KAIREI KR02-01 Shipboard Three Component Magnetometer (STCM)

Last Modified: 2019-08-26

ReadMe | Observation Data | Data Format

Cruise ID: KR02-01
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)

2002-01-09 00:11 – 2002-01-13 05:57
2002-01-13 08:47 – 2002-01-27 03:19
2002-01-27 04:35 – 2002-01-30 20:43

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. As a quality control, data of low reliability was removed (see Data processing 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 KR02-01 cruise
Date (UTC)
2002/01/13 00:43:00 - 2002/01/13 01:07:00
2002/01/17 06:18:00 - 2002/01/17 06:41:00
2002/01/18 15:16:00 - 2002/01/18 15:35:00

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

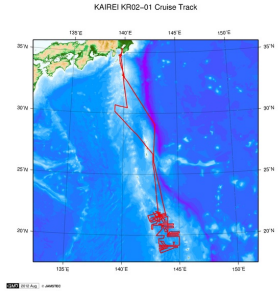
This coefficient was calculated from the above-mentioned Figure of 8 turn

	1.0917	0.0914	0.0171		-3206.4857
B=	-0.0952	1.3089	0.0363	Hbp=	-8092.8040
	-0.0297	0.0036	0.8131		-4796.5801

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

KR02-01
Ship Name: KAIREI
Period: 2002-01-09 - 2002-01-30
Chief Scientist: Makoto Arima (Yokohama National University)

Update History

2019-08-26	An observation data was registerd.
2019-06-21	An observation data was registerd.
2018-10-31	An observation data was registerd.
2018-03-23	An observation data was registerd.
2012-12-25	An observation data was registerd.

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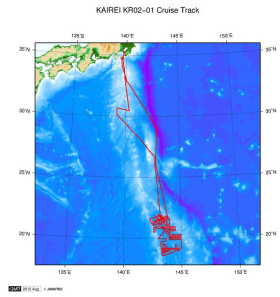
STCM Corrected

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	

Related Information



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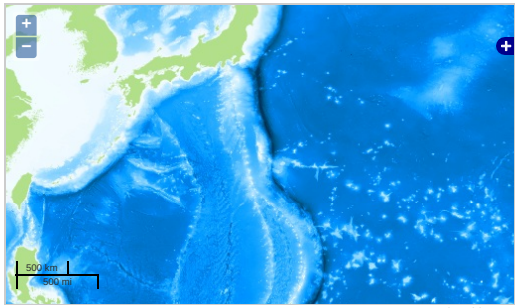
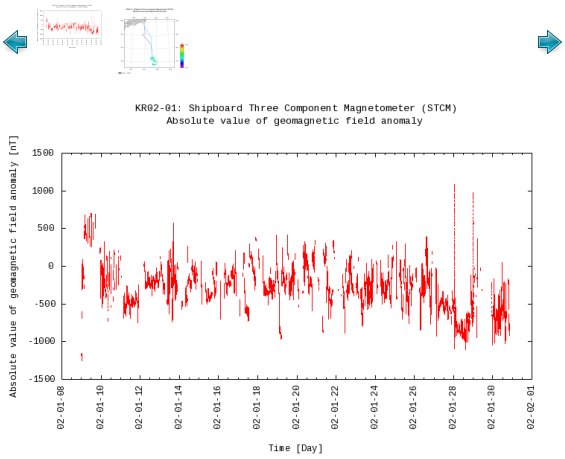
Observation Map



Imagery reproduced from ...

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

Figures



Data List

Add to Basket

File names
KR02-01_corr.stcm

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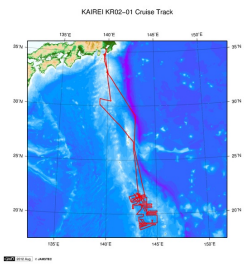

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