

KAIREI KR18-08 Shipboard Three Component Magnetometer (STCM)

Last Modified: 2019-08-26

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Cruise ID: [KR18-08](#)

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

For Using Data

Principal Investigator

Data Management Office

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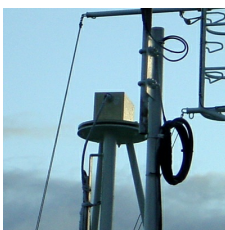
Period (UTC)

2018-07-14 00:09 – 2018-06-17 23:33

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. 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 : 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 and Gyro compass

Manufacturer : IXBLUE

Type : OCTANS

Accuracy(Roll, Pitch) : 0.01 degree

Accuracy(Gyro) : 0.05 degree *Secant(Lat.)

Location : Tank top(on the bottom of ship)

Duration of the Figure of 8 turn

In KR18-07 cruise

Date (UTC)

2018/07/02 22:33:00 - 2018/07/02 22:57:00

2018/07/06 08:35:00 - 2018/07/06 09:01:00

Data processing

The following corrections and calculations were performed.

(1) Ship magnetization correction

$Hob = ARPYF + Hp \rightarrow (I)$

Hob : Observed magnetic field vector (Ship coordinates)

A : Estimated induced magnetization of the ship

A : Effect or 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.

$$RPF = BHob + Hbp \text{ ---(ii)}$$

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 ±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

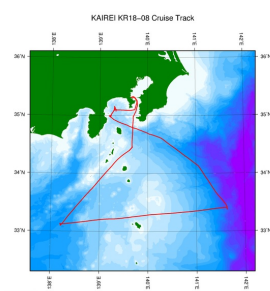
	1.0895	0.0905	-0.0591		1520.7627
B=	-0.0786	1.2996	-0.1268	Hbp=	1028.7951
	-0.0203	0.0024	0.8169		-4640.7576

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

☒ Cruise Data ☐ Dive Data



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KR18-08
Ship Name: KAI REI
Period: 2018-07-14 - 2018-07-17
Chief Scientist: Yoshinobu Nanbu (JAMSTEC)

Update History

2019-08-26	An observation data was registered.
2019-06-12	An observation data was registered.
2019-01-17	An observation data was registered.

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HAKUHO MARU

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

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JAMSTEC

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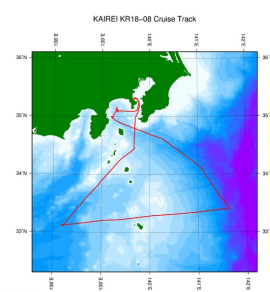
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STCM Corrected

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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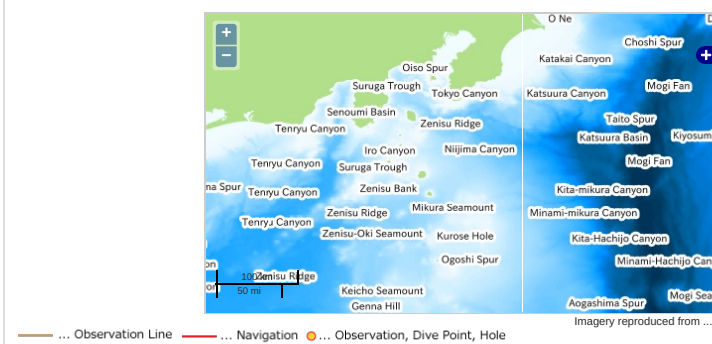
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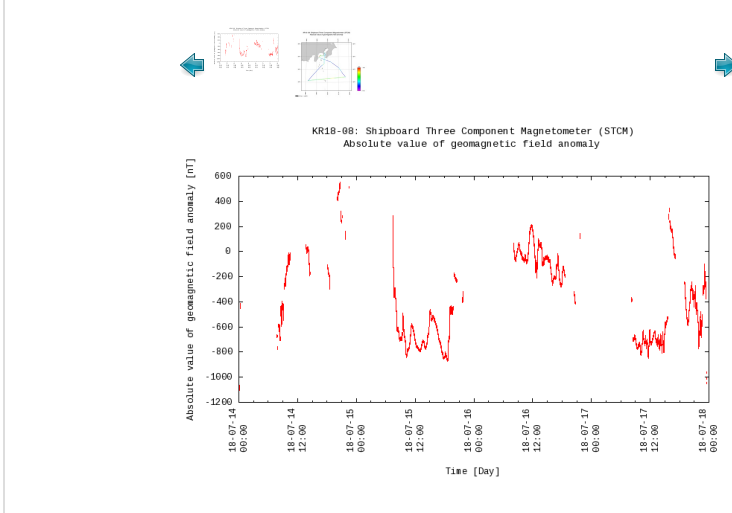
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Observation Map



Figures



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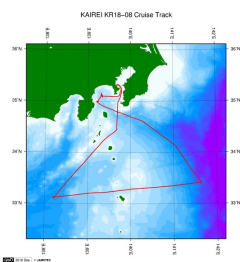
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File names

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