

MIRAI MR20-E01 Shipboard Three Component Magnetometer (STCM)

Last Modified: 2021-03-13

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

Cruise ID: [MR20-E01](#)

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/MR20-E01_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)

2020-08-01 00:19 – 2020-09-13 22:32

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 MR20-E01 cruise

Date (UTC)

2020/08/04 05:31:00 - 2020/08/04 05:54:00

2020/09/07 17:36:00 - 2020/09/07 17:57:00

2020/09/11 23:12:00 - 2020/09/11 23:35:00

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.

$$RPYF = BHob + Hpb \text{ ---(ii)}$$

B : coefficient of Figure of 8 turn

Hpb : 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 13th 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 $\pm 4000nT$

(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

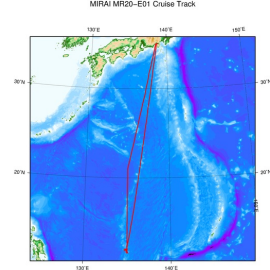
This coefficient was calculated from the above-mentioned Figure of 8 turn

	0.9893	-0.0156	0.0312		3563.4540
B =	0.0163	1.0459	-0.0051	Hpb =	-895.6931
	0.0391	0.0001	0.9568		1672.7472

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



MIRAI MR20-E01 Cruise Track

MR20-E01
Ship Name: MIRAI
Period: 2020-08-01 - 2020-09-13
Chief Scientist: Satoru Yokoi (JAMSTEC)
Proposal ▶ Study on air-sea interaction associated with the northward-propagating boreal summer
Title: intraseasonal oscillation

[Enlarge Image](#)

Update History

2021-03-13	An observation data was registered.
------------	-------------------------------------

Update History
Feeds

KAIMEI
SHINSEI MARU
HAKUHO MARU

YOKOSUKA DEEP TOW
6K Camera DEEP TOW
6K Sonar DEEP TOW
KM-ROV
POWER GRAB SAMPLER
(SHELL)
POWER GRAB SAMPLER
(CLOW)
BMS

Copyright 2011 Japan Agency for Marine-Earth Science and
Technology



JAMSTEC 国立研究開発法人
海洋研究開発機構
JAPAN AGENCY FOR MARINE-EARTH SCIENCE AND TECHNOLOGY

MIRAI MR20-E01 Shipboard Three Component Magnetometer (STCM)

Last Modified: 2021-03-13

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

Cruise ID: [MR20-E01](#)

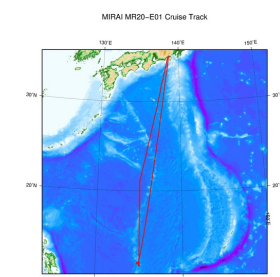
Shipboard Three Component Magnetometer (STCM): Processed (DMO)-Corrected

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. Negative for the southern hemisphere.
4	27 -36	Longitude	f10.5	degree	No sign for eastern hemisphere. 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



© 2020 JAMSTEC

[Enlarge Image](#)

MR20-E01

Ship Name: MIRAI

Period: 2020-08-01 - 2020-09-13

Chief Scientist: Satoru Yokoi (JAMSTEC)

Proposal ▶ Study on air-sea interaction associated with the northward-propagating boreal summer intraseasonal oscillation

Update History

2021-03-13 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 MR20-E01 Shipboard Three Component Magnetometer (STCM)

Last Modified: 2021-03-13

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

Cruise ID: [MR20-E01](#)

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

Data Policy: [JAMSTEC](#)

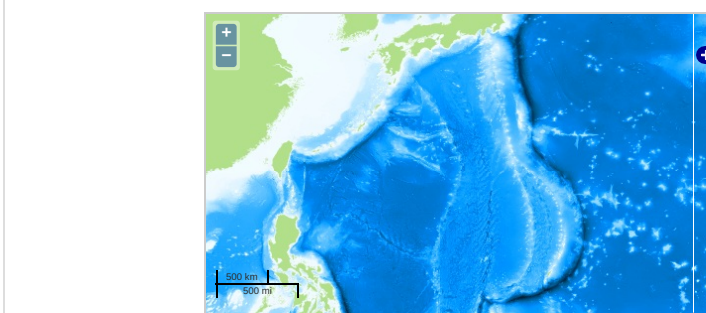
Observation Items: X, Y and Z component of geomagnetic field anomaly, Absolute value of geomagnetic field anomaly

Science Keywords:

OCEANS > MARINE GEOPHYSICS > MARINE
MAGNETICS

SOLID EARTH > GEOMAGNETISM

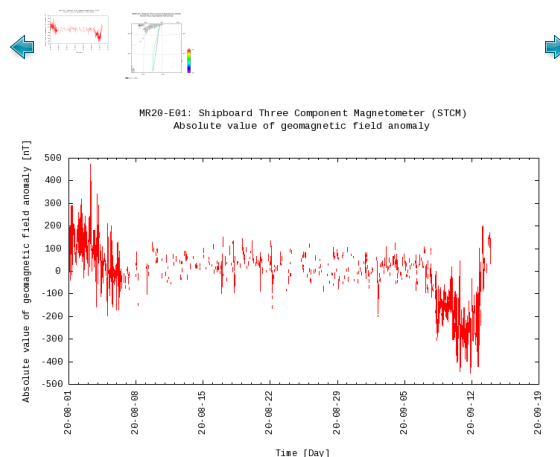
Observation Map



... Observation Line ... Navigation ... Observation, Dive Point, Hole

Imagery reproduced from ...

Figures



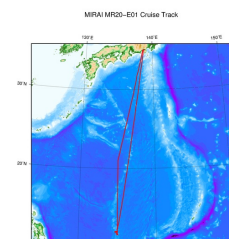
Data List

[Add to Basket](#)

File names

☐ MR20-E01_corr.stcm

Related Information



[Enlarge Image](#)

MR20-E01

Ship Name: MIRAI

Period: 2020-08-01 - 2020-09-13

Chief Scientist: Satoru Yokoi (JAMSTEC)

Proposal ▶ Study on air-sea interaction associated with the northward-propagating boreal summer intraseasonal oscillation

Title:

Update History

2021-03-13 An observation data was registerd.

Application for Data and
Samples
Data Policy

What's New
Update History
Feeds

Data
Map Search
Data Tree
Detailed Search

YOKOSUKA
MIRAI
KAIREI
CHIKYU
KAIMEI
SHINSEI MARU
HAKUHO MARU

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 Dive Information

Dive ID:

Go

Copyright 2011 Japan Agency for Marine-Earth Science and Technology



JAMSTEC

国立研究開発法人
海洋研究開発機構
JAPAN AGENCY FOR MARINE-EARTH SCIENCE AND TECHNOLOGY