

## MIRAI MR02-K05 Leg1 Bottle Sampling Water Chemical Analysis

Last Modified: 2015-05-29

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

Cruise ID: [MR02-K05 Leg1](#)

Bottle Sampling Water Chemical Analysis: Processed (PI)

Data Policy: [JAMSTEC](#)

Observation Items: Temperature, Salinity, Dissolved oxygen, Chlorophyll, Silicate, Nitrate, Nitrite, Phosphate, Ammonia, Total inorganic carbon, Alkalinity, 18O

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	> PHOSPHATE
OCEANS > OCEAN CHEMISTRY	> SILICATE
OCEANS > OCEAN CHEMISTRY	> SALINITY
OCEANS > OCEAN CHEMISTRY	> CHLOROPHYLL
OCEANS > OCEAN TEMPERATURE	> WATER TEMPERATURE
OCEANS > SALINITY/DENSITY	> SALINITY
OCEANS > OCEAN CHEMISTRY	> ALKALINITY
OCEANS > OCEAN CHEMISTRY	> CARBON
OCEANS > OCEAN CHEMISTRY	> STABLE ISOTOPES

Cruise Report

[http://www.godac.jamstec.go.jp/catalog/data/doc\\_catalog/media/MR02-K05\\_leg1\\_all.pdf](http://www.godac.jamstec.go.jp/catalog/data/doc_catalog/media/MR02-K05_leg1_all.pdf)

### For Using Data

#### Principal Investigator

CTDTMP : Koji Shimada (JAMSTEC)  
 CTDSAL : Koji Shimada (JAMSTEC)  
 SALNTY : Koji Shimada (JAMSTEC)  
 CTDOXY : Koji Shimada (JAMSTEC)  
 OXYGEN : Motoyo Itoh (JAMSTEC)  
 CHLORA : Sanae Chiba (JAMSTEC)  
 CHLWELSH : Sanae Chiba (JAMSTEC)  
 SILCAT : Shigeto Nishino (JAMSTEC)  
 NITRAT : Shigeto Nishino (JAMSTEC)  
 NITRIT : Shigeto Nishino (JAMSTEC)  
 PHSPHT : Shigeto Nishino (JAMSTEC)  
 NH4 : Shigeto Nishino (JAMSTEC)  
 TCARBN : Akihiko Murata (JAMSTEC)  
 ALKALI : Akihiko Murata (JAMSTEC)  
 O18O16 : Noriyuki Tanaka (International Arctic Research Center)

#### 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(4ch) ( - MR09-01)



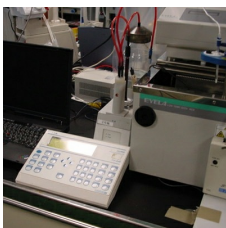
Instrument:

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



Instrument:

Titration for total alkalinity ( - MR14-02)



Instrument:

Fluorometer (TURNER DESIGNS)



### Overview

#### Citation

Shimada, K. 2002, R/V Mirai Cruise Report MR02-K05 Leg1, edited by K. Shimada, S. Nishino, and M. Itoh, 226pp., JAMSTEC, Yokosuka, Japan.

Upon consultation in advance with the chief of investigation and the person(s) in charge of research issues who gathered that data, that it was obtained during the R/V Mirai cruise of MR02-K05 Leg1 under the project of JWACS 2002, the Chief Scientist, Koji Shimada (JAMSTEC), and the following Principal Investigators (PI) for gathering the data.

Chief Scientist

Koji Shimada (JAMSTEC)

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E-mail: koji AT kaiyodai.ac.jp

PI for bottle salinity

Koji Shimada (JAMSTEC)

Collaborators:

Motoyo Itoh (JAMSTEC)

Eddy Carmack (Institute of Ocean Sciences)

PI for bottle oxygen

Motoyo Itoh (JAMSTEC)

PI for nutrients

Shigeto Nishino (JAMSTEC)

Collaborators:

Fiona McLaughlin (Institute of Ocean Sciences)

Nori Tanaka (International Arctic Research Center)

PI for carbonate

Akihiko Murata (JAMSTEC)

PI for chlorophyll

Sanae Chiba (JAMSTEC)

PI for O-18

Nori Tanaka (International Arctic Research Center)

**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 : 0-15ml/l (120% of surface saturation)

Accuracy : 0.1ml/l (2% of saturation)

Resolution : 0.01ml/l

**Information on Chemical and Biological data**

1. Dissolved Oxygen

(1) Instruments : Titrator: Model 716 DMS Titrino (Metrohm)

Detector: Pt electrode

(2) Methods : Winkler method/potentiometric method

(3) Precision : 0.66 umol/kg (n=108)

(4) Reference Material/Calibration: -

2. Salinity

(1) Instruments: Autosol salinometer model 8400B (Guildline Instruments Ltd.)

(2) Methods : -

(3) Precision : -

(4) Reference Material/Calibration: IAPSO Standard Sea Water batch P142 (Ocean Scientific International Ltd.)

3. Silicate

(1) Instruments: TRAACS800 (Bran+Luebbe)

(2) Methods : Molybdenum blue method

(3) Precision : 0.08 umol/kg (Average of difference between duplicate samples)

(4) Reference Material/Calibration: 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

(3) Precision : 0.03 umol/kg (Average of difference between duplicate samples)

(4) Reference Material/Calibration: KNO<sub>3</sub> solution

#### 5. Nitrite

- (1) Instruments: TRAACS800 (Bran+Luebbe)
- (2) Methods :Diazotization method (reduced to nitrite by Cd - Cu tube)
- (3) Precision :0.00umol/kg(Average of difference between duplicate samples)
- (4) Reference Material/Calibration:NaNO<sub>2</sub> solution

#### 6. Phosphate

- (1) Instruments: TRAACS800 (Bran+Luebbe)
- (2) Methods :Molybdenum blue method
- (3) Precision :0.01umol/kg(Average of difference between duplicate samples)
- (4) Reference Material/Calibration:KH<sub>2</sub>PO<sub>4</sub> solution

#### 7. Ammonia

- (1) Instruments: TRAACS800 (Bran+Luebbe)
- (2) Methods :Indophenol method/gas diffusion method(GDM)
- (3) Precision :0.04umol/kg(Average of difference between duplicate samples)
- (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> sampling system (Nippon ANS) equipped with carbon coulometer 5012 (UIC Co.)
- (2) Methods :coulometry
- (3) Precision :The standard deviation of the absolute differences was 1.17 umol/kg (n=96)
- (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. Total Alkalinity

- (1) Instruments:auto-burette (Radiometer,ABU901), a pH glass electrode (Radiometer, pHG201-7), a reference electrode(Radiometer, REF201),
- (2) Methods :Modified Gran titration/Open-cell
- (3) Precision : the standard deviation of the absolute differences was 2.17 umol/kg (n=96)
- (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

#### 10. Chlorophyll-a

- (1) Instruments:Fluorophotometer model 10-AU-005 (Turner design)
- (2) Methods :extract in N,N-dimethylformamide/fluorometric determination (traditional acidification method)
- (3) Precision : -
- (4) Reference Material/Calibration: -

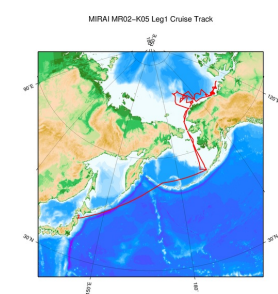
#### 11. Chlorophyll-a(Welschmeyer method)

- (1) Instruments:Fluorophotometer model 10-AU-005 (Turner design)
- (2) Methods :extract in N,N-dimethylformamide /fluorometric determination (Welschmeyer non-acidification method)
- (3) Precision : -
- (4) Reference Material/Calibration: -

#### 12. Oxygen Isotope Hydrology

- (1) Instruments:mass spectrometer (Finnigan MAT252) connected to a CO<sub>2</sub>-H<sub>2</sub>O equilibration unit (made by Thermoquest CO., Ltd.).
- (2) Methods :Samples was analyzed for oxygen isotope composition (in terms of δ<sup>18</sup>O) in the laboratory at the International Arctic Research Center.
- (3) Precision : -
- (4) Reference Material/Calibration: -

### Related Information



[Enlarge Image](#)

#### MR02-K05 Leg1

Ship Name: MIRAI  
Period: 2002-08-24 - 2002-10-10  
Chief Scientist: Akihiko Murata (JAMSTEC)/Koji Shimada (JAMSTEC)  
Project Name: [Arctic Ocean Climate System Reaserch]

### Update History

2015-05-29	An observation data was registerd.
2013-08-23	An observation data was registerd.
2012-12-25	An observation data was registerd.

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#### 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

#### Go to a Cruise Information

Cruise ID:

#### Go to a Dive Information

Dive ID:

(SHELL)  
POWER GRAB SAMPLER  
(CLOW)  
BMS

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## MIRAI MR02-K05 Leg1 Bottle Sampling Water Chemical Analysis

Last Modified: 2015-05-29

ReadMe Observation Data **Data Format** Quality Information

Cruise ID: [MR02-K05 Leg1](#)

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	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	CTDSAL[PSS-78]	CTD Salinity sensor		
16	QF	Quality flag for CTD data		
17	SALNTY[PSS-78]	Salinity		
18	QF	Quality flags for water samples		
19	CTDOXY[UMOL/KG]	CTD Oxygen sensor		
20	QF	Quality flag for CTD data		
21	OXYGEN[UMOL/KG]	Oxygen		
22	QF	Quality flags for water samples		
23	CHLORA[MG/CUM]	Chlorophyll a		
24	QF	Quality flags for water samples		
25	CHLWELSH[MG/CUM]	Chlorophyll a (Welschmeyer method)		
26	QF	Quality flags for water samples		
27	SILCAT[UMOL/KG]	Silicate		
28	QF	Quality flags for water samples		
29	NITRAT[UMOL/KG]	Nitrate		
30	QF	Quality flags for water samples		
31	NITRIT[UMOL/KG]	Nitrite		
32	QF	Quality flags for water samples		
33	PHSPHT[UMOL/KG]	Phosphate		
34	QF	Quality flags for water samples		
35	NH4[UMOL/KG]	Ammonium		
36	QF	Quality flags for water samples		
37	TCARBN[UMOL/KG]	Total carbon		
38	QF	Quality flags for water samples		
39	ALKAL[UMOL/KG]	Total alkalinity		
40	QF	Quality flags for water samples		
41	O18O16[MILLE]	18O/16O ratio		
42	QF	Quality flags for water samples		
43	SAMPNO	Sample number		
44	QF	Bottle quality flag		

### ODV Format

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

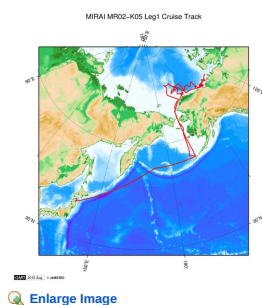
[Ocean Data View \(ODV\)](#)

Format Information

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2	Station	Station number_Cast number
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31	NITRIT[UMOL/KG]	Nitrite
32	QF	Quality flags for water samples
33	PHSPHT[UMOL/KG]	Phosphate
34	QF	Quality flags for water samples
35	NH4[UMOL/KG]	Ammonium
36	QF	Quality flags for water samples
37	TCARB[UMOL/KG]	Total carbon
38	QF	Quality flags for water samples
39	ALKAL[UMOL/KG]	Total alkalinity
40	QF	Quality flags for water samples
41	O18O16[‰]	18O/16O ratio
42	QF	Quality flags for water samples
43	SAMPNO	Sample number
44	QF	Bottle quality flag

#### Related Information



#### MR02-K05 Leg1

Ship Name: MIRAI  
Period: 2002-08-24 - 2002-10-10  
Chief Scientist: Akihiko Murata (JAMSTEC)/Koji Shimada (JAMSTEC)  
Project Name: [Arctic Ocean Climate System Research]

#### Update History

2015-05-29	An observation data was registered.
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6K Camera DEEP TOW  
6K Sonar DEEP TOW  
KM-ROV  
POWER GRAB  
SAMPLER (SHELL)  
POWER GRAB  
SAMPLER (CLOW)  
BMS

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#### Go to a Dive Information

Dive ID:

## MIRAI MR02-K05 Leg1 Bottle Sampling Water Chemical Analysis

Last Modified: 2015-05-29

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Cruise ID: [MR02-K05 Leg1](#)

Bottle Sampling Water Chemical Analysis: Processed (PI)

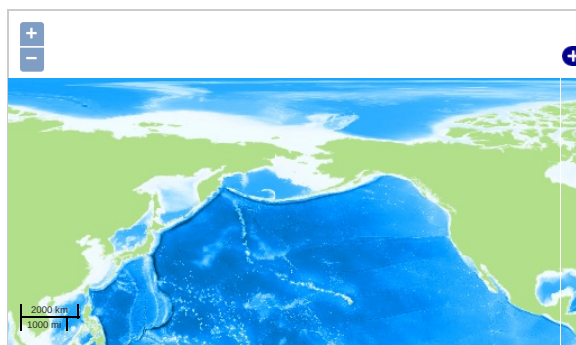
Data Policy: [JAMSTEC](#)

Observation Items: Temperature, Salinity, Dissolved oxygen, Chlorophyll, Silicate, Nitrate, Nitrite, Phosphate, Ammonia, Total inorganic carbon, Alkalinity, 18O

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OCEANS > OCEAN CHEMISTRY > CARBON  
OCEANS > OCEAN CHEMISTRY > STABLE ISOTOPES

### Observation Map



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

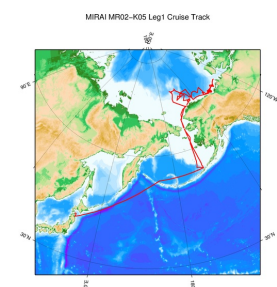
### Data List

☐ File names

☐ MR02K0501\_ex\_bot.csv

☐ MR02K0501\_odv\_bot.txt

### Related Information



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#### MR02-K05 Leg1

Ship Name: MIRAI

Period: 2002-08-24 - 2002-10-10

Chief Scientist: Akihiko Murata (JAMSTEC)/Koji Shimada (JAMSTEC)

Project Name: [Arctic Ocean Climate System Reaserch]

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[DEEP TOW](#)

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