

## KAIREI KR99-12 Shipboard Three Component Magnetometer (STCM)

Last Modified: 2019-08-26

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Cruise ID: [KR99-12](#)

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/KR99-12\\_all.pdf](http://www.godac.jamstec.go.jp/catalog/data/doc_catalog/media/KR99-12_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)

2000-01-29 06:20 – 2000-01-29 06:50  
2000-01-16 23:41 – 2000-01-20 08:08  
2000-01-16 13:01 – 2000-01-16 15:58  
2000-01-10 02:01 – 2000-01-15 12:59  
2000-01-04 19:01 – 2000-01-08 19:28  
1999-12-27 06:31 – 1999-12-28 16:43  
1999-12-26 01:01 – 1999-12-26 02:59  
1999-12-23 12:41 – 1999-12-25 03:29

### 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 : ±0.2 degree \*Secant(Lat.)  
Location : Bridge deck

#### Duration of the Figure of 8 turn

In KR99-11\_leg3 and KR99-12 cruise  
Date (UTC)  
2000/01/14 04:57:00 - 2000/01/14 05:15:00  
1999/12/10 06:38:00 - 1999/12/10 07:06:00

#### 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 ±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

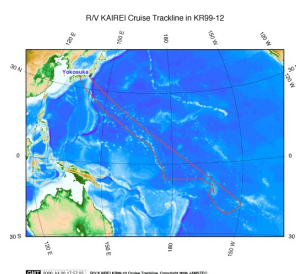
This coefficient was calculated from the above-mentioned Figure of 8 turn

	1.0920	0.0968	0.0157		-3473.3265
B=	-0.1013	1.3024	0.0081	Hbp=	-8255.8231
	-0.0271	0.0056	0.8151		-6012.8478

#### 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



**KR99-12**  
Ship Name: KAIREI  
Period: 1999-12-15 - 2000-02-03  
Chief Scientist: Toshitsugu Yamazaki (Geological Survey of Japan)

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#### Update History

2019-08-26	An observation data was registerd.
2019-06-21	An observation data was registerd.
2019-01-24	An observation data was registerd.

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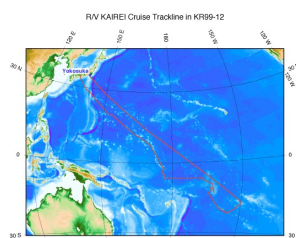
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Data Policy: [JAMSTEC](#)

### 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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Period: 1999-12-15 - 2000-02-03

Chief Scientist: Toshitsugu Yamazaki (Geological Survey of Japan)

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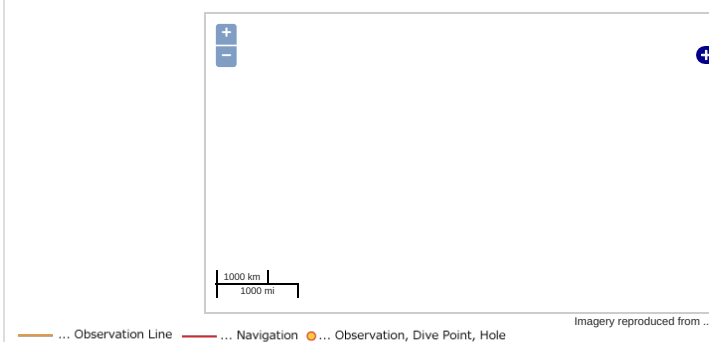
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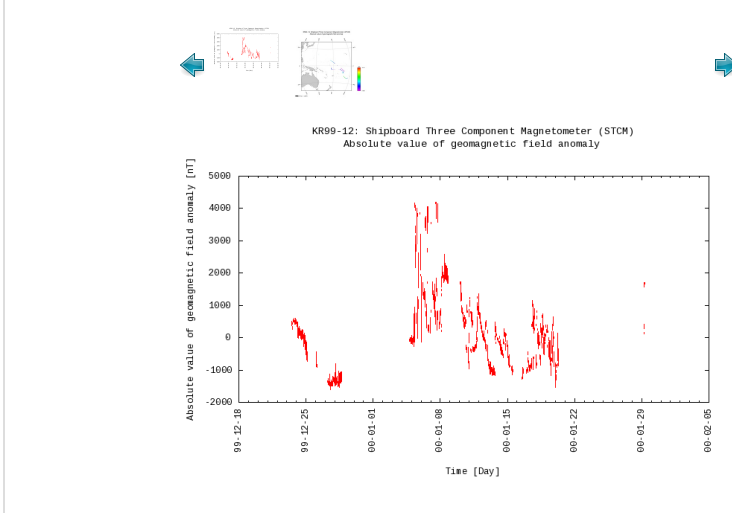
OCEANS > MARINE GEOPHYSICS > MARINE  
MAGNETICS

SOLID EARTH > GEOMAGNETISM

### Observation Map



### Figures

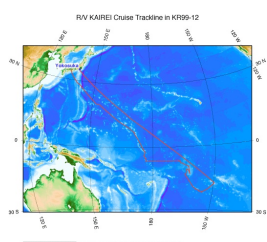


### Data List

File names

☐ KR99-12\_corr.stcm

### Related Information



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Period: 1999-12-15 - 2000-02-03

Chief Scientist: Toshitsugu Yamazaki (Geological Survey of Japan)

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