

## MIRAI MR12-E03 Bottle Sampling Water Chemical Analysis

Last Modified: 2018-01-25

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

Cruise ID: [MR12-E03](#)

Bottle Sampling Water Chemical Analysis: Processed (PI)

Data Policy: [JAMSTEC](#)

Observation Items: Temperature, Salinity, Dissolved oxygen, Transmittance, Fluorescence, PAR, Silicate, Nitrate, Nitrite, Phosphate, Ammonia, Total inorganic carbon, Alkalinity, POC, Chlorophyll, 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	> PHOSPHATE
OCEANS	> OCEAN CHEMISTRY	> SILICATE
OCEANS	> OCEAN CHEMISTRY	> SALINITY
OCEANS	> OCEAN CHEMISTRY	> CHLOROPHYLL
OCEANS	> OCEAN TEMPERATURE	> WATER TEMPERATURE
OCEANS	> SALINITY/DENSITY	> SALINITY
BIOSPHERE	> AQUATIC ECOSYSTEMS	> PLANKTON
OCEANS	> OCEAN OPTICS	> PHOTOSYNTHETICALLY ACTIVE RADIATION
BIOSPHERE	> ECOLOGICAL DYNAMICS	> ECOSYSTEM FUNCTIONS
OCEANS	> OCEAN CHEMISTRY	> ALKALINITY
BIOSPHERE	> ECOLOGICAL DYNAMICS	> ECOSYSTEM FUNCTIONS
OCEANS	> OCEAN CHEMISTRY	> CARBON
OCEANS	> OCEAN OPTICS	> FLUORESCENCE
OCEANS	> OCEAN TEMPERATURE	> POTENTIAL TEMPERATURE
		> PHYTOPLANKTON
		> PRIMARY PRODUCTION
		> PHOTOSYNTHESIS

Cruise Report

[http://www.godac.jamstec.go.jp/catalog/data/doc\\_catalog/media/MR12-E03\\_all.pdf](http://www.godac.jamstec.go.jp/catalog/data/doc_catalog/media/MR12-E03_all.pdf)

### For Using Data

#### Principal Investigator

CTDTMP :Takashi Kikuchi (JAMSTEC)/Shigeto Nishino (JAMSTEC)  
 SBE35 :Takashi Kikuchi (JAMSTEC)/Shigeto Nishino (JAMSTEC)  
 CTDSAL :Takashi Kikuchi (JAMSTEC)/Shigeto Nishino (JAMSTEC)  
 SALNTY :Takashi Kikuchi (JAMSTEC)/Shigeto Nishino (JAMSTEC)  
 CTDOXY :Takashi Kikuchi (JAMSTEC)/Shigeto Nishino (JAMSTEC)  
 OXYGEN :Shigeto Nishino (JAMSTEC)  
 FLUOR :Takashi Kikuchi (JAMSTEC)/Shigeto Nishino (JAMSTEC)  
 CHLWELSH :Toru Hirawake (Hokkaido University)/Shigeto Nishino (JAMSTEC)  
 SIZECHL :Toru Hirawake (Hokkaido University)/Shigeto Nishino (JAMSTEC)  
 PAR :Takashi Kikuchi (JAMSTEC)/Shigeto Nishino (JAMSTEC)  
 XMISS :Takashi Kikuchi (JAMSTEC)/Shigeto Nishino (JAMSTEC)  
 SILCAT :Michio Aoyama (JAMSTEC/Fukushima University)/Shigeto Nishino (JAMSTEC)  
 NITRAT :Michio Aoyama (JAMSTEC/Fukushima University)/Shigeto Nishino (JAMSTEC)  
 NITRIT :Michio Aoyama (JAMSTEC/Fukushima University)/Shigeto Nishino (JAMSTEC)  
 PHSPHT :Michio Aoyama (JAMSTEC/Fukushima University)/Shigeto Nishino (JAMSTEC)  
 NH4 :Michio Aoyama (JAMSTEC/Fukushima University)/Shigeto Nishino (JAMSTEC)  
 TCARBN :Shigeto Nishino (JAMSTEC)  
 ALKALI :Shigeto Nishino (JAMSTEC)  
 d-POC :Shigeto Nishino (JAMSTEC)/Toru Hirawake (Hokkaido University)

#### 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:

CN mass spectrometer



Instrument:

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



Instrument:

Titration for DO Dissolved oxygen titration equipment (MR11-06 - )



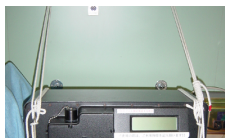
Instrument:

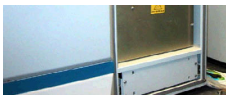
Total dissolved inorganic carbon measurement system (MR11-05 Leg1 - )



Instrument:

Fluorometer (TURNER DESIGNS)





#### Data Citation

Kikuchi, T., 2012, R/V Mirai Cruise Report MR12-E03, edited by T. Kikuchi and S. Nishino, 190pp., 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, we request that the text of the results material contain a statement to the effect that it was obtained during the R/V Mirai cruise of MR12-E03, the Chief Scientist, Takashi Kikuchi (JAMSTEC), and the following Principal Investigators (PIs) for gathering the data.

##### Chief Scientist

Takashi Kikuchi

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Tel: +81-46-867-9486, Fax: +81-46-867-9437

E-mail: takashik @ jamstec.go.jp

##### PI for CTD

Takashi Kikuchi (JAMSTEC)

Shigeto Nishino (JAMSTEC)

##### PI for bottle salinity

Takashi Kikuchi (JAMSTEC)

Shigeto Nishino (JAMSTEC)

##### PI for bottle oxygen

Shigeto Nishino (JAMSTEC)

##### PI for nutrients

Michio Aoyama (JAMSTEC/Fukushima University)

Shigeto Nishino (JAMSTEC)

##### PI for total inorganic carbon and total alkalinity

Shigeto Nishino (JAMSTEC)

##### PI for chlorophyll a

Toru Hirawake (Hokkaido University)

Shigeto Nishino (JAMSTEC)

##### PI for carbon uptake rate

Shigeto Nishino (JAMSTEC)

Toru Hirawake (Hokkaido University)

And also the data were obtained under the GRENE (Green Network of Excellence) Arctic Climate Change Research Project of the Ministry of Education, Culture, Sports, Science and Technology in Japan (MEXT).

#### Information on CTD data

##### 1. 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) Transmissometer

Model : C-Star, WET Labs, Inc.

Linearity : 99% R<sup>2</sup>

###### (6) Fluorometer

Model : Seapoint Sensors, Inc.

Measurement range : 0-5ug/L

Resolution : 0.02ug/L

###### (7) PAR sensor

Model : Satlantic, Inc.

Measurement range : 0-5000μmol photons m<sup>-2</sup> s<sup>-1</sup>

Accuracy : 5%

(8) Deep Ocean Standards Thermometer

Model : SBE35, Sea-Bird Electronics, Inc.  
Measurement range : -5.0 to +35degC  
Accuracy : 0.001degC  
Resolution : 0.000025degC

**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 : Autosal salinometer model 8400B (Guildline Instruments Ltd.)  
(2) Methods : -  
(3) Precision : 0.006 (depth<200db), 0.0003 (depth>200db)  
(4) Reference Material/Calibration : IAPSO Standard Sea Water batch P153 (Ocean Scientific International Ltd.)

3. Silicate

- (1) Instruments : QuAAtro  
(2) Methods : Molybdenum blue method  
(3) Precision : C.V. 0.12%  
(4) Reference Material/Calibration : RMNS [Aoyama and Hydes, 2010; Sato et al., 2010]  
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 : QuAAtro  
(2) Methods : Diazotization method (reduced to nitrite by Cd - Cu tube)  
(3) Precision : C.V. 0.12%  
(4) Reference Material/Calibration : KNO<sub>3</sub> solution and RMNS [Aoyama and Hydes, 2010; Sato et al., 2010]

5. Nitrite

- (1) Instruments : QuAAtro  
(2) Methods : Diazotization method  
(3) Precision : C.V. 0.21%  
(4) Reference Material/Calibration : NaNO<sub>2</sub> solution and RMNS [Aoyama and Hydes, 2010; Sato et al., 2010]

6. Phosphate

- (1) Instruments : QuAAtro  
(2) Methods : Molybdenum blue method  
(3) Precision : C.V. 0.19%  
(4) Reference Material/Calibration : KH<sub>2</sub>PO<sub>4</sub> solution and RMNS [Aoyama and Hydes, 2010; Sato et al., 2010]

7. Ammonium

- (1) Instruments : QuAAtro  
(2) Methods : Indophenol method/gas diffusion method (GDM)  
(3) Precision : C.V. 0.39%  
(4) Reference Material/Calibration: (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> solution

8. Total Alkalinity

- (1) Instruments : 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 additional procedure/spectrophotometry  
(3) Precision : 0.57 umol kg<sup>-1</sup>  
(4) Reference Material/Calibration : Na<sub>2</sub>CO<sub>3</sub> solution and the CRM provided by Scripps Institute of Oceanography

9. Total inorganic carbon

- (1) Instruments : Automated TCO<sub>2</sub> analyzer (Nippon ANS, Inc.) equipped with carbon coulometer 3000 (UIC Inc.)  
(2) Methods : coulometry  
(3) Precision : 0.7 umol kg<sup>-1</sup>  
(4) Reference Material/Calibration : The CRM provided by Scripps Institute of Oceanography

10. 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 : Pure chlorophyll a (Sigma chemical Co.)

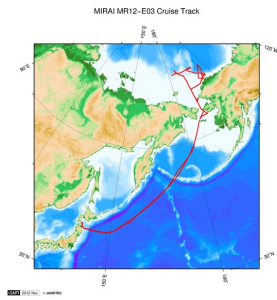
11. Carbon uptake rate (Simulated in-situ incubation method)

- (1) Instruments : ANCA-NT SYSTEM (Europa Scientific Ltd.)  
(2) Methods : Stable <sup>13</sup>C isotope method [Hama et al., 1983]  
(3) Precision : -  
(4) Reference Material/Calibration : -

**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](#)

### MR12-E03

Ship Name: MIRAI  
Period: 2012-09-03 - 2012-10-17  
Chief Scientist: Takashi Kikuchi (JAMSTEC)  
Project Name: [Arctic Ocean Climate System Research]  
Proposal ▶ Ecosystem studies on the Arctic Ocean declining sea ice  
Title:

## Update History

2018-01-25	An observation data was registerd.
2015-06-30	An observation data was registerd.

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### Information of the Submersibles

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[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:

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**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 MR12-E03 Bottle Sampling Water Chemical Analysis

Last Modified: 2018-01-25

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Cruise ID: **MR12-E03**

Bottle Sampling Water Chemical Analysis: Processed (PI)

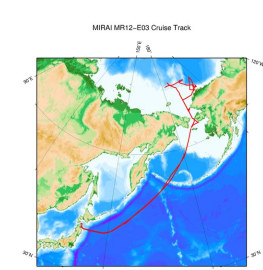
Data Policy: **JAMSTEC**

### Data Format

Column No.	Column Heading Mnemonic	Units Mnemonic	Comments
1	EXPOCODE	-	A14 ExpoCode
2	STNNBR	-	- Station Number
3	CASTNO:METAVAR	-	I1 Cast Number
4	SAMPNO:METAVAR	-	- Sample Number
5	BTLNBR	-	- Bottle Number
6	QV:WOCEBOTTLE	-	I1 Flag of the data on the left column
7	DATE	UTC	A10 Cast date
8	TIME	UTC	- Cast time
9	LATITUDE	DEG	- -
10	LONGITUDE	DEG	- -
11	DEPTH:METAVAR	M	- Bottom depth
12	CTDPRS	DBAR	- Pressure
13	QV:WOCEBOTTLE	-	I1 Flag of the data on the left column
14	CTDDPT	M	- Depth
15	CTDTMP	ITS-90	- Temperature (primary sensor)
16	QV:WOCEBOTTLE	-	I1 Flag of the data on the left column
17	CTDTMP_1	ITS-90	- Temperature (secondary sensor)
18	QV:WOCEBOTTLE	-	I1 Flag of the data on the left column
19	CTDSAL	PSS-78	- Salinity (primary sensor)
20	QV:WOCEBOTTLE	-	I1 Flag of the data on the left column
21	CTDSAL_1	PSS-78	- Salinity (secondary sensor)
22	QV:WOCEBOTTLE	-	I1 Flag of the data on the left column
23	CTDCND	S/m	- Conductivity (primary sensor)
24	CTDCND_1	S/m	- Conductivity (secondary sensor)
25	CTDOXY	UMOL/KG	- Oxygen_CTD (primary sensor)
26	QV:WOCEBOTTLE	-	I1 Flag of the data on the left column
27	CTDOXY_1	UMOL/KG	- Oxygen_CTD (secondary sensor)
28	QV:WOCEBOTTLE	-	I1 Flag of the data on the left column
29	CTDOXV	V	- Oxygen_CTD voltage (primary sensor)
30	CTDOXV_1	V	- Oxygen_CTD voltage (secondary sensor)
31	THETA	DEG C	- Potential temperature (primary sensor)
32	THETA_1	DEG C	- Potential temperature (secondary sensor)
33	SIG0	KG/CUM	- Density (primary sensor)
34	QV:WOCEBOTTLE	-	I1 Flag of the data on the left column
35	SIG0_1	KG/CUM	- Density (secondary sensor)
36	QV:WOCEBOTTLE	-	I1 Flag of the data on the left column
37	XMISS	%TRANS	- Transmissometer
38	QV:WOCEBOTTLE	-	I1 Flag of the data on the left column
39	XMISSV	V	- Transmissometer voltage
40	FLUOR	UG/L	- Fluorescence
41	QV:WOCEBOTTLE	-	I1 Flag of the data on the left column
42	PAR	umol photons/m <sup>2</sup> /s	- PAR
43	QV:WOCEBOTTLE	-	I1 Flag of the data on the left column
44	SBE35	ITS-90	- Temperature from Deep Ocean Standards Thermometer
45	QV:WOCEBOTTLE	-	I1 Flag of the data on the left column
46	SALNTY	PSS-78	- Bottle Salinity
47	QV:WOCEBOTTLE	-	I1 Flag of the data on the left column
48	SALNTY_1	PSS-78	- Bottle Salinity (duplicate)
49	QV:WOCEBOTTLE	-	I1 Flag of the data on the left column
50	OXYGEN	UMOL/KG	- Oxygen
51	QV:WOCEBOTTLE	-	I1 Flag of the data on the left column
52	OXYGEN_1	UMOL/KG	- Oxygen (duplicate)
53	QV:WOCEBOTTLE	-	I1 Flag of the data on the left column
54	TCARBN	UMOL/KG	- Total Carbon CT
55	QV:WOCEBOTTLE	-	I1 Flag of the data on the left column
56	TCARBN_1	UMOL/KG	- Total Carbon CT (duplicate)
57	QV:WOCEBOTTLE	-	I1 Flag of the data on the left column
58	ALKALI	UMOL/KG	- Total alkalinity
59	QV:WOCEBOTTLE	-	I1 Flag of the data on the left column
60	ALKALI_1	UMOL/KG	- Total alkalinity (duplicate)
61	QV:WOCEBOTTLE	-	I1 Flag of the data on the left column
62	NITRAT1	UMOL/KG	- Nitrate
63	QV:WOCEBOTTLE	-	I1 Flag of the data on the left column
64	NITRIT1	UMOL/KG	- Nitrite
65	QV:WOCEBOTTLE	-	I1 Flag of the data on the left column
66	SILCAT1	UMOL/KG	- Silicate
67	QV:WOCEBOTTLE	-	I1 Flag of the data on the left column
68	PHSPHT1	UMOL/KG	- Phosphate

Column No.	Column Heading	Units Mnemonic	Comments	Flag of the data on the left column
70	AMMONIA1	UMOL/KG	-	Ammonium
71	QV:WOCEBOTTLE	-	I1	Flag of the data on the left column
72	NITRAT2	UMOL/KG	-	Nitrate (duplicate)
73	QV:WOCEBOTTLE	-	I1	Flag of the data on the left column
74	NITRIT2	UMOL/KG	-	Nitrite (duplicate)
75	QV:WOCEBOTTLE	-	I1	Flag of the data on the left column
76	SILCAT2	UMOL/KG	-	Silicate (duplicate)
77	QV:WOCEBOTTLE	-	I1	Flag of the data on the left column
78	PHSPHT2	UMOL/KG	-	Phosphate (duplicate)
79	QV:WOCEBOTTLE	-	I1	Flag of the data on the left column
80	AMMONIA2	UMOL/KG	-	Ammonium (duplicate)
81	QV:WOCEBOTTLE	-	I1	Flag of the data on the left column
82	NITRAT_AVE	UMOL/KG	-	Nitrate (average)
83	QV:WOCEBOTTLE	-	I1	Flag of the data on the left column
84	NITRIT_AVE	UMOL/KG	-	Nitrite (average)
85	QV:WOCEBOTTLE	-	I1	Flag of the data on the left column
86	SILCAT_AVE	UMOL/KG	-	Silicate (average)
87	QV:WOCEBOTTLE	-	I1	Flag of the data on the left column
88	PHSPHT_AVE	UMOL/KG	-	Phosphate (average)
89	QV:WOCEBOTTLE	-	I1	Flag of the data on the left column
90	AMMONIA_AVE	UMOL/KG	-	Ammonium (average)
91	QV:WOCEBOTTLE	-	I1	Flag of the data on the left column
92	d-POC_C1	mgC/m3/day	-	Carbon uptake rate
93	QV:WOCEBOTTLE	-	I1	Flag of the data on the left column
94	d-POC_C2	mgC/m3/day	-	Carbon uptake rate (duplicate)
95	QV:WOCEBOTTLE	-	I1	Flag of the data on the left column
96	CHLWEL	UG/L	-	Chlorophyll a
97	QV:WOCEBOTTLE	-	I1	Flag of the data on the left column
98	CHLWEL_1	UG/L	I4	Chlorophyll a (duplicate)
99	QV:WOCEBOTTLE	-	I1	Flag of the data on the left column
100	SIZECHL	UG/L	-	Chlorophyll a > 20um
101	QV:WOCEBOTTLE	-	I1	Flag of the data on the left column
102	1SIZECHL	UG/L	-	Chlorophyll a 10-20um
103	QV:WOCEBOTTLE	-	I1	Flag of the data on the left column
104	2SIZECHL	UG/L	-	Chlorophyll a 5-10um
105	QV:WOCEBOTTLE	-	I1	Flag of the data on the left column
106	3SIZECHL	UG/L	-	Chlorophyll a 2-5um
107	QV:WOCEBOTTLE	-	I1	Flag of the data on the left column
108	4SIZECHL	UG/L	-	Chlorophyll a < 2um
109	QV:WOCEBOTTLE	-	I1	Flag of the data on the left column

Related Information



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**MR12-E03**  
Ship Name: MIRAI  
Period: 2012-09-03 - 2012-10-17  
Chief Scientist: Takashi Kikuchi (JAMSTEC)  
Project Name: [Arctic Ocean Climate System Reaserch]  
Proposal ▶ Ecosystem studies on the Arctic Ocean declining sea ice  
Title:

Update History

2018-01-25	An observation data was registered.
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YOKOSUKA  
MIRAI  
KAIREI  
CHIKYU  
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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Go to a Dive Information

Dive ID:

## MIRAI MR12-E03 Bottle Sampling Water Chemical Analysis

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Bottle Sampling Water Chemical Analysis: Processed (PI)

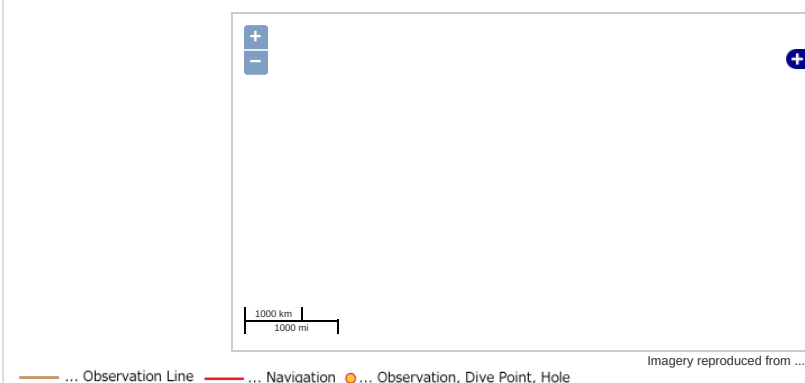
Data Policy: [JAMSTEC](#)

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

**Science Keywords:**

OCEANS	> OCEAN CHEMISTRY	> AMMONIA
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OCEANS	> OCEAN CHEMISTRY	> CARBON
OCEANS	> OCEAN OPTICS	> FLUORESCENCE
OCEANS	> OCEAN TEMPERATURE	> POTENTIAL TEMPERATURE

### Observation Map



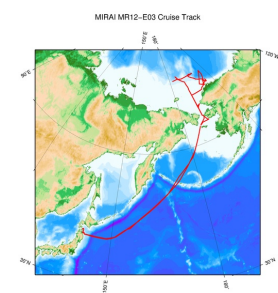
### Data List

[Add to Basket](#)

**File names**

☐ MR12E0320121101015118\_rev.csv

### Related Information



[Enlarge Image](#)

#### MR12-E03

Ship Name: MIRAI  
Period: 2012-09-03 - 2012-10-17  
Chief Scientist: Takashi Kikuchi (JAMSTEC)  
Project Name: [Arctic Ocean Climate System Research]  
Proposal ▶ Ecosystem studies on the Arctic Ocean declining sea ice  
Title:

### Update History

2018-01-25	An observation data was registered.
2015-06-30	An observation data was registered.

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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 (SHELL)  
POWER GRAB SAMPLER (CLOW)  
BMS

## Go to a Cruise Information

Cruise ID:

## Go to a Dive Information

Dive ID:

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JAPAN AGENCY FOR MARINE-EARTH SCIENCE AND TECHNOLOGY