

## KAIREI KR04-05 Shipboard Three Component Magnetometer (STCM)

Last Modified: 2019-06-21

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Cruise ID: [KR04-05](#)

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

### 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)

2004-05-06 01:15 – 2004-05-10 21:57

### 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 :  $\pm 45$  degree

Accuracy :  $\pm 0.2$  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 :  $\pm 0.2$  degree \*Secant(Lat.)

Location : Bridge deck

### Duration of the Figure of 8 turn

In KR04-04 cruise

Date (UTC)

2004/04/15 20:33:00 - 2004/04/15 20:44:00  
2004/04/19 20:12:00 - 2004/04/19 20:23:00

#### 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 11th Generation models by using navigation data ; latitude, longitude and date.

Reference: IAGA Division V-MOD Geomagnetic Field Modeling[<http://www.ngdc.noaa.gov/AGA/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  $\pm 4000\text{nT}$

(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

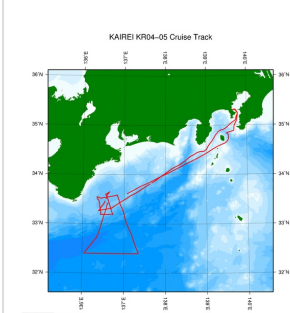
This coefficient was calculated from the Figure of 8 turn (see above)

	1.0917	0.0901	-0.0437		-807.3410
B=	-0.0959	1.2958	-0.0792	Hbp=	-3540.2195
	-0.0233	0.0041	0.8239		-5718.5633

#### 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



#### KR04-05

Ship Name: KAIRESI

Period: 2004-05-06 - 2004-05-10

Chief Scientist: Makoto Yamano (The University of Tokyo)

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#### Update History

2019-06-21	An observation data was registerd.
2018-03-23	An observation data was registerd.
2014-09-23	An observation data was registerd.
2013-12-06	An observation data was registerd.
2012-11-25	An observation data was registerd.

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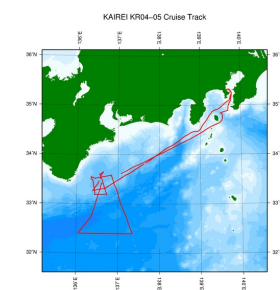
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### STCM Corrected

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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#### KR04-05

Ship Name: KAIKEI

Period: 2004-05-06 - 2004-05-10

Chief Scientist: Makoto Yamano (The University of Tokyo)

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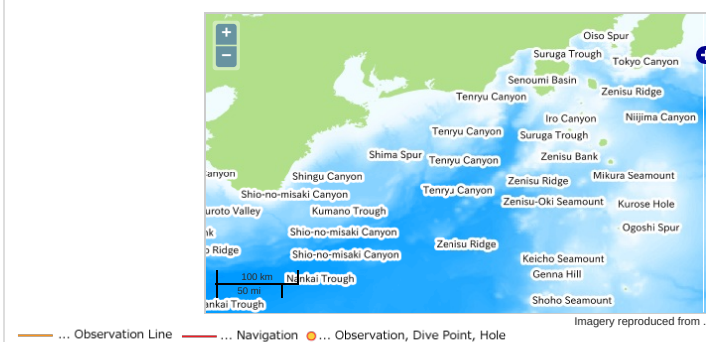
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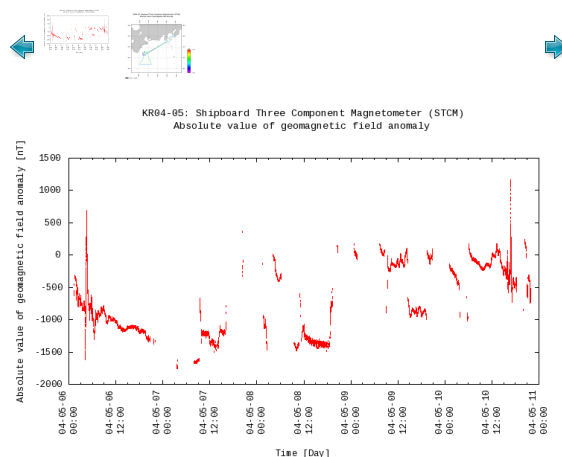
OCEANS > MARINE GEOPHYSICS > MARINE  
MAGNETICS

SOLID EARTH > GEOMAGNETISM

### Observation Map



### Figures



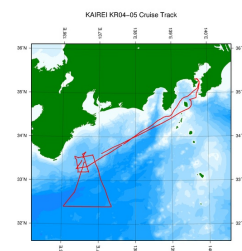
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File names

☐ KR04-05\_corr.stcm

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