

## Cruise summary

1. Cruise ID/Ship : MR12-01 Leg.2/ 「MIRAI」  
 2. Cruise title : 2012 「MIRAI」 Engineering Cruise and  
 Fundamental experiment for the TSUNAMI-buoy  
 3. Person in charge : Shinya Okumura (MARITEC/ JAMSTEC)  
 4. Embarkation : See Attachment 1  
 5. Area : Off-Hachijyo, Off the Izu Island chain and Ogasawasa  
 Islands, The Pacific coastal area in east Japan  
 6. Cruise Period : 2012/5/20 – 2012/5/30 (Yokohama – Sekinehama)

<Objective>

**Trial Operation**

The operation check of observation equipments and chemical analysis equipments that were introduced newly is carried out in this cruise.

**Fundamental experiment for the TSUNAMI-buoy**

As a part of development of the tsunami detection system, JAMSTEC was carried out acoustic signal test in the sea.

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**Trial Operation**

- (1) Engine Trial
- (2) Observation equipments with a hull

The operation check was carried out the observation equipments shown in Table 1.

Additionally, the free-fall of the cable was carried out about the piston core winch, the Dynacon winch and the CTD winch.

Table 1 : List of observation equipments.

|   |   |
|---|---|
| 1 | ADCP (Acoustic Doppler Current Profiler)  |
| 2 | MBES/SBP                                  |
| 3 | Acoustic Navigation System                |
| 4 | Three-Component Magnetometer              |
| 5 | Doppler Rader                             |
| 6 | XCTD/XBT                                  |
| 7 | Surface Meteorological observation system |

|    |   |
|----|---|
| 8  | Wave Height Meter                           |
| 9  | Ceiriometer                                 |
| 10 | Satellite Data Receiving System             |
| 11 | Navigation System/Network Management System |

(3) chemical analysis equipments

For chemical analysis equipments, maintenance and performance was confirmed.

Table 2 : List of chemical analysis equipments.

|    |   |
|----|---|
| 1  | Water sampling system with CTD                                  |
| 2  | Autosal   |
| 3  | Titration apparatus for dissolved oxygen                        |
| 4  | Nutrients auto analyzer (4ch)                                   |
| 5  | Total CO <sub>2</sub> analyzing system for surface seawater     |
| 6  | pH meter  |
| 7  | Gas Chromatograph   |
| 8  | High-Performance Liquid Chromatographic (HPLC) analyzing system |
| 9  | Spectrofluorophotometer   |
| 10 | Spectrophotometer   |
| 11 | Integrated monitoring system of surface seawater                |
| 12 | pCO <sub>2</sub> analyzing system                               |
| 13 | Ultrapure water purification system                             |
| 14 | Dryer • Electric Muffle Furnace                                 |
| 15 | Draft Chamber   |
| 16 | Air Suction Compressor Pump                                     |
| 17 | Seawater Sampling Pump(for surface later)                       |
| 18 | Clean Room  |
| 19 | Piston Core Sampling System                                     |
| 20 | Core photograph unit  |
| 21 | Spectrophotometer   |
| 22 | Multi Censer Core Logger  |

**Fundamental experiment for the TSUNAMI-buoy**

In the development of tsunami detection system in the fast water current, buoy on the sea surface for receive real-time data was slack mooring and put precision pressure gauge on the ocean floor as an independent buoy on the sea surface.

For the transfer of data using acoustic communication, we research influence the bottom of the sea and sea surface reflection, a transmission and receive angle and

Doppler Effect by the movement of the buoy behavior.

A transmission experiment was carried out at depth of 4,200m and slant range was 3,700-6,000m. Additionally, we reflect the analysis result for system development.

< Overview of Observations >

### **Trial Operation**

We carried out test of all the equipments, and obtained good results.

### **Fundamental experiment for the TSUNAMI-buoy**

Acoustic pulses from a bottom station to a buoy station were recorded those were propagated over 3,000 m of slant range. Recorded data have been processing now. Command signal to a bottom station by acoustic signal was operable. XCTD and noise measurement of R/V MIRAI were also carried out.

| Cruise Member  |   |
|--|---|
| Shinya Okumura   | MARITEC / JAMSTEC                                       |
| Hiroshi Ochi   | MARITEC / JAMSTEC                                       |
| Hiroyasu Mori  | MARITEC / JAMSTEC                                       |
| Tatsuya Fukuda   | MARITEC / JAMSTEC                                       |
| Tomohiko Sugiyama  | MARITEC / JAMSTEC                                       |
| Shigeru Fujita   | Global Ocean Development Inc.                           |
| Keisuke Nakamura   | Global Ocean Development Inc.                           |
| Tsunehiro Takase   | Global Ocean Development Inc.                           |
| Yasuyuki Yoshihara   | E.M.S LTD.  |
| Marine Technician  |   |
| Global Ocean Development Inc.<br>Observation & Research Department | Marine Works Japan LTD.<br>Department of Marine Science |
| Wataru Tokunaga  | Satoshi Ozawa   |
| Katsuhisa Maeno  | Tomonori Watai  |
| Kazuho Yoshida   | Hideki Yamamoto   |
| Harumi Ota   | Katsunori Sagishima                                     |
| Toshimitsu Goto  | Shungo Oshitani   |
| Masanori Murakami  | Tomoyuki Takamori                                       |
| Koichi Inagaki   | Naoko Miyamoto  |
| Toshio Furuta  | Yoshiko Ishikawa  |
|  | Tatsuya Tanaka  |
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|  | Yasushi Hashimoto                                       |
|  | Shohei Taketomo   |
|  | Shoko Tatamisashi                                       |
|  | Ei Hatakeyama   |
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|  | Elena Hayashi   |
|  | Keitaro Matsumoto                                       |
|  | Emi Deguchi   |