

KAIREI KR05-06 Shipboard Three Component Magnetometer (STCM)

Last Modified: 2019-07-13

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Cruise ID: [KR05-06](#)

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/JAM_RandD04_01.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)

2005-05-26 02:27 – 2005-06-03 20:03

2005-06-05 06:31 – 2005-06-05 14:37

2005-06-06 07:06 – 2005-06-19 23:32

Instrument

Instrument:

3 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 (see section 4.). As a quality control, data of low reliability was removed (see section 5. 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 : No.2 Laboratory (Dry laboratory)

(2) Magnetic Sensor

Manufacturer : Tierra Technica Ltd.

Form : flux-gate sensors with ring-cored coils

Location : Compass deck

(3) Attitude sensor

Manufacturer : Tierra Technica Ltd.

Type : TVM-4

Measurement range : ± 45 degree

Accuracy : ± 0.2 degree (<30 degree)

Resolution : 0.0055 degree / LSB

Location : Gravimeter Room

(4) Gyro compass

Manufacturer : Yokogawa Denshikiki Co.,Ltd.

Type : CMZ500

Follow-Up Speed : 12 degree / sec

Accuracy : ± 0.2 degree *Secant(Lat.)

Location : Bridge deck

Duration of the Figure of 8 turn

In KR05-02 cruise
Date (UTC)
2005/03/07 02:55:00 - 2005/03/07 03:09:00
2005/03/07 22:22:00 - 2005/03/07 23:59:30
2005/03/08 00:00:00 - 2005/03/08 05:58:00

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 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

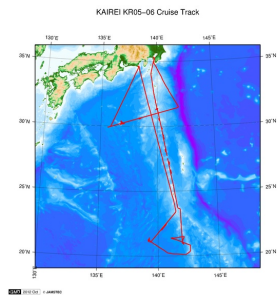
This coefficient was calculated from the Figure of 8 turn (see above)

| | | | | | |
|----|---------|--------|---------|------|-------------|
| | 1.0911 | 0.0939 | -0.0249 | | -1746.2723 |
| B= | -0.0931 | 1.2986 | 0.0536 | Hbp= | -10258.1641 |
| | -0.0349 | 0.0037 | 0.9042 | | -8763.7124 |

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



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KR05-06

Ship Name: KAIKEI

Period: 2005-05-26 - 2005-06-19

Chief Scientist: Yuka Kaiho (JAMSTEC)

Update History

| | |
|------------|-------------------------------------|
| 2019-07-13 | An observation data was registered. |
| 2019-06-21 | An observation data was registered. |
| 2018-03-20 | An observation data was registered. |
| 2014-09-23 | An observation data was registered. |
| 2012-11-25 | An observation data was registered. |

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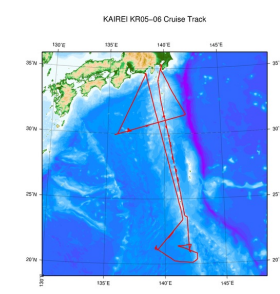
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STCM Corrected

| 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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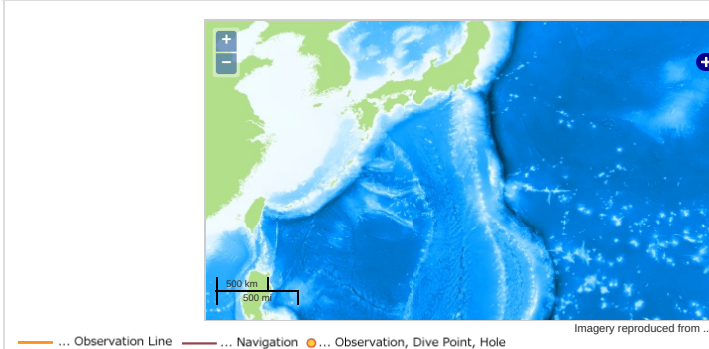
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Science Keywords:

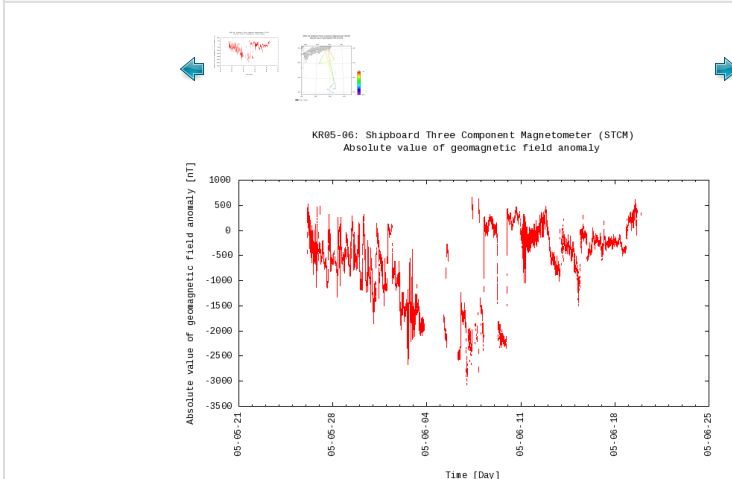
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MAGNETICS

SOLID EARTH > GEOMAGNETISM

Observation Map



Figures



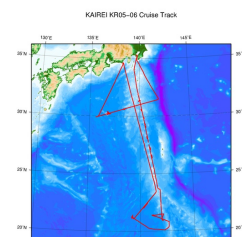
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File names

☐ KR05-06_corr.stcm

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