

## MIRAI MR10-01 Leg1 Bottle Sampling Water Chemical Analysis

Last Modified: 2017-07-28

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

Cruise ID: [MR10-01 Leg1](#)

Bottle Sampling Water Chemical Analysis: Processed (DMO/PI)

Data Policy: [JAMSTEC](#)

**Observation Items:** Temperature, Salinity, Dissolved oxygen, Fluorescence, PAR, Chlorophyll, Silicate, Nitrate, Nitrite, Phosphate, Ammonia, Total inorganic carbon, Alkalinity, pH, DOC, Potential temperature, Density

**Science Keywords:**

OCEANS > OCEAN CHEMISTRY	> AMMONIA
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 CHEMISTRY	> CHLOROPHYLL
OCEANS > OCEAN TEMPERATURE	> WATER TEMPERATURE
OCEANS > SALINITY/DENSITY	> SALINITY
OCEANS > OCEAN OPTICS	> PHOTOSYNTHETICALLY ACTIVE RADIATION
OCEANS > OCEAN CHEMISTRY	> ALKALINITY
OCEANS > OCEAN CHEMISTRY	> CARBON
OCEANS > OCEAN OPTICS	> FLUORESCENCE
OCEANS > OCEAN TEMPERATURE	> POTENTIAL TEMPERATURE

**Cruise Report**

[http://www.godac.jamstec.go.jp/catalog/data/doc\\_catalog/media/MR10-01\\_leg1-2\\_all.pdf](http://www.godac.jamstec.go.jp/catalog/data/doc_catalog/media/MR10-01_leg1-2_all.pdf)

### For Using Data

#### Principal Investigator

CTDTMP : Masahide Wakita (JAMSTEC)  
 SBE35 : Masahide Wakita (JAMSTEC)  
 CTDSAL : Masahide Wakita (JAMSTEC)  
 SALNTY : Masahide Wakita (JAMSTEC)  
 CTDOXY : Masahide Wakita (JAMSTEC)  
 OPTOXY : Masahide Wakita (JAMSTEC)  
 OXYGEN : Masahide Wakita (JAMSTEC)  
 FLUOR : Masahide Wakita (JAMSTEC)  
 PAR : Masahide Wakita (JAMSTEC)  
 CHLORA : Kazuhiko Matsumoto(JAMSTEC)  
 CHLWEL : Kazuhiko Matsumoto(JAMSTEC)  
 SILCAT : Masahide Wakita (JAMSTEC)  
 NITRAT : Masahide Wakita (JAMSTEC)  
 NITRIT : Masahide Wakita (JAMSTEC)  
 PHSPHT : Masahide Wakita (JAMSTEC)  
 NH4 : Masahide Wakita (JAMSTEC)  
 TCARBN : Masahide Wakita (JAMSTEC)  
 ALKALI : Masahide Wakita (JAMSTEC)  
 PH : Masahide Wakita (JAMSTEC)  
 DOC : Masahide Wakita (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:

Nutrient analyzer(5ch) (MR09-02 - )



Instrument:

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



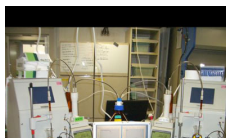
Instrument:

pH meter (MR02-K03 - )



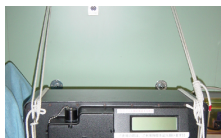
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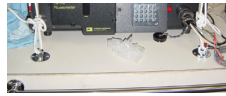
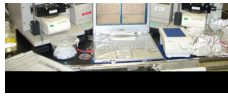
Titration for DO ( - MR11-05 Leg2)



Instrument:

Fluorometer (TURNER DESIGNS)





#### Notice

- Temperature data measured by a mercury thermometer is listed in CTDTMP column at SAMPNO 0 which means sampled by bucket. Please notice that this data is different from other data in format (f9.1) and instrument.
- 11 Jul. 2013 The nutrients concentration data are changed.  
The concentration of nutrients was calculated to correct the overestimate within 0.7%. It was caused for several calculation steps. First, the temperature used for density calculation was the laboratory ambient temperature ( 20 - 27 degrees C ) instead of 20 degrees C. Then, the density was used for converting from  $\text{mol}/\text{cm}^3$  to  $\text{mol}/\text{kg}$ .
- 11 Jul. 2013 add "SBE35", "CTDOXY", "OPTOXY", "FLUOR" and "PAR" data were added.
- 28 Feb. 2014 Data of latitude and longitude are corrected. Because those columns are switched.

#### 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  
Model : SBE43, Sea-Bird Electronics, Inc.  
Measurement range: 120% of surface saturation  
Accuracy: 2% of saturation
- (5) Optode oxygen sensor  
Model: RINKO-III (Alec Eelectronics Co. Ltd.)
- (6) Fluorometer  
Model : Seapoint Sensors, Inc.
- (7) Deep Ocean Standards Thermometer  
Model : SBE 35, Sea-Bird Electronics, Inc.
- (8) PAR  
Model : Satlantic Inc.

#### Information on Chemical and Biological data

- 1.Dissolved Oxygen
  - (1)Instruments : Burette:APB-510 manufactured by Kyoto Electronic Co. Ltd. /  $10\text{ cm}^3$  of titration vessel  
Detector and Software: Automatic photometric titrator manufactured by Kimoto Electronic Co. Ltd
  - (2)Methods : Winkler method/photometric methods
  - (3)Precision :  $0.19\text{ }\mu\text{mol kg}^{-1}$
  - (4)Reference Material/Calibration : 0.001667M  $\text{KIO}_3$  solution
- 2.Salinity
  - (1)Instruments : Autosol salinometer model 8400B(Guildline Instruments Ltd.)
  - (2)Methods : -
  - (3)Precision : 0.0001 PSU
  - (4)Reference Material/Calibration : IAPSO Standard Sea Water batch P151(Ocean Scientific International Ltd.)
- 3.Silicate
  - (1)Instruments : SEAL QuAAtro system
  - (2)Methods : Molybdenum blue method
  - (3)Precision : C.V. 0.11% ( $170\text{ }\mu\text{M}$ )
  - (4)Reference Material/Calibration : RMNS (KANSO Co.,Ltd.) and Silicate standard solution, the silicate primary standard, was obtained from Merck, Ltd. This standard solution, traceable to SRM from NIST was 1000 mg per liter.
- 4.Nitrate
  - (1)Instruments : SEAL QuAAtro system
  - (2)Methods : Diazotization method (reduced to nitrite by Cd - Cu tube)
  - (3)Precision : C.V. 0.13% ( $55.0\text{ }\mu\text{M}$ )
  - (4)Reference Material/Calibration :  $\text{KNO}_3$  solution and RMNS (KANSO Co.,Ltd.)
- 5.Nitrite
  - (1)Instruments : SEAL QuAAtro system
  - (2)Methods : Diazotization method
  - (3)Precision : C.V. 0.22% ( $1.18\text{ }\mu\text{M}$ )
  - (4)Reference Material/Calibration :  $\text{NaNO}_2$  solution and RMNS (KANSO Co.,Ltd.)
- 6.Phosphate
  - (1)Instruments : SEAL QuAAtro system
  - (2)Methods : Molybdenum blue method
  - (3)Precision : C.V. 0.21% ( $3.64\text{ }\mu\text{M}$ )
  - (4)Reference Material/Calibration :  $\text{KH}_2\text{PO}_4$  solution and RMNS (KANSO Co.,Ltd.)
- 7.Ammonia
  - (1)Instruments : SEAL QuAAtro system

- (1)Instruments : SEAL QUAAtro system  
(2)Methods : Indophenol method/gas diffusion method(GDM)  
(3)Precision : C.V. 0.25% (6.0μM)  
(4)Reference Material/Calibration:(NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> solution

#### 8.Total inorganic carbon

- (1)Instruments : automated TCO<sub>2</sub> analyzer (Nippon ANS, Inc.) equipped with carbon coulometer 5012 (UIC Inc.)  
(2)Methods : coulometry  
(3)Precision : 0.7μmol kg<sup>-1</sup>  
(4)Reference Material/Calibration : -

#### 9.Total Alkalinity

- (1)Instruments : Measurement of A<sub>T</sub> was made based on spectrophotometry using a custom-made system(Nippon ANS, Inc.).  
The system comprises of a water dispensing unit and a spectrophotometer (Cary 50 Scan, Varian)  
(2)Methods : single step acid addition procedure/spectrophotometry  
(3)Precision : 0.4 umol kg<sup>-1</sup>  
(4)Reference Material/Calibration : -

#### 10.pH

- (1)Instruments : a glass / reference electrode with a pH / Ion meter (Radiometer PHM240)  
(2)Methods : potentiometric methods at 25deg-C  
(3)Precision : 0.0007 pH unit  
(4)Reference Material/Calibration : total hydrogen ion scale

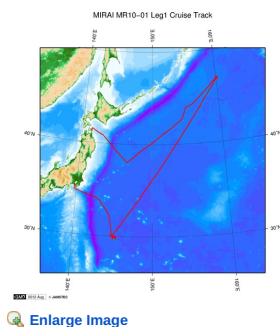
#### 12. Chlorophyll a

- (1)Instruments : Fluorometer model 10-AU-005 (Turner design)  
(2)Methods : Extract in N,N-dimethylformamide / fluorometric determination (Non-acidification method and Acidification method)  
(3)Precision : -  
(4)Reference Material/Calibration : Pure chlorophyll a (Sigma chemical Co.)

#### 13.DOC

- (1)Instruments : Shimadzu TOC-V (Shimadzu)  
(2)Methods : High temperature combustion method  
(3)Precision : -  
(4)Reference Material/Calibration : -

### Related Information



#### MR10-01 Leg1

Ship Name: MIRAI  
Period: 2010-01-19 - 2010-02-06  
Chief Scientist: Kazuhiko Matsumoto (JAMSTEC)  
Project Name: [Station K2, Station S1, Station KEO, Station KNOT]  
Proposal ▶ Change in material cycles and ecosystem by the climate change and its feed back  
Title:

### Update History

2017-07-28	An observation data was registerd.
2015-05-29	An observation data was registerd.
2015-03-04	An observation data was registerd.
2014-02-28	An observation data was registerd.
2013-08-29	An observation data was registerd.
2013-07-30	An observation data was registerd.
2012-11-30	An observation data was registerd.

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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

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Bottle Sampling Water Chemical Analysis: Processed (DMO/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	F8.3	LATITUDE
11	LONGITUDE	DEG	F9.3	LONGITUDE
12	DEPTH	M	I5	Reported depth to bottom.
13	CTDDPT	M	F9.1	Depth
14	CTDDPT_FLAG_W		I1	Quality flag for CTD data
15	CTDPRS	DBAR	F9.1	Pressure
16	CTDPRS_FLAG_W		I1	Quality flag for CTD data
17	CTDTMP	ITS-90	F9.4	Temperature
18	CTDTMP_FLAG_W		I1	Quality flag for CTD data
19	SBE35	ITS-90	F10.5	Temperature from Deep Ocean Standards Thermometer
20	SBE35_FLAG_W		I1	Quality flag for CTD data
21	CTDSAL	PSS-78	F9.4	CTD Salinity sensor
22	CTDSAL_FLAG_W		I1	Quality flag for CTD data
23	SALNTY	PSS-78	F9.4	Salinity
24	SALNTY_FLAG_W		I1	Quality flags for water samples
25	CTDOXY	UMOL/KG	F9.2	CTD Oxygen sensor
26	CTDOXY_FLAG_W		I1	Quality flag for CTD data
27	OPTOXY	UMOL/KG	F9.2	Optode oxygen
28	OPTOXY_FLAG_W		I1	Quality flag for CTD data
29	OXYGEN	UMOL/KG	F9.2	Oxygen
30	OXYGEN_FLAG_W		I1	Quality flags for water samples
31	FLUOR	UG/L	F9.2	Fluorometer
32	FLUOR_FLAG_W		I1	Quality flag for CTD data
33	EDPAR	UMOL-PHOTONS/M2/S	F9.2	Ed PAR
34	EDPAR_FLAG_W		I1	Quality flag for CTD data
35	CHLORA	MG/CUM	F9.2	Chlorophyll a
36	CHLORA_FLAG_W		I1	Quality flags for water samples
37	CHLWELSH	MG/CUM	F9.2	Chlorophyll a (Welschmeyer method)
38	CHLWELSH_W		I1	Quality flags for water samples
39	SILCAT	UMOL/KG	F9.2	Silicate
40	SILCAT_FLAG_W		I1	Quality flags for water samples
41	NITRAT	UMOL/KG	F9.2	Nitrate
42	NITRAT_FLAG_W		I1	Quality flags for water samples
43	NITRIT	UMOL/KG	F9.2	Nitrite
44	NITRIT_FLAG_W		I1	Quality flags for water samples
45	PHSPHT	UMOL/KG	F9.3	Phosphate
46	PHSPHT_FLAG_W		I1	Quality flags for water samples
47	NH4	UMOL/KG	F9.2	Ammonium
48	NH4_FLAG_W		I1	Quality flags for water samples
49	TCARBN	UMOL/KG	F9.1	Total carbon
50	TCARBN_FLAG_W		I1	Quality flags for water samples
51	ALKALI	UMOL/KG	F9.1	Total alkalinity
52	ALKALI_FLAG_W		I1	Quality flags for water samples
53	PH	-	F9.3	pH
54	PH_FLAG_W		I1	Quality flags for water samples
55	DOC	UMOL/KG	F9.1	Dissolved organic carbon
56	DOC_FLAG_W		I1	Quality flags for water samples
57	THETA	DEG C	F9.4	Potential temperature
58	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	OPTOXY[UMOL/KG]	Optode oxygen
24	QF	Quality flag for CTD data
25	OXYGEN[UMOL/KG]	Oxygen
26	QF	Quality flags for water samples
27	FLUOR[UG/L]	Fluorometer
28	QF	Quality flag for CTD data
29	EDPAR[UMOL-PHOTONS/M2/S]	Ed PAR
30	QF	Quality flag for CTD data
31	CHLORA[MG/CUM]	Chlorophyll a
32	QF	Quality flags for water samples
33	CHLWELSH[MG/CUM]	Chlorophyll a (Welschmeyer method)
34	QF	Quality flags for water samples
35	SILCAT[UMOL/KG]	Silicate
36	QF	Quality flags for water samples
37	NITRAT[UMOL/KG]	Nitrate
38	QF	Quality flags for water samples
39	NITRIT[UMOL/KG]	Nitrite
40	QF	Quality flags for water samples
41	PHSPHT[UMOL/KG]	Phosphate
42	QF	Quality flags for water samples
43	NH4[UMOL/KG]	Ammonium
44	QF	Quality flags for water samples
45	TCARBN[UMOL/KG]	Total carbon
46	QF	Quality flags for water samples
47	ALKAL[UMOL/KG]	Total alkalinity
48	QF	Quality flags for water samples
49	PH	pH
50	QF	Quality flags for water samples
51	DOC[UMOL/KG]	Dissolved organic carbon
52	QF	Quality flags for water samples
53	THETA[DEG C]	Potential temperature
54	QF	Quality flag for CTD data
55	SIG0[KG/CUM]	Density
56	QF	Quality flag for CTD data
57	SAMPNO	Sample number
58	QF	Bottle quality flag

Related Information



**MR10-01 Leg1**

Ship Name: MIRAI

Period: 2010-01-19 - 2010-02-06

Chief Scientist: Kazuhiko Matsumoto (JAMSTEC)

Project Name: [Station K2,Station S1,Station KEO,Station KNOT]

Proposal ▶ Change in material cycles and ecosystem by the climate change and its feed back

Title:

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2012-11-30

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SAMPLER (SHELL)  
POWER GRAB  
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BMS

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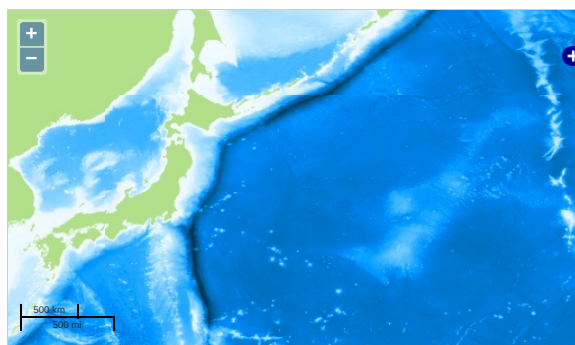
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**Observation Items:** Temperature, Salinity, Dissolved oxygen, Fluorescence, PAR, Chlorophyll, Silicate, Nitrate, Nitrite, Phosphate, Ammonia, Total inorganic carbon, Alkalinity, pH, DOC, Potential temperature, Density

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OCEANS > OCEAN CHEMISTRY > OXYGEN  
OCEANS > OCEAN CHEMISTRY > pH  
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### Observation Map

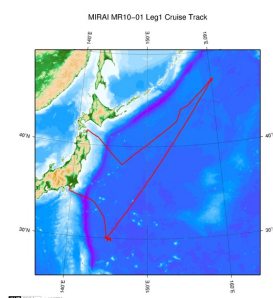


— ... Observation Line — ... Navigation ● ... Observation, Dive Point, Hole

### Data List

☐ **File names**  
☐ MR100101\_ex\_bot.csv  
☐ MR100101\_odv\_bot.txt

### Related Information



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#### MR10-01 Leg1

Ship Name: MIRAI

Period: 2010-01-19 - 2010-02-06

Chief Scientist: Kazuhiko Matsumoto (JAMSTEC)

Project Name: [Station K2, Station S1, Station KEO, Station KNOT]

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#### Data

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#### Information of the Ships

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#### Information of the Submersibles

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