ltd., Ottawa, Canada

(3) About Data

The oxygen sensors were used as option sensors of the shipboard CTD system (SBE 911plus, Sea-Bird Electronics, Inc., Bellevue, Washington, USA). The sensor output (voltage) was recorded at a rate of 24 Hz and compiled with the CTD data. The sensor output will be used to examine time-dependent pressure-induced effect on the oxygen sensors.

The temperature and pressure (TD) logger was attached to the shipboard CTD frame and the pressure and temperature data were obtained at a rate of 1 Hz during the deep CTD cast. The temperature and pressure data were compared with the temperature and pressure measured by the SBE 9plus CTD (Fig. 3-1). Since the SBE 9plus temperature data was not calibrated in situ according to a method of Uchida et al., 2015, doi:10.1175/JTECH-D-15-0013.1), viscous heating effect (+0.5 mK, Uchida et al., 2007, doi:10.1175/JTECH2093.1) on the SBE 9plus temperature sensor was subtracted from the SBE 9plus temperature data. For pressure comparison, temperature hysteresis of the SBE 9plus pressure sensor was relatively large, therefore, the data obtained during the down cast was used for the evaluation. For temperature comparison, variability of the temperature difference was quite large for shallow depths due to large vertical gradient of temperature, therefore, the data obtained for depths deeper than 2000 dbar was used for the evaluation. Linear fit coefficients were as follows:

$$P_{TD} - P_{9plus} = -1.393 + 0.0009106 P_{9plus}$$

$$T_{TD} - T_{9plus} = -0.0016 + 4.5201e-7 P_{9plus}$$

From these results, accuracy of the pressure and temperature data measured by the TD logger is expected to be 1.4 dbar and 1.6 mK, respectively.

These obtained data will be submitted to JAMSTEC Data Management Group (DMG).

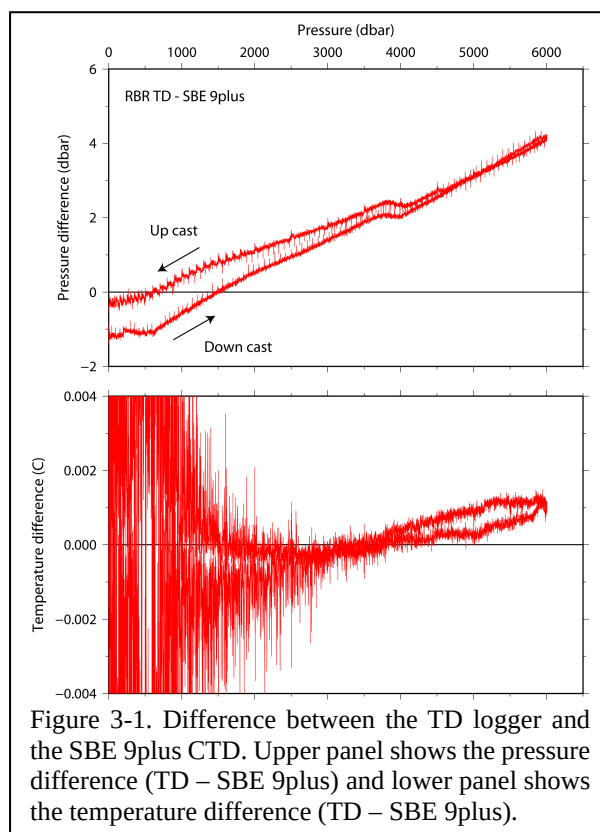


Figure 3-1. Difference between the TD logger and the SBE 9plus CTD. Upper panel shows the pressure difference (TD – SBE 9plus) and lower panel shows the temperature difference (TD – SBE 9plus).

- **4. Notice on Using**

Notice on using: Insert the following notice to users regarding the data and samples obtained.

This cruise report is a preliminary documentation as of the end of the cruise.
This report may not be corrected even if changes on contents (i.e. taxonomic classifications) may be found after its publication. This report may also be changed without notice. Data on this cruise report may be raw or unprocessed. If you are going to use or refer to the data written on this report, please ask the Chief Scientist for latest information.
Users of data or results on this cruise report are requested to submit their results to the Data Management Group of JAMSTEC.