

MIRAI MR03-K04 Leg5 Shipboard Three Component Magnetometer (STCM)

Last Modified: 2019-08-26

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Cruise ID: [MR03-K04 Leg5](#)

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

Data Policy: [JAMSTEC](#)

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

Science Keywords:

OCEANS > MARINE GEOPHYSICS > MARINE MAGNETICS
SOLID EARTH > GEOMAGNETISM

Cruise Report

http://www.godac.jamstec.go.jp/catalog/data/doc_catalog/media/MR03-K04_leg5_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)

2003-12-09 06:02 – 2004-01-24 00:22

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 : Honeywell
Type : DRUH
Accuracy(Roll, Pitch) : less than ± 0.03 degree
Accuracy(Gyro) : less than ± 0.06 degree
Location : In the doppler radar dome

Duration of the Figure of 8 turn

In MR03-K04_leg5 cruise

Date (UTC)

2003/12/19 15:48:00 - 2003/12/19 16:16:00

2004/01/15 11:21:00 - 2004/01/15 11:48:00

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 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

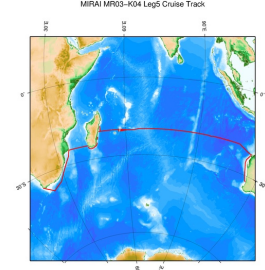
This coefficient was calculated from the above-mentioned Figure of 8 turn

| | | | | | |
|-----|---------|--------|---------|-------|-----------|
| | 0.9961 | 0.0352 | 0.0295 | | 2227.5401 |
| B = | -0.0371 | 1.0608 | -0.0023 | Hbp = | -7.8583 |
| | 0.0386 | 0.0039 | 0.9455 | | 1461.6030 |

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 MR03-K04 Leg5 Cruise Track

MR03-K04 Leg5
Ship Name: MIRAI
Period: 2003-12-09 - 2004-01-24
Chief Scientist: Masao Fukasawa (JAMSTEC)
Project Name: [Blue Earth Global Expedition 2003,POST-WOCE Hydrography]

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Update History

| | |
|------------|------------------------------------|
| 2019-08-26 | An observation data was registerd. |
| 2019-06-25 | An observation data was registerd. |
| 2019-01-25 | An observation data was registerd. |
| 2018-05-18 | An observation data was registerd. |
| 2012-12-25 | An observation data was registerd. |

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Update History
Feeds

Data
Map Search
Data Tree
Detailed Search

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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

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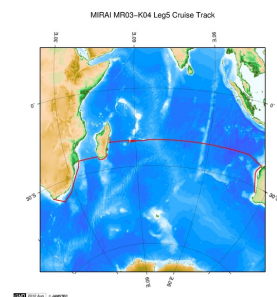
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STCM Corrected

| 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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MR03-K04 Leg5

Ship Name: MIRAI

Period: 2003-12-09 - 2004-01-24

Chief Scientist: Masao Fukasawa (JAMSTEC)

Project Name: [Blue Earth Global Expedition 2003,POST-WOCE Hydrography]

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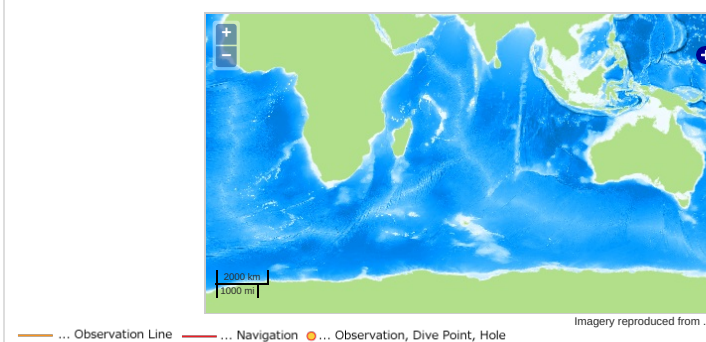
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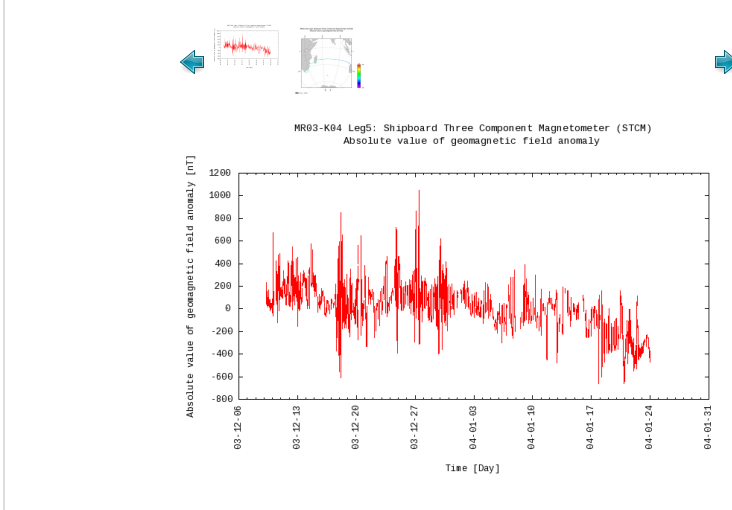
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Observation Map



Figures



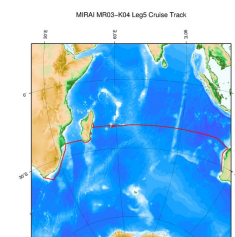
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Related Information



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Period: 2003-12-09 - 2004-01-24

Chief Scientist: Masao Fukasawa (JAMSTEC)

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Update History

Feeds

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