

MIRAI MR09-01 Leg1 Bottle Sampling Water Chemical Analysis

Last Modified: 2018-01-25

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Cruise ID: [MR09-01 Leg1](#)

Bottle Sampling Water Chemical Analysis: Processed (PI)

Data Policy: [JAMSTEC](#)

Observation Items: Salinity, Dissolved oxygen, Silicate, Nitrate, Nitrite, Phosphate, CFC11, CFC12, CFC113, Total inorganic carbon, Alkalinity, pH, Temperature, Carbon14, Carbon13, 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	> RADIOCARBON
OCEANS > OCEAN CHEMISTRY	> SILICATE
OCEANS > OCEAN CHEMISTRY	> SEA SURFACE TEMPERATURE
OCEANS > OCEAN CHEMISTRY	> SALINITY
OCEANS > OCEAN TEMPERATURE	> WATER TEMPERATURE
OCEANS > SALINITY/DENSITY	> SALINITY
OCEANS > OCEAN CHEMISTRY	> CARBON
OCEANS > OCEAN CHEMISTRY	> OCEAN TRACERS
OCEANS > OCEAN CHEMISTRY	> STABLE ISOTOPES
OCEANS > OCEAN TEMPERATURE	> POTENTIAL TEMPERATURE

Cruise Report

http://www.godac.jamstec.go.jp/catalog/data/doc_catalog/media/MR09-01_leg1-3_all.pdf

For Using Data

Principal Investigator

CTDTMP : Hiroshi Uchida (JAMSTEC)
 SBE35 : Hiroshi Uchida (JAMSTEC)
 CTDSAL : Hiroshi Uchida (JAMSTEC)
 SALNTY : Takeshi Kawano (JAMSTEC)
 CTDOXY : Hiroshi Uchida (JAMSTEC)
 OXYGEN : Yuichiro Kumamoto (JAMSTEC)
 SILCAT : Michio Aoyama (Meteorological Research Institute)
 NITRAT : Michio Aoyama (Meteorological Research Institute)
 NITRIT : Michio Aoyama (Meteorological Research Institute)
 PHSPHT : Michio Aoyama (Meteorological Research Institute)
 CFC-11 : Kenichi Sasaki (JAMSTEC)
 CFC-12 : Kenichi Sasaki (JAMSTEC)
 CFC113 : Kenichi Sasaki (JAMSTEC)
 TCARBON : Akihiko Murata (JAMSTEC)
 ALKALI : Akihiko Murata (JAMSTEC)
 PH_TOT : Akihiko Murata (JAMSTEC)
 DELC14 : Yuichiro Kumamoto (JAMSTEC)
 DELC13 : Yuichiro Kumamoto (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:

Titration for DO (- MR11-05 Leg2)



Instrument:

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





Overview

Please see the [Data book](#) for details of data.

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) DO sensor

RINKO-III(JFE Advantech, Co. Ltd.)

(5) 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 cm³ of titration vessel
Detector: Automatic photometric titrator manufactured by Kimoto Electronic Co. Ltd
- (2) Methods: Winkler method/photometric methods
- (3) Precision: 0.07 umol kg⁻¹ in MR09-01 cruise
- (4) Reference Material/Calibration: 0.001667M KIO₃ solution/Comparison with CSK standard solution (Wako pure chemical industries, Ltd.)

2. Salinity

- (1) Instruments: Autosol salinometer model 8400B (Guildline Instruments Ltd.)
- (2) Methods: -
- (3) Precision: 0.00023 PSU
- (4) Reference Material/Calibration: IAPSO Standard Sea Water batch P150 (Ocean Scientific International Ltd.)

3. Silicate

- (1) Instruments: TRAACS800 (Bran+Luebbe)
- (2) Methods: Molybdenum blue method
- (3) Precision: C.V. 0.07% (170uM) Median, in MR09-01 cruise
- (4) Reference Material/Calibration: RMNS [Aoyama et al., 2006, 2007, 2008] and Silicate standard solution, Silicate standard solution was provided by Merck.
The silicate concentration is certified by NIST-SRM3150 with the uncertainty of 0.5 %.

4. Nitrate

- (1) Instruments: TRAACS800 (Bran+Luebbe)
- (2) Methods: Diazotization method (reduced to nitrite by Cd - Cu tube)
- (3) Precision: C.V. 0.08% (55uM) Median, in MR09-01 cruise
- (4) Reference Material/Calibration: KNO₃ solution and RMNS [Aoyama et al., 2006, 2007, 2008]

5. Nitrite

- (1) Instruments: TRAACS800 (Bran+Luebbe)
- (2) Methods: Diazotization method
- (3) Precision: -
- (4) Reference Material/Calibration: NaNO₂ solution and RMNS [Aoyama et al., 2006, 2007, 2008]

6. Phosphate

- (1) Instruments: TRAACS800 (Bran+Luebbe)
- (2) Methods: Molybdenum blue method
- (3) Precision: C.V. 0.10% (3.6uM) Median, in MR09-01 cruise
- (4) Reference Material/Calibration: KH₂PO₄ solution and RMNS [Aoyama et al., 2006, 2007, 2008]

7. Total inorganic carbon

- (1) Instruments: the automated TCO₂ analyzer (Nippon ANS, Inc.) equipped with carbon coulometer 5012 (UIC Inc.)
- (2) Methods: coulometry
- (3) Precision: 0.6umol kg⁻¹
- (4) Reference Material/Calibration: Na₂CO₃ solution and the CRM provided by Dr. Dickson in Scripps Institute of Oceanography

8. Total Alkalinity

- (1) Instruments: Measurement of A_T was made based on spectrophotometry using a custom-made system(Nippon ANS, Inc.).
The system comprises of a water dispensing unit, an auto-burette (765 Dosimat,Metrohm), and a spectrophotometer (Carry 50 Bio, Varian), which are automatically controlled by a PC.
- (2) Methods: Single step acid additional procedure/spectrophotometry
- (3) Precision: 0.6 umol kg⁻¹
- (4) Reference Material/Calibration: the CRM provided by Dr. Dickson in Scripps Institute of Oceanography

9. pH

- (1) Instruments: Measurement of pH was made by a pH measuring system (Nippon ANS, Inc.), which adopts a method of the spectrophotometric determination.
The measuring system comprises of a water dispensing unit with an auto-sampler and a spectrophotometer (Carry 50 Scan, Varian).
- (2) Methods: spectrophotometric method at 25degC.

(2) Method: Spectrophotometric method at 420nm
(3) Precision: 0.0004 pH unit
(4) Reference Material/Calibration: total hydrogen ion scale

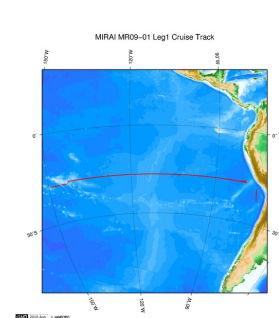
10. CFCs

(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 "DATA BOOK"
(3) Precision: CFC-11 0.010pmol kg⁻¹; CFC-12 0.006pmol kg⁻¹; CFC-113 0.010pmol kg⁻¹
(4) Reference Material/Calibration: see "DATA BOOK"

About this data

There are some description error for nutrient data of this cruise.
Please refer to the errata of the cruise report.

Related Information



[Enlarge Image](#)

MR09-01 Leg1

Ship Name: MIRAI
Period: 2009-04-10 - 2009-05-19
Chief Scientist: Akihiko Murata (JAMSTEC)
Project Name: [POST-WOCE Hydrography, South Pacific Ocean Research Activity 2009]

Update History

2018-01-25	An observation data was registerd.
2015-05-29	An observation data was registerd.
2013-08-29	An observation data was registerd.
2012-09-28	An observation data was registerd.

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6K Sonar DEEP TOW
KM-ROV
POWER GRAB SAMPLER (SHELL)
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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		A6	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	F8.4	LATITUDE
11	LONGITUDE	DEG	F9.4	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	F10.5	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	CTDOXY	UMOL/KG	F9.2	CTD Oxygen sensor
24	CTDOXY_FLAG_W		I1	Quality flag for CTD data
25	OXYGEN	UMOL/KG	F9.2	Oxygen
26	OXYGEN_FLAG_W		I1	Quality flags for water samples
27	SILCAT	UMOL/KG	F9.2	Silicate
28	SILCAT_FLAG_W		I1	Quality flags for water samples
29	SILUNC	UMOL/KG	F9.2	Uncertainty of Silicate data
30	NITRAT	UMOL/KG	F9.2	Nitrate
31	NITRAT_FLAG_W		I1	Quality flags for water samples
32	NRAUNC	UMOL/KG	F9.2	Uncertainty of Nitrate data
33	NITRIT	UMOL/KG	F9.2	Nitrite
34	NITRIT_FLAG_W		I1	Quality flags for water samples
35	NRIUNC	UMOL/KG	F9.2	Uncertainty of Nitrite data
36	PHSPHT	UMOL/KG	F9.3	Phosphate
37	PHSPHT_FLAG_W		I1	Quality flags for water samples
38	PHPUNC	UMOL/KG	F9.3	Uncertainty of Phosphate data
39	CFC-11	PMOL/KG	F9.3	Freon-11
40	CFC-11_FLAG_W		I1	Quality flags for water samples
41	CFC-12	PMOL/KG	F9.3	Freon-12
42	CFC-12_FLAG_W		I1	Quality flags for water samples
43	CFC113	PMOL/KG	F9.3	Freon-113
44	CFC113_FLAG_W		I1	Quality flags for water samples
45	TCARBN	UMOL/KG	F9.1	Total carbon
46	TCARBN_FLAG_W		I1	Quality flags for water samples
47	ALKALI	UMOL/KG	F9.1	Total alkalinity
48	ALKALI_FLAG_W		I1	Quality flags for water samples
49	PH_TOT	-	F9.4	pH (Total scale)
50	PH_TOT_FLAG_W		I1	Quality flags for water samples
51	PH_TMP	DEG C	I9	Temperature of Analysis
52	DELC14	/MILLE	F9.1	14Carbon
53	DELC14_FLAG_W		I1	Quality flags for water samples
54	C14ERR	/MILLE	F9.1	Expected error
55	DELC13	/MILLE	F9.3	13Carbon
56	DELC13_FLAG_W		I1	Quality flags for water samples
57	C13ERR	/MILLE	F9.3	Expected error
58	THETA	DEG C	F9.4	Potential temperature
59	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
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
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	CTDOXY[UMOL/KG]	CTD Oxygen sensor
22	QF	Quality flag for CTD data
23	OXYGEN[UMOL/KG]	Oxygen
24	QF	Quality flags for water samples
25	SILCAT[UMOL/KG]	Silicate
26	QF	Quality flags for water samples
27	SILUNC	Uncertainty of Silicate data
28	QF	Quality flags for water samples
29	NITRAT[UMOL/KG]	Nitrate
30	QF	Quality flags for water samples
31	NRAUNC	Uncertainty of Nitrate data
32	QF	Quality flags for water samples
33	NITRIT[UMOL/KG]	Nitrite
34	QF	Quality flags for water samples
35	NRIUNC	Uncertainty of Nitrite data
36	QF	Quality flags for water samples
37	PHSPHT[UMOL/KG]	Phosphate
38	QF	Quality flags for water samples
39	PHPUNC	Uncertainty of Phosphate data
40	QF	Quality flags for water samples
41	CFC-11[PMOL/KG]	Freon-11
42	QF	Quality flags for water samples
43	CFC-12[PMOL/KG]	Freon-12
44	QF	Quality flags for water samples
45	CFC113[PMOL/KG]	Freon-113
46	QF	Quality flags for water samples
47	TCARBN[UMOL/KG]	Total carbon
48	QF	Quality flags for water samples
49	ALKAL[UMOL/KG]	Total alkalinity
50	QF	Quality flags for water samples
51	PH_TOT	pH (Total scale)
52	QF	Quality flags for water samples
53	PH_TMP[DEG C]	Temperature of Analysis
54	QF	Quality flags for water samples
55	DELC14[/MILLE]	14Carbon
56	QF	Quality flags for water samples
57	C14ERR	Expected error
58	QF	Quality flags for water samples
59	DELC13[/MILLE]	13Carbon
60	QF	Quality flags for water samples
61	C13ERR	Expected error
62	QF	Quality flags for water samples
63	THETA[DEG C]	Potential temperature
64	QF	Quality flag for CTD data
65	SIG0[KG/CUM]	Density
66	QF	Quality flag for CTD data
67	SAMPNO	Sample number
68	QF	Bottle quality flag

Related Information

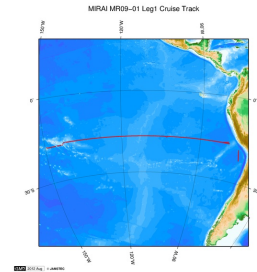
MR09-01 Leg1

Ship Name: MIRAI

Period: 2009-04-10 - 2009-05-19

Chief Scientist: Akihiko Murata (JAMSTEC)

Project Name: [POST-WOCE Hydrography, South Pacific Ocean Research Activity 2009]



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Update History

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Bottle Sampling Water Chemical Analysis: Processed (PI)

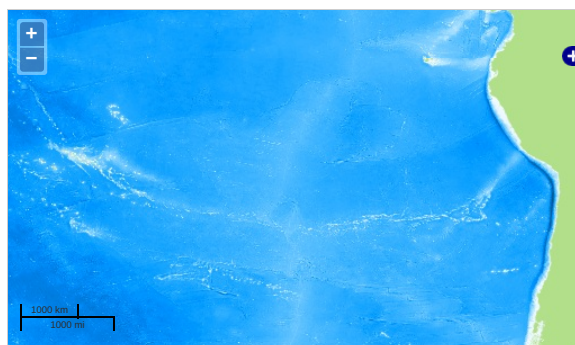
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Observation Items: Salinity, Dissolved oxygen, Silicate, Nitrate, Nitrite, Phosphate, CFC11, CFC12, CFC113, Total inorganic carbon, Alkalinity, pH, Temperature, Carbon14, Carbon13, Potential temperature, Density

Science Keywords:

OCEANS > OCEAN CHEMISTRY > DISSOLVED GASES
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OCEANS > OCEAN CHEMISTRY > STABLE ISOTOPES
OCEANS > OCEAN TEMPERATURE > POTENTIAL TEMPERATURE

Observation Map



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

Imagery reproduced from ...

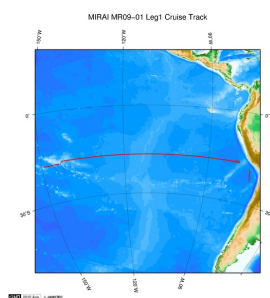
Data List

☐ File names

☐ MR090101_ex_bot.csv

☐ MR090101_odv_bot.txt

Related Information



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MR09-01 Leg1

Ship Name: MIRAI

Period: 2009-04-10 - 2009-05-19

Chief Scientist: Akihiko Murata (JAMSTEC)

Project Name: [POST-WOCE Hydrography, South Pacific Ocean Research Activity 2009]

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