

## MIRAI MR12-E02 Leg3 Shipboard Three Component Magnetometer (STCM)

Last Modified: 2019-06-21

[ReadMe](#) [Observation Data](#) [Data Format](#)

Cruise ID: [MR12-E02 Leg3](#)

Shipboard Three Component Magnetometer (STCM): Processed (DMO)-Corrected

Data Policy: [JAMSTEC](#)

Observation Items: X, Y and Z component of geomagnetic field anomaly, Absolute value of geomagnetic field anomaly

Science Keywords:

OCEANS > MARINE GEOPHYSICS > MARINE MAGNETICS  
SOLID EARTH > GEOMAGNETISM

Cruise Report

[http://www.godac.jamstec.go.jp/catalog/data/doc\\_catalog/media/MR12-E02\\_leg3\\_all.pdf](http://www.godac.jamstec.go.jp/catalog/data/doc_catalog/media/MR12-E02_leg3_all.pdf)

### For Using Data

#### Principal Investigator

Data Management Office

#### Use Constraints

See [Terms and Conditions](#) about constrain of use.

#### Data Citation

See [Terms and Conditions](#) about data citation.

### Period (UTC)

2012-03-23 00:06 – 2012-03-29 00:39

### Instrument

Instrument:

Three component magnetometer



### Overview

The data provided is for corrected three component geomagnetic field anomalies. Three-axes flux-gate sensors with ring-cored coils were fixed on the roof of the bridge.

They measure the following items :

- h-component : along track line component, positive for the bow direction pitch.
- s-component : across track line component, positive for the starboard side roll.
- v-component : vertical component, positive for the downward direction.

The effect of ship motion was eliminated by roll and pitch data which was provided by a tilt sensor. The apparent magnetic influence can be detected through a "Figure of 8 turn"(a pair of clockwise and anti-clockwise turns) on each cruise. If no Figure of 8 turn on the cruise was completed, the latest Figure of 8 turn from the previous cruise was applied. As a quality control, data of low reliability was removed (see Data processing for quality control criteria). Synthetic geomagnetic field values were calculated from IGRF models.

### Measurement System

#### (1) Magnetometer

Manufacturer : Tierra Technica Ltd.  
Type : SFG1214  
Measurement range :  $\pm 100,000$  nT  
Accuracy : less than 100 nT  
Resolution : 1 nT  
Location : Dry Laboratory

#### (2) Magnetic Sensor

Manufacturer : Tierra Technica Ltd.  
Form : flux-gate sensors with ring-cored coils  
Location : Foremast

#### (3) Attitude sensor and Gyro compass

Manufacturer : IXBLUE  
Type : PHINS  
Accuracy(Roll, Pitch) : 0.01 degree  
Accuracy(Gyro) : 0.01 degree \*Secant(Lat.)  
Location : In the doppler radar dome

### Duration of the Figure of 8 turn

In MR11-08\_leg3 cruise

Date (UTC)

2012/01/24 12:10:00 - 2012/01/24 12:36:00

2012/02/06 01:11:00 - 2012/02/06 01:45:00

### Data processing

The following corrections and calculations were performed.

- (1) Ship magnetization correction  
 $Hob = ARPYF + Hp \text{ ---(i)}$   
 Hob: Observed magnetic field vector (Ship coordinates)  
 A: Effect of induced magnetization of the ship  
 R: Matrix of rotation due to the roll  
 P: Matrix of rotation due to the pitch  
 Y: Matrix of rotation due to the heading  
 F: Geomagnetic field vector  
 Hp: Ship's permanent magnetic moment

Following the equation(i), we calculate the geomagnetic field F.  
 $RPYF = BHob + Hbp \text{ ---(ii)}$   
 B: coefficient of Figure of 8 turn  
 Hbp: Permanent magnetic field vector of the ship

Reference: Isezaki,N., A new shipboard three-component magnetometer, GEOPHYSICS. VOL.51,NO10(1986);P1992-1998

- (2) International Geomagnetic Reference Field (IGRF)  
 Synthetic geomagnetic field values are calculated from IGRF 11th Generation models by using navigation data ; latitude, longitude and date.  
 Reference: IAGA Division V-MOD Geomagnetic Field Modeling[<http://www.ngdc.noaa.gov/IAGA/vmod/igrf.html>]

- (3) Calculation of the geomagnetic field anomaly  
 $An = F - Figrf$   
 An: Geomagnetic field anomaly vector  
 F: Geomagnetic field vector  
 Figrf: Synthetic geomagnetic field vector from IGRF

- (4) Quality control of data  
 Following criteria were used for removal of data of low reliability:
- Time error (inversion of time, continuation of same timestamps)
  - Summation of the difference of heading by one second exceeding 20 degree per 5 minutes
  - Ground speed of the ship below 3knot or exceeding 20knot
  - X, Y, or Z component of geomagnetic field anomaly exceeding ±4000nT

- (5) Filtering of the geomagnetic field anomaly  
 Due to the residual undulation of the ship, a 120 second length Gaussian filter was applied for each component of the geomagnetic field anomaly data.

- (6) Output of the data  
 Time (UTC)  
 Latitude (degree)  
 Longitude (degree)  
 X: Northward (positive on the north) component of geomagnetic field anomaly (nT)  
 Y: Eastward (positive on the east) component of geomagnetic field anomaly (nT)  
 Z: Vertical (positive for downward) component of geomagnetic field anomaly (nT)  
 T: Absolute value of geomagnetic field anomaly (nT)

#### Coefficient of the Figure of 8 turn and Permanent magnetic field vector of the ship

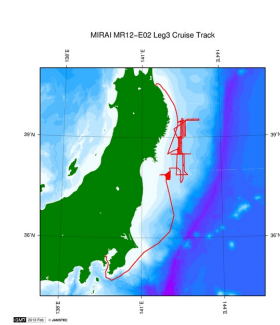
This coefficient was calculated from the above-mentioned Figure of 8 turn

|    |         |        |        |      |           |
|----|---------|--------|--------|------|-----------|
|    | 0.9930  | 0.0570 | 0.0311 |      | 2240.7615 |
| B= | -0.0620 | 1.0581 | 0.0030 | Hbp= | -152.5501 |
|    | 0.0393  | 0.0060 | 0.9712 |      | 712.7126  |

#### Note

- (1) File naming rule: Cruise\_ID\_corr.stcm  
 (2) Sampling rate: 10 seconds  
 (3) Geodetic system: WGS84  
 (4) If you would like the raw data set, please contact us from "Contact Us" above.

#### Related Information



[Enlarge Image](#)

#### MR12-E02 Leg3

Ship Name: MIRAI  
 Period: 2012-03-22 - 2012-03-30  
 Chief Scientist: Hidetaka Nomaki (JAMSTEC)  
 Project Name: [Tohoku Ecosystem-Associated Marine Sciences (TEAMS)]  
 Proposal Title: Marine Ecosystems Investigation, Impact by the mega-earthquake (the 2011 Earthquake of the Pacific coast of Tohoku) and Tsunami: For Recovery and Rebuilding of Sanriku Fisheries Activities

#### Update History

|            |                                    |
|------------|------------------------------------|
| 2019-06-21 | An observation data was registerd. |
| 2018-04-18 | An observation data was registerd. |
| 2014-08-12 | An observation data was registerd. |
| 2014-03-31 | An observation data was registerd. |
| 2013-07-18 | An observation data was registerd. |

JAMSTEC  
Site Policy  
Privacy Policy  
Application for Data and  
Samples  
Data Policy

What's New  
Update History  
Feeds

Lists  
Publication List  
Amount of Public Info.

Data  
Map Search  
Data Tree  
Detailed Search

Information of the Ships  
NATSUSHIMA  
KAIYO  
YOKOSUKA  
MIRAI  
KAIREI  
CHIKYU  
KAIMEI  
SHINSEI MARU  
HAKUHO MARU

Information of the  
Submersibles  
KAIKO  
SHINKAI 2000  
SHINKAI 6500  
DEEP TOW  
HYPER-DOLPHIN  
URASHIMA  
YOKOSUKA DEEP TOW  
6K Camera DEEP TOW  
6K Sonar DEEP TOW  
KM-ROV  
POWER GRAB SAMPLER  
(SHELL)  
POWER GRAB SAMPLER  
(CLOW)  
BMS

Go to a Cruise Information

Cruise ID:

Go to a Dive Information

Dive ID:

Copyright 2011 Japan Agency for Marine-Earth Science and  
Technology



**JAMSTEC**  
JAPAN AGENCY FOR MARINE-EARTH SCIENCE AND TECHNOLOGY

国立研究開発法人  
海洋研究開発機構

## MIRAI MR12-E02 Leg3 Shipboard Three Component Magnetometer (STCM)

Last Modified: 2019-06-21

[ReadMe](#) [Observation Data](#) [Data Format](#)

Cruise ID: [MR12-E02 Leg3](#)

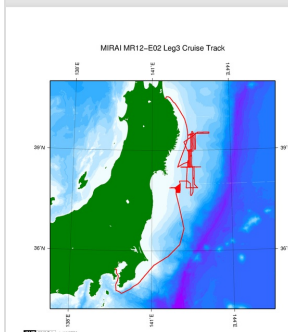
Shipboard Three Component Magnetometer (STCM): Processed (DMO)-Corrected

Data Policy: [JAMSTEC](#)

### STCM Corrected

| No. | Column | Content                                     | Format   | Unit   | Remarks   |
|-----|--------|---|----------|--------|---|
| 1   | 1 - 8  | Date  | i4,i2,i2 |        | YYYYMMDD (UTC)  |
| 2   | 10 -15 | Time  | i2,i2,i2 |        | hhmmss (UTC)  |
| 3   | 17 -25 | Latitude                                    | f9.5     | degree | No sign for the northern hemisphere.<br>Negative for the southern hemisphere. |
| 4   | 27 -36 | Longitude                                   | f10.5    | degree | No sign for eastern hemisphere.<br>Negative for the western hemisphere.       |
| 5   | 38 -43 | X component of geomagnetic field anomaly    | f6.0     | nT     | Positive on the north   |
| 6   | 45 -50 | Y component of geomagnetic field anomaly    | f6.0     | nT     | Positive on the east  |
| 7   | 52 -57 | Z component of geomagnetic field anomaly    | f6.0     | nT     | Positive for downward   |
| 8   | 59 -64 | Absolute value of geomagnetic field anomaly | f6.0     | nT     |   |

### Related Information



[Enlarge Image](#)

#### MR12-E02 Leg3

Ship Name: MIRAI

Period: 2012-03-22 - 2012-03-30

Chief Scientist: Hidetaka Nomaki (JAMSTEC)

Project Name: [Tohoku Ecosystem-Associated Marine Sciences (TEAMS)]

Proposal Title: Marine Ecosystems Investigation, Impact by the mega-earthquake (the 2011 Earthquake of the Pacific coast of Tohoku) and Tsunami: For Recovery and Rebuilding of Sanriku Fisheries Activities

### Update History

|            |                                    |
|------------|------------------------------------|
| 2019-06-21 | An observation data was registerd. |
| 2018-04-18 | An observation data was registerd. |
| 2014-08-12 | An observation data was registerd. |
| 2014-03-31 | An observation data was registerd. |
| 2013-07-18 | An observation data was registerd. |

#### JAMSTEC

[Site Policy](#)  
[Privacy Policy](#)  
[Application for Data and Samples](#)  
[Data Policy](#)

[What's New](#)  
[Update History](#)  
[Feeds](#)

#### Lists

[Publication List](#)  
[Amount of Public Info.](#)  
  
[Data](#)  
[Map Search](#)  
[Data Tree](#)  
[Detailed Search](#)

#### Information of the Ships

[NATSUSHIMA](#)  
[KAIYO](#)  
[YOKOSUKA](#)  
[MIRAI](#)  
[KAIREI](#)  
[CHIKYU](#)  
[KAIMEI](#)  
[SHINSEI MARU](#)  
[HAKUHO MARU](#)

#### Information of the Submersibles

[KAIKO](#)  
[SHINKAI 2000](#)  
[SHINKAI 6500](#)  
[DEEP TOW](#)  
[HYPER-DOLPHIN](#)  
[URASHIMA](#)  
[YOKOSUKA DEEP TOW](#)  
[6K Camera DEEP TOW](#)  
[6K Sonar DEEP TOW](#)  
[KM-ROV](#)  
[POWER GRAB SAMPLER \(SHELL\)](#)  
[POWER GRAB SAMPLER \(CLOW\)](#)  
[BMS](#)

#### Go to a Cruise Information

Cruise ID:

#### Go to a Dive Information

Dive ID:



## MIRAI MR12-E02 Leg3 Shipboard Three Component Magnetometer (STCM)

Last Modified: 2019-06-21

[ReadMe](#) [Observation Data](#) [Data Format](#)

Cruise ID: **MR12-E02 Leg3**

Shipboard Three Component Magnetometer (STCM): Processed (DMO)-Corrected

Data Policy: **JAMSTEC**

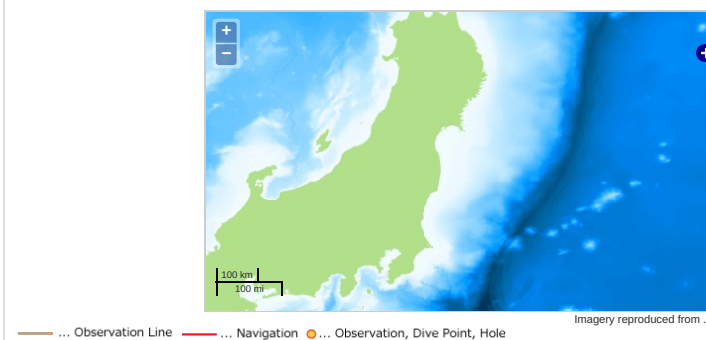
Observation Items: X, Y and Z component of geomagnetic field anomaly, Absolute value of geomagnetic field anomaly

Science Keywords:

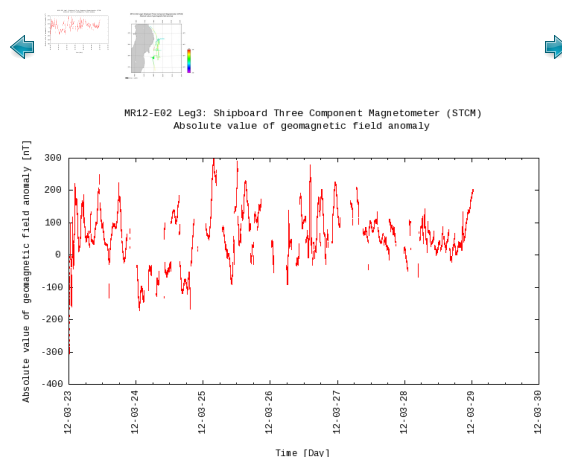
OCEANS > MARINE GEOPHYSICS > MARINE  
MAGNETICS

SOLID EARTH > GEOMAGNETISM

### Observation Map



### Figures



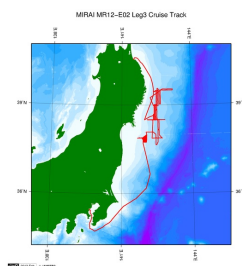
### Data List

[Add to Basket](#)

File names

☐ MR12-E02\_leg3\_corr.stcm

### Related Information



[Enlarge Image](#)

#### MR12-E02 Leg3

Ship Name: MIRAI

Period: 2012-03-22 - 2012-03-30

Chief Scientist: Hidetaka Nomaki (JAMSTEC)

Project Name: [Tohoku Ecosystem-Associated Marine Sciences (TEAMS)]

Proposal Marine Ecosystems Investigation, Impact by the mega-earthquake (the 2011 Earthquake of the Pacific coast of Tohoku) and Tsunami: For Recovery and Rebuilding of Sanriku Fisheries Activities

### Update History

|            |                                     |
|------------|-------------------------------------|
| 2019-06-21 | An observation data was registered. |
| 2018-04-18 | An observation data was registered. |
| 2014-08-12 | An observation data was registered. |
| 2014-03-31 | An observation data was registered. |
| 2013-07-18 | An observation data was registered. |

JAMSTEC

Site Policy  
Privacy Policy  
Application for Data and Samples  
Data Policy

What's New

Update History  
Feeds

Lists

Publication List  
Amount of Public Info.

Data

Map Search  
Data Tree  
Detailed Search

Information of the Ships

NATSUSHIMA  
KAIYO  
YOKOSUKA  
MIRAI  
KAIREI  
CHIKYU  
KAIMEI  
SHINSEI MARU  
HAKUHO MARU

Information of the Submersibles

KAIKO  
SHINKAI 2000  
SHINKAI 6500  
DEEP TOW  
HYPER-DOLPHIN  
URASHIMA  
YOKOSUKA DEEP TOW  
6K Camera DEEP TOW  
6K Sonar DEEP TOW  
KM-ROV  
POWER GRAB SAMPLER (SHELL)  
POWER GRAB SAMPLER (CLOW)  
BMS

Go to a Cruise Information

Cruise ID:

Go to a Dive Information

Dive ID:

