

## MIRAI MR04-04 Bottle Sampling Water Chemical Analysis

Last Modified: 2017-07-28

[ReadMe](#) [Observation Data](#) [Data Format](#) [Quality Information](#)

Cruise ID: [MR04-04](#)

Bottle Sampling Water Chemical Analysis: Processed (PI)

Data Policy: [JAMSTEC](#)

Observation Items: Temperature, Salinity, Dissolved oxygen, Silicate, Nitrate, Nitrite, Phosphate, CFC11, CFC12, Total inorganic carbon, Alkalinity, pH, Potential temperature, Density

Science Keywords:

OCEANS > OCEAN CHEMISTRY > DISSOLVED GASES  
OCEANS > OCEAN CHEMISTRY > INORGANIC CARBON  
OCEANS > OCEAN CHEMISTRY > NITRITE  
OCEANS > OCEAN CHEMISTRY > NITRATE  
OCEANS > OCEAN CHEMISTRY > NUTRIENTS  
OCEANS > OCEAN CHEMISTRY > OXYGEN  
OCEANS > OCEAN CHEMISTRY > pH  
OCEANS > OCEAN CHEMISTRY > PHOSPHATE  
OCEANS > OCEAN CHEMISTRY > SILICATE  
OCEANS > OCEAN CHEMISTRY > SALINITY  
OCEANS > OCEAN TEMPERATURE > WATER TEMPERATURE  
OCEANS > SALINITY/DENSITY > SALINITY  
OCEANS > OCEAN CHEMISTRY > ALKALINITY  
OCEANS > OCEAN CHEMISTRY > CARBON  
OCEANS > OCEAN CHEMISTRY > OCEAN TRACERS  
OCEANS > OCEAN TEMPERATURE > POTENTIAL TEMPERATURE

### For Using Data

#### Principal Investigator

CTDTMP : Shuichi Watanabe (JAMSTEC)  
SBE35 : Shuichi Watanabe (JAMSTEC)  
CTDSAL : Shuichi Watanabe (JAMSTEC)  
SALNTY : Shuichi Watanabe (JAMSTEC)  
OXYGEN : Shuichi Watanabe (JAMSTEC)  
SILCAT : Shuichi Watanabe (JAMSTEC)  
NITRAT : Shuichi Watanabe (JAMSTEC)  
NITRIT : Shuichi Watanabe (JAMSTEC)  
PHSPHT : Shuichi Watanabe (JAMSTEC)  
CFC-11 : Masahide Wakita (JAMSTEC)  
CFC-12 : Masahide Wakita (JAMSTEC)  
TCARBN : Shuichi Watanabe (JAMSTEC)  
ALKALI : Shuichi Watanabe (JAMSTEC)  
PH : Shuichi Watanabe (JAMSTEC)

#### Use Constraints

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

#### Data Citation

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

### Instrument

Instrument:  
Salinity measurement system



Instrument:  
Total dissolved inorganic carbon measurement system ( - MR11-E02)



Instrument:  
Gas chromatograph



Instrument:  
Titrator for DO ( - MR11-05 Leg2)



Instrument:  
Nutrient analyzer(4ch) ( - MR09-01)



### Notice

The values of TA and silicate have systematic errors among cruises, because the analytical methods used for these determinations, and the precision and standards for analysis varied slightly from cruise to cruise. The dataset posted here is "corrected" in a cruise. If you need the corrected data for systematic errors among cruises, please see "[Hydrographic Data at Station K2 and KNOT](#)". (Available data are station K2 and KNOT data only.)

### Information on CTD data

- (1) Temperature sensor
 

Model: SBE3, Sea-Bird Electronics, Inc.  
 Measurement range: -5.0 to +35degC  
 Accuracy: 0.001degC  
 Resolution: 0.0002degC
- (2) Salinity sensor
 

Model: SBE4, Sea-Bird Electronics, Inc.  
 Measurement range: 0.0 to 7S/m  
 Accuracy: 0.0003S/m  
 Resolution: 0.00004S/m
- (3) Pressure sensor
 

Model: SBE9plus, Sea-Bird Electronics, Inc.  
 Measurement range: up to 10500m  
 Accuracy: 0.015%F.S.  
 Resolution: 0.001%F.S.
- (4) Deep Ocean Standards Thermometer
 

Model: SBE 35, Sea-Bird Electronics, Inc.

#### Information on Chemical and Biological data

##### 1. Dissolved Oxygen

- (1) Instruments: Burette: APB-510 manufactured by Kyoto Electronic Co. Ltd. / 10 cm<sup>3</sup> of titration vessel  
 Detector and Software: Automatic photometric titrator manufactured by Kimoto Electronic Co. Ltd
- (2) Methods: Winkler method/photometric methods
- (3) Precision: 0.12 umol kg<sup>-1</sup>
- (4) Reference Material/Calibration: 0.001667M KIO<sub>3</sub> solution

##### 2. Salinity

- (1) Instruments: Autosol salinometer model 8400B (Guildline Instruments Ltd.)
- (2) Methods: -
- (3) Precision: 0.0002 PSU
- (4) Reference Material/Calibration: IAPSO Standard Sea Water batch P144 (Ocean Scientific International Ltd.)

##### 3. Silicate

- (1) Instruments: TRAACS800 (Bran+Luebbe)
- (2) Methods: Molybdenum blue method
- (3) Precision: C.V. 0.17% (172uM)
- (4) Reference Material/Calibration: RMNS [Aoyama et al., 2007] and Silicate standard solution, the silicate primary standard, is obtained from Kanto Chemical CO., Inc.

This standard solution is 1000 mg per liter with 0.5 M KOH and prepared for ICP analysis.

##### 4. Nitrate

- (1) Instruments: TRAACS800 (Bran+Luebbe)
- (2) Methods: Diazotization method (reduced to nitrite by Cd-Cu tube)
- (3) Precision: C.V. 0.18% (55uM)
- (4) Reference Material/Calibration: KNO<sub>3</sub> solution and RMNS [Aoyama et al., 2007]

##### 5. Nitrite

- (1) Instruments: TRAACS800 (Bran+Luebbe)
- (2) Methods: Diazotization method
- (3) Precision: C.V. 0.34% (1.2uM)
- (4) Reference Material/Calibration: NaNO<sub>2</sub> solution and RMNS [Aoyama et al., 2007]

##### 6. Phosphate

- (1) Instruments: TRAACS800 (Bran+Luebbe)
- (2) Methods: Molybdenum blue method
- (3) Precision: C.V. 0.26% (3.6uM)
- (4) Reference Material/Calibration: KH<sub>2</sub>PO<sub>4</sub> solution and RMNS [Aoyama et al., 2007]

##### 7. Total inorganic carbon

- (1) Instruments: the automated TCO<sub>2</sub> analyzer (Nippon ANS, Inc.) equipped with carbon coulometer 5012 (UIC Inc.)
- (2) Methods: coulometry
- (3) Precision: 0.9umol kg<sup>-1</sup>
- (4) Reference Material/Calibration: Na<sub>2</sub>CO<sub>3</sub> solution and the CRM provided by Dr. Dickson in Scripps Institute of Oceanography

##### 8. Total Alkalinity

- (1) Instruments: TALK measuring systems (TA-1000), which were made by Nippon ANS, Inc.
- (2) Methods: Modified Gran titration/Closed-cell/Potentiometry
- (3) Precision: 2.4umol kg<sup>-1</sup>
- (4) Reference Material/Calibration: Na<sub>2</sub>CO<sub>3</sub> solution and the CRM provided by Dr. Dickson in Scripps Institute of Oceanography

##### 9. pH

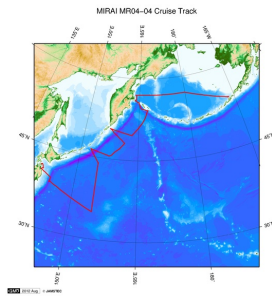
- (1) Instruments: a glass / reference electrode with a pH / Ion meter (Radiometer PHM95)
- (2) Methods: potentiometric methods at 25deg-C
- (3) Precision: The average of absolute differences between replicate samples was 0.001 pH unit
- (4) Reference Material/Calibration: total hydrogen ion scale

##### 10. CFCs

- (1) Instruments: A custom made purging and trapping system was attached to gas chromatograph (GC-14B: Shimadzu Ltd.) having an electron capture detector (ECD-14: Shimadzu Ltd.).
- (2) Methods: see "Cruise Report"
- (3) Precision: CFC-11 and CFC-12 were 0.02pmol/kg and 0.02pmol/kg, respectively
- (4) Reference Material/Calibration: The standard gases of CFCs used in this cruise will be calibrated to SIO scale standard gases after the cruise, and then

the data will be corrected.

#### Related Information



 [Enlarge Image](#)

#### MR04-04

Ship Name: MIRAI  
Period: 2004-08-07 - 2004-08-30  
Chief Scientist: Shuichi Watanabe (JAMSTEC)  
Project Name: [Station K2, Station KNOT]

#### Update History

2017-07-28	An observation data was registerd.
2015-05-29	An observation data was registerd.
2013-08-23	An observation data was registerd.
2012-11-25	An observation data was registerd.

#### JAMSTEC

[Site Policy](#)  
[Privacy Policy](#)  
[Application for Data and Samples](#)  
[Data Policy](#)

**What's New**  
[Update History](#)  
[Feeds](#)

#### Lists

[Publication List](#)  
[Amount of Public Info.](#)

#### Data

[Map Search](#)  
[Data Tree](#)  
[Detailed Search](#)

#### Information of the Ships

NATSUSHIMA  
KAIYO  
YOKOSUKA  
MIRAI  
KAIREI  
CHIKYU  
KAIMEI  
SHINSEI MARU  
HAKUHO MARU

#### Information of the Submersibles

KAIKO  
SHINKAI 2000  
SHINKAI 6500  
DEEP TOW  
HYPER-DOLPHIN  
URASHIMA  
YOKOSUKA DEEP TOW  
6K Camera DEEP TOW  
6K Sonar DEEP TOW  
KM-ROV  
POWER GRAB SAMPLER (SHELL)  
POWER GRAB SAMPLER (CLOW)  
BMS

#### Go to a Cruise Information

Cruise ID:

#### Go to a Dive Information

Dive ID:

Copyright 2011 Japan Agency for Marine-Earth Science and Technology



**JAMSTEC** 国立研究開発法人  
海洋研究開発機構  
JAPAN AGENCY FOR MARINE-EARTH SCIENCE AND TECHNOLOGY

## MIRAI MR04-04 Bottle Sampling Water Chemical Analysis

Last Modified: 2017-07-28

[ReadMe](#) [Observation Data](#) [Data Format](#) [Quality Information](#)

Cruise ID: [MR04-04](#)

Bottle Sampling Water Chemical Analysis: Processed (PI)

Data Policy: [JAMSTEC](#)

### Exchange Format

Provided in the Exchange Format of CCHDO (CLIVAR and Carbon Hydrographic Data Office).

Please see the following link for details of Exchange Format.

[CCHDO | CLIVAR & Carbon Hydrographic Data Office](#)

Format Information

Column No.	Column Heading Mnemonic	Units Mnemonic	Reporting Precision FORTRAN Format	Comments
1	EXPCODE		A14	Expedition code
2	SECT		A6	For WOCE data the WHP section identifier
3	STNNBR		A18	Station number
4	CASTNO		I3	Cast number
5	SAMPNO		A7	Sample number
6	BTLNBR		A7	Bottle identification number
7	BTLNBR_FLAG_W		I1	Bottle quality flag
8	DATE		I8	Cast date(UTC)
9	TIME	UTC	I4	Cast time (UTC)
10	LATITUDE	DEG	F8.3	LATITUDE
11	LONGITUDE	DEG	F9.3	LONGITUDE
12	DEPTH	M	I5	Reported depth to bottom.
13	CTDPRS	DBAR	F9.1	Pressure
14	CTDPRS_FLAG_W		I1	Quality flag for CTD data
15	CTDTMP	ITS-90	F9.4	Temperature
16	CTDTMP_FLAG_W		I1	Quality flag for CTD data
17	SBE35	ITS-90	F9.4	Temperature from Deep Ocean Standards Thermometer
18	SBE35_FLAG_W		I1	Quality flag for CTD data
19	CTDSAL	PSS-78	F9.4	CTD Salinity sensor
20	CTDSAL_FLAG_W		I1	Quality flag for CTD data
21	SALNTY	PSS-78	F9.4	Salinity
22	SALNTY_FLAG_W		I1	Quality flags for water samples
23	OXYGEN	UMOL/KG	F9.1	Oxygen
24	OXYGEN_FLAG_W		I1	Quality flags for water samples
25	SILCAT	UMOL/KG	F9.2	Silicate
26	SILCAT_FLAG_W		I1	Quality flags for water samples
27	NITRAT	UMOL/KG	F9.2	Nitrate
28	NITRAT_FLAG_W		I1	Quality flags for water samples
29	NITRIT	UMOL/KG	F9.2	Nitrite
30	NITRIT_FLAG_W		I1	Quality flags for water samples
31	PHSPHT	UMOL/KG	F9.2	Phosphate
32	PHSPHT_FLAG_W		I1	Quality flags for water samples
33	CFC-11	PMOL/KG	F9.3	Freon-11
34	CFC-11_FLAG_W		I1	Quality flags for water samples
35	CFC-12	PMOL/KG	F9.3	Freon-12
36	CFC-12_FLAG_W		I1	Quality flags for water samples
37	TCARBN	UMOL/KG	F9.1	Total carbon
38	TCARBN_FLAG_W		I1	Quality flags for water samples
39	ALKALI	UMOL/KG	F9.1	Total alkalinity
40	ALKALI_FLAG_W		I1	Quality flags for water samples
41	PH	-	F9.3	pH
42	PH_FLAG_W		I1	Quality flags for water samples
43	THETA	DEG C	F9.4	Potential temperature
44	SIG0	KG/CUM	F9.4	Density

### ODV Format

Please see the following link for details of ODV Format and ODV Software.

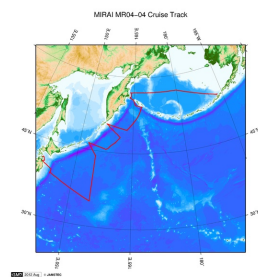
[Ocean Data View \(ODV\)](#)

Format Information

Column No.	Column Heading	Comments
1	Cruise	Cruise Label
2	Station	Station number_Cast number
3	Type	Station type
4	mon/day/yr	Cast date(UTC)
5	hh:mm	Cast time (UTC)
6	Latitude [degrees_north]	LATITUDE
7	Longitude [degrees_east]	LONGITUDE
8	Bot. Depth [m]	Reported depth to bottom.
9	CTDDPT[M]	Depth(Calculate from CTDPRS and LATITUDE)
10	QF	Quality flag for CTD data
11	CTDPRS[DBAR]	Pressure
12	QF	Quality flag for CTD data
13	CTDTMP[ITS-90]	Temperature
14	QF	Quality flag for CTD data

Column No.	Column Heading	Comments
15	SBE35[ITS-90]	Temperature from Deep Ocean Standards Thermometer
16	QF	Quality flag for CTD data
17	CTDSAL[PSS-78]	CTD Salinity sensor
18	QF	Quality flag for CTD data
19	SALNTY[PSS-78]	Salinity
20	QF	Quality flags for water samples
21	OXYGEN[UMOL/KG]	Oxygen
22	QF	Quality flags for water samples
23	SILCAT[UMOL/KG]	Silicate
24	QF	Quality flags for water samples
25	NITRAT[UMOL/KG]	Nitrate
26	QF	Quality flags for water samples
27	NITRIT[UMOL/KG]	Nitrite
28	QF	Quality flags for water samples
29	PHSPHT[UMOL/KG]	Phosphate
30	QF	Quality flags for water samples
31	CFC-11[PMOL/KG]	Freon-11
32	QF	Quality flags for water samples
33	CFC-12[PMOL/KG]	Freon-12
34	QF	Quality flags for water samples
35	TCARBN[UMOL/KG]	Total carbon
36	QF	Quality flags for water samples
37	ALKAL[UMOL/KG]	Total alkalinity
38	QF	Quality flags for water samples
39	PH	pH
40	QF	Quality flags for water samples
41	THETA[DEG C]	Potential temperature
42	QF	Quality flag for CTD data
43	SIG0[KG/CUM]	Density
44	QF	Quality flag for CTD data
45	SAMPNO	Sample number
46	QF	Bottle quality flag

#### Related Information



[Enlarge Image](#)

#### MR04-04

Ship Name: MIRAI  
Period: 2004-08-07 - 2004-08-30  
Chief Scientist: Shuichi Watanabe (JAMSTEC)  
Project Name: [Station K2, Station KNOT]

#### Update History

2017-07-28	An observation data was registered.
2015-05-29	An observation data was registered.
2013-08-23	An observation data was registered.
2012-11-25	An observation data was registered.

JAMSTEC  
Site Policy  
Privacy Policy  
Application for Data and Samples  
Data Policy  
What's New  
Update History  
Feeds

Lists  
Publication List  
Amount of Public Info.  
Data  
Map Search  
Data Tree  
Detailed Search

Information of the Ships  
NATSUSHIMA  
KAIYO  
YOKOSUKA  
MIRAI  
KAIREI  
CHIKYU  
KAIMEI  
SHINSEI MARU  
HAKUHO MARU

Information of the Submersibles  
KAIKO  
SHINKAI 2000  
SHINKAI 6500  
DEEP TOW  
HYPER-DOLPHIN  
URASHIMA  
YOKOSUKA DEEP TOW  
6K Camera DEEP TOW  
6K Sonar DEEP TOW  
KM-ROV  
POWER GRAB  
SAMPLER (SHELL)  
POWER GRAB  
SAMPLER (CLOW)  
BMS

#### Go to a Cruise Information

Cruise ID:

#### Go to a Dive Information

Dive ID:



## MIRAI MR04-04 Bottle Sampling Water Chemical Analysis

Last Modified: 2017-07-28

[ReadMe](#) [Observation Data](#) [Data Format](#) [Quality Information](#)

Cruise ID: [MR04-04](#)

Bottle Sampling Water Chemical Analysis: Processed (PI)

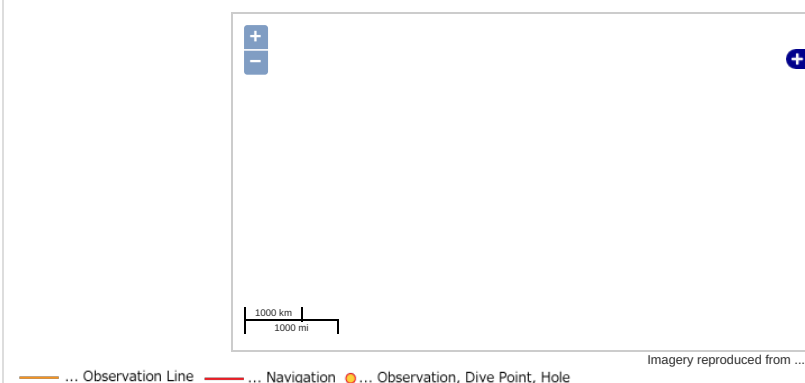
Data Policy: [JAMSTEC](#)

Observation Items: Temperature, Salinity, Dissolved oxygen, Silicate, Nitrate, Nitrite, Phosphate, CFC11, CFC12, Total inorganic carbon, Alkalinity, pH, Potential temperature, Density

Science Keywords:

OCEANS > OCEAN CHEMISTRY > DISSOLVED GASES  
OCEANS > OCEAN CHEMISTRY > INORGANIC CARBON  
OCEANS > OCEAN CHEMISTRY > NITRITE  
OCEANS > OCEAN CHEMISTRY > NITRATE  
OCEANS > OCEAN CHEMISTRY > NUTRIENTS  
OCEANS > OCEAN CHEMISTRY > OXYGEN  
OCEANS > OCEAN CHEMISTRY > pH  
OCEANS > OCEAN CHEMISTRY > PHOSPHATE  
OCEANS > OCEAN CHEMISTRY > SILICATE  
OCEANS > OCEAN CHEMISTRY > SALINITY  
OCEANS > OCEAN TEMPERATURE > WATER TEMPERATURE  
OCEANS > SALINITY/DENSITY > SALINITY  
OCEANS > OCEAN CHEMISTRY > ALKALINITY  
OCEANS > OCEAN CHEMISTRY > CARBON  
OCEANS > OCEAN CHEMISTRY > OCEAN TRACERS  
OCEANS > OCEAN TEMPERATURE > POTENTIAL TEMPERATURE

### Observation Map



### Data List

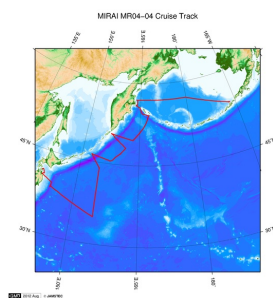
[Add to Basket](#)

☐ File names

☐ MR040400\_ex\_bot.csv

☐ MR040400\_odv\_bot.txt

### Related Information



[Enlarge Image](#)

#### MR04-04

Ship Name: MIRAI

Period: 2004-08-07 - 2004-08-30

Chief Scientist: Shuichi Watanabe (JAMSTEC)

Project Name: [Station K2, Station KNOT]

### Update History

2017-07-28	An observation data was registered.
2015-05-29	An observation data was registered.
2013-08-23	An observation data was registered.
2012-11-25	An observation data was registered.

[Privacy Policy](#)  
[Application for Data and Samples](#)  
[Data Policy](#)  
  
[What's New](#)  
[Update History](#)  
[Feeds](#)

[Amount of Public Info.](#)  
  
[Data](#)  
[Map Search](#)  
[Data Tree](#)  
[Detailed Search](#)

[KAIYO](#)  
[YOKOSUKA](#)  
[MIRAI](#)  
[KAIREI](#)  
[CHIKYU](#)  
[KAIMEI](#)  
[SHINSEI MARU](#)  
[HAKUHO MARU](#)

[KAIKO](#)  
[SHINKAI 2000](#)  
[SHINKAI 6500](#)  
[DEEP TOW](#)  
[HYPER-DOLPHIN](#)  
[URASHIMA](#)  
[YOKOSUKA DEEP TOW](#)  
[6K Camera DEEP TOW](#)  
[6K Sonar DEEP TOW](#)  
[KM-ROV](#)  
[POWER GRAB SAMPLER \(SHELL\)](#)  
[POWER GRAB SAMPLER \(CLOW\)](#)  
[BMS](#)

Cruise ID:

[Go to a Dive Information](#)

Dive ID:

Copyright 2011 Japan Agency for Marine-Earth Science and Technology



**JAMSTEC** 国立研究開発法人  
海洋研究開発機構  
JAPAN AGENCY FOR MARINE-EARTH SCIENCE AND TECHNOLOGY