README for Shipboard Three Component Magnetometer (STCM) Data

Measurement System

Name:	Magnetometer
Manufacturer:	Tierra Technica Ltd.
Type:	SFG1214
Range:	-100,000 to +100,000 nT
Accuracy:	better than 100 nT
Resolution:	1 nT

Name:	Attitude sensor and Gyro compass
Manufacturer:	Ixsea
Type:	Phins
Range:	-180 to +180 degree
Resolution:	better than 0.01 degree
Accuracy:	+/- 0.01 degree

Data processing

The followings were conducted to produce magnetic fields.

(1) Ship magnetization correction

Hob = ARPYF + Hp --- (i)

where

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

RPYF = BHob + Hbp --- (ii)

where

B:	coefficient of Figure of 8 turn
Hbp:	Permanent magnetic field vector of the ship

(2) International Geomagnetic Reference Field (IGRF)

For calculation of IGRF, the 11th Generation version was used.

It is available from [http://www.ngdc.noaa.gov/IAGA/vmod/igrf.html].

(3) Calculation of the geomagnetic field anomaly

An = F - Figrf

where

An: Geomagnetic field anomaly vector

F: Geomagnetic field vector

Figrf: Synthetic geomagnetic field vector from IGRF

(4) Quality control of data

In case data show any of the followings, those data have been removed.

(a) Time record error

(b) Integrated value of heading change per second exceeds 20 deg/5 min.

(c) Ground speed of ship is faster than 20 kt or slower than 3 kt.

(d) X, Y, or Z-component of geomagnetic field anomaly exceeds ±4000nT.

Data Format

Date in UTC	(yyyymmdd)	i8
Time in UTC	(hhmmss)	1x,i6
Latitude	(degree North)	f10.5
Longitude	(degree East)	f11.5
Northward component of GMF	(nT)	i7
Eastward component of GMF	(nT)	i7
Vertical component of GMF	(nT)	i7
Absolute value of GMF	(nT)	i7

Observation Period

Leg-1	12:06	25 Sept 2011	-	23:58	25 Oct 2011
Leg-2	00:00	29 Oct 2011	-	02:59	01 Dec 2011

Remarks

WGS84 was adopted as a geodetic system.

For more information

Contact to Kunio Yoneyama (yoneyamak [at] jamstec.go.jp)

or

http://www.godac.jamstec.go.jp/darwin/data/mirai/mr11-07_leg1/stcm/e

http://www.godac.jamstec.go.jp/darwin/data/mirai/mr11-07_leg2/stcm/e