

KAIREI KR97-11 Shipboard Three Component Magnetometer (STCM)

Last Modified: 2019-08-26

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Cruise ID: [KR97-11](#)

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

Use Constraints

See [Terms and Conditions](#) about constrain of use.

Data Citation

See [Terms and Conditions](#) about data citation.

Period (UTC)

1997-12-11 00:07 – 1997-12-24 12:51

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 KR97-11 cruise

Date (UTC)

1997/12/20 06:00:15 - 1997/12/20 06:27:00
1997/12/22 00:06:00 - 1997/12/22 00:40:00

Data processing

The following corrections and calculations were performed.

(1) Ship magnetization correction

$$\text{Hob} = \text{RPYF} + \text{Hbp} \quad \text{---(i)}$$

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.

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

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

$$\text{An} = \text{F} - \text{Figrf}$$

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

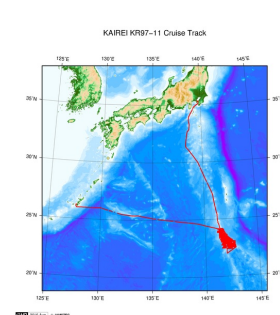
This coefficient was calculated from the above-mentioned Figure of 8 turn

	1.0875	0.0942	0.0275		-6199.3535
B =	-0.0996	1.3064	0.0148	Hbp =	-8685.8660
	-0.0323	0.0079	0.8747		-9079.5351

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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KR97-11

Ship Name: KAIREI
Period: 1997-12-10 - 1997-12-25
Chief Scientist: Jiro Naka (JAMSTEC)

Update History

2019-08-26	An observation data was registerd.
2019-06-21	An observation data was registerd.
2019-01-25	An observation data was registerd.

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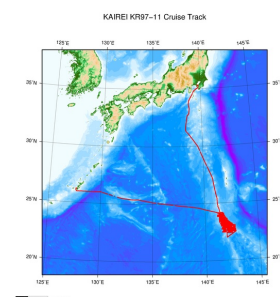
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STCM Corrected

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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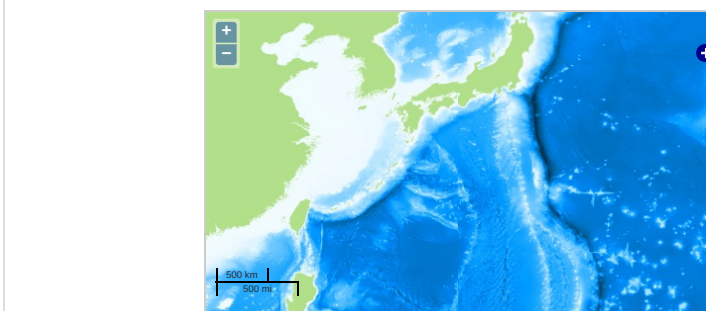
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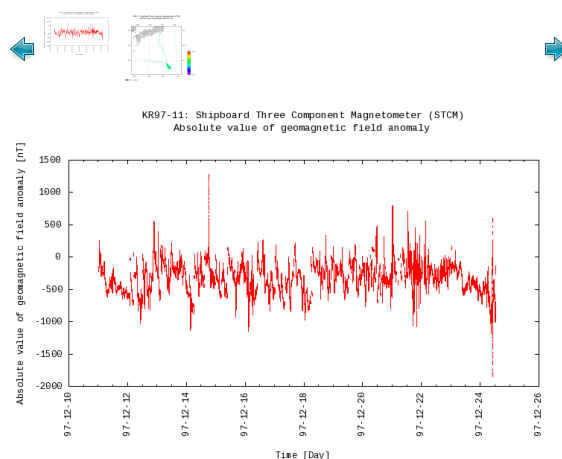
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Observation Map



... Observation Line ... Navigation ... Observation, Dive Point, Hole

Figures



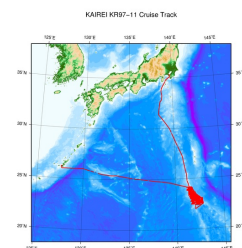
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File names

☐ KR97-11_corr.stcm

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