KAIREI KR01-14 Leg2 Shipboard Three Component Magnetometer (STCM)

Last Modified: 2019-06-21

ReadMe | Observation Data | Data Format

Cruise ID: KR01-14 Leg2
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)
2001-11-20 00:22 – 2001-12-02 23:29

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 : ±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 : Gravitymeter 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 KR01-14_leg2 cruise
Date (UTC)

2001/11/23 21:07:00 - 2001/11/23 21:31:00

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

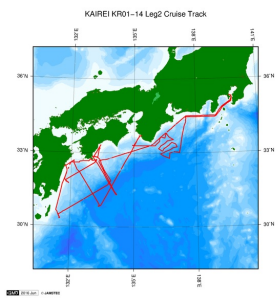
This coefficient was calculated from the Figure of 8 turn (see section 4.)

	1.0972	0.0808	-0.0992		1969.4185
B=	-0.0872	1.3051	-0.0135	Hbp=	-6182.2987
	-0.0394	0.0059	1.1081		-17501.3398

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



Enlarge Image

KR01-14 Leg2
Ship Name: KAIREI
Period: 2001-11-20 - 2001-12-02
Chief Scientist: Tetsuro Tsuru (JAMSTEC)
Project Name: [Seismic study]

Update History

2019-06-21	An observation data was registerd.
2018-05-26	An observation data was registerd.

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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	

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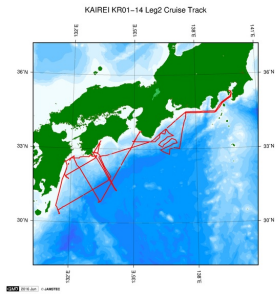

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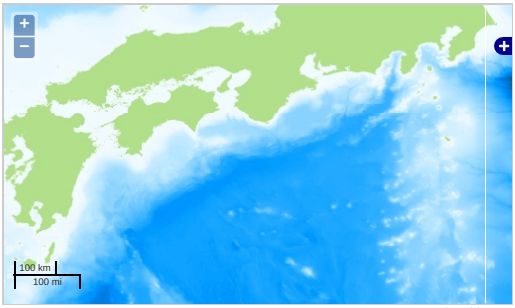
Observation Map



Imagery reproduced from ...

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

Data List

Add to Basket

File names
KR01-14_leg2_corr.stcm

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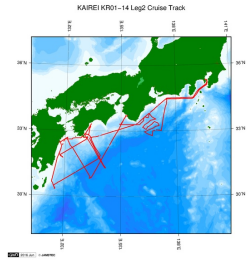

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