

KAIREI KR09-16 Shipboard Three Component Magnetometer (STCM)

Last Modified: 2019-06-19

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Cruise ID: [KR09-16](#)

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/KR09-16_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)

2009-10-30 00:16 – 2009-11-11 23:23

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

Direction of the Figure of 8 turn

Duration of the Figure of 8 turn

On this cruise

Date (UTC)

2009-11-05 07:53:00 - 2009-11-05 08:14:00

2009-11-08 07:43:00 - 2009-11-08 08:02:00

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/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 $\pm 4000nT$

(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 section 4.)

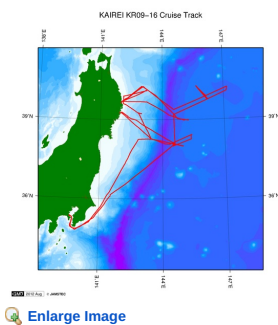
	1.0814	0.0971	0.0594		-5358.4462
B=	-0.0956	1.2906	0.0105	Hbp=	-8049.1617
	-0.0276	0.0040	0.7829		-2866.7222

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



KR09-16

Ship Name: KAIKEI

Period: 2009-10-30 - 2009-11-12

Chief Scientist: Makoto Yamano (The University of Tokyo)

Proposal Title: Studies on the thermal structure and the water distribution in the upper part of the Pacific plate subducting along the Japan Trench

Update History

2019-06-19	An observation data was registered.
2018-03-14	An observation data was registered.
2014-09-23	An observation data was registered.
2012-09-28	An observation data was registered.

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Publication List
Amount of Public Info.

Data

Map Search
Data Tree
Detailed Search

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YOKOSUKA DEEP TOW
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6K Sonar DEEP TOW
KM-ROV
POWER GRAB SAMPLER
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Cruise ID:

Go to a Dive Information

Dive ID:



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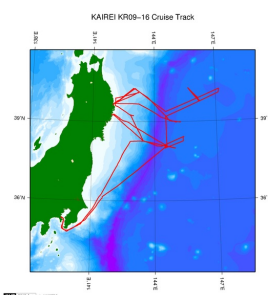
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STCM Corrected

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

[Cruise Data](#) [Dive Data](#)



[Enlarge Image](#)

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Cruise ID:

Go to a Dive Information

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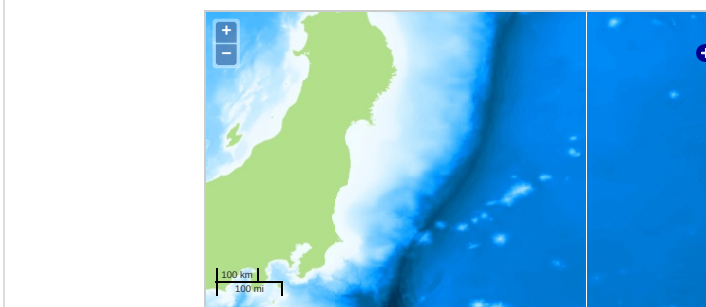
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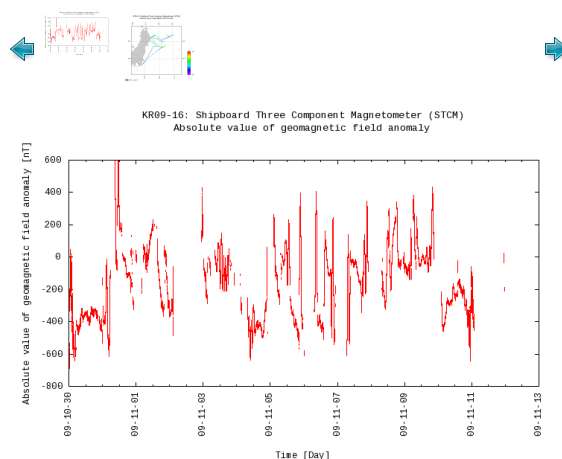
Observation Map



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

Imagery reproduced from ...

Figures



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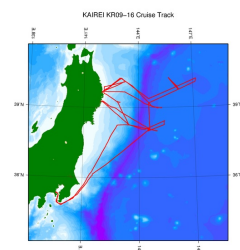
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File names

☐ KR09-16_corr.stcm

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Data Policy

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Update History
Feeds

Lists

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Amount of Public Info.

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Data Tree
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