

MIRAI MR17-08 Leg2 Shipboard Three Component Magnetometer (STCM)

Last Modified: 2019-08-26

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Cruise ID: [MR17-08 Leg2](#)

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/MR17-08_leg1-2_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)

2018-01-06 02:50 – 2018-01-11 07:30

2018-01-12 00:31 – 2018-01-17 23:27

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 MR17-08_leg1 and MR17-08_leg2 cruise

Date (UTC)

2018/01/01 23:44:00 - 2018/01/02 00:13:00

2018/01/17 20:53:00 - 2018/01/17 21:18:00

Data processing

The following corrections and calculations were performed.

- (1) Ship magnetization correction
 $Hob = ARPYF + Hp$ ---(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.
 $RPYF = BHob + Hbp$ ---(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 12th 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

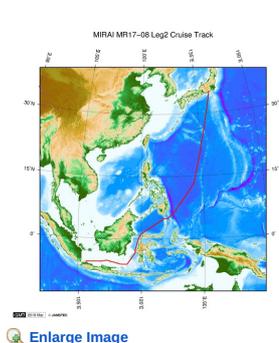
This coefficient was calculated from the above-mentioned Figure of 8 turn

	0.9901	0.0303	0.0320		2132.8088
B =	-0.0357	1.0581	-0.0080	Hbp =	-0.2256
	0.0405	0.0053	0.9548		1559.4623

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



MR17-08 Leg2

Ship Name: MIRAI
 Period: 2018-01-06 - 2018-01-17
 Chief Scientist: Satoru Yokoi (JAMSTEC)
 Project Name: [Tropical Ocean Climate Study (TOCS)]
 Proposal ▶ Study on air-sea interaction over upwelling region in the eastern Indian Ocean
 Title:

Update History

2019-08-26	An observation data was registerd.
2019-06-21	An observation data was registerd.
2018-08-03	An observation data was registerd.

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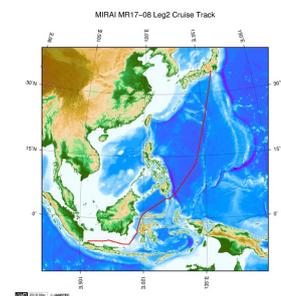
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STCM Corrected

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



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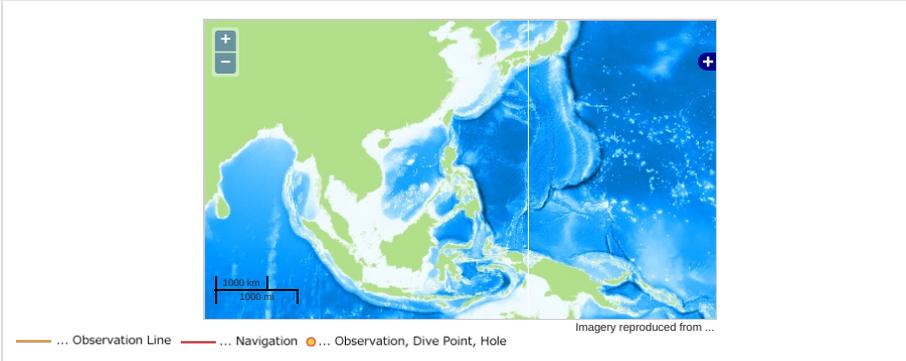
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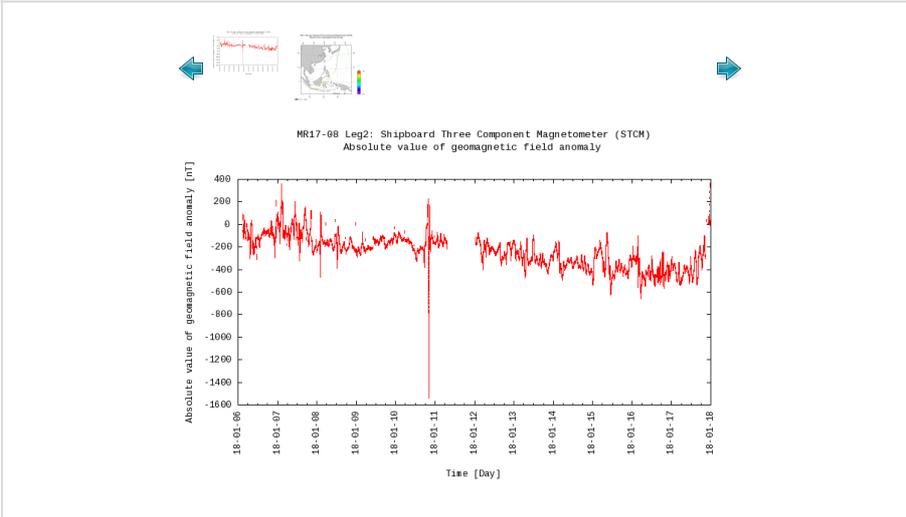
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Observation Map



Figures



Data List

File names

MR17-08_leg2_corr.stcm

Related Information

MIRAI MR17-08 Leg2 Cruise Track

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