

MIRAI MR02-K06 Leg3 Primary Production

Last Modified: 2016-10-11

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Cruise ID: [MR02-K06 Leg3](#)

Primary Production: Processed (DMO)-QCed

Data Policy: [JAMSTEC](#)

Observation Items: POC

Science Keywords:

BIOSPHERE > AQUATIC ECOSYSTEMS > PLANKTON > PHYTOPLANKTON
BIOSPHERE > ECOLOGICAL DYNAMICS > ECOSYSTEM FUNCTIONS > PRIMARY PRODUCTION
BIOSPHERE > ECOLOGICAL DYNAMICS > ECOSYSTEM FUNCTIONS > PHOTOSYNTHESIS

Cruise Report

http://www.godac.jamstec.go.jp/catalog/data/doc_catalog/media/MR02-K06_leg3-4_all.pdf

For Using Data

Principal Investigator

Kazuhiko Matsumoto (JAMSTEC)

Use Constraints

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

Data Citation

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

Instrument

Instrument:

CN mass spectrometer



Overview

Primary Production Data during MR02-K06 Leg3 and Leg4 cruise were obtained by the following methods :

- In-situ incubation method (IS)
- Simulated in-situ incubation method (SIS)

Water sampling, incubation, and devices and tracers for analysis for each method are outlined below. For further information, please see Cruise Report.

Outline of water sampling, incubation, and analysis

1) In-situ incubation (IS) [Outline figure](#)

- 1.1) Vertical sampling : Niskin
- 1.2) Surface sampling : Bucket
- 1.3) Sampling layer : 13
- 1.4) Tracer : $\text{NaH}^{13}\text{CO}_3$
- 1.5) Incubation period : 24hours
- 1.6) Filtration : Whatman GF/F filter was used at dark place.
- 1.7) Preservation : Filters were kept to freeze at -20degC and dried in the oven at 45degC.
- 1.8) Preservation period of frozen filter paper : within 100 days
- 1.9) Analysis place : YOKOSUKA JAMSTEC, MIRAI
- 1.10) Analysis device : CN mass spectrometer (see section 3 and 4 for detail)
- 1.11) Analysis method : Dumas method, Mass spectrometry

2) Simulated in-situ incubation (SIS) [Outline figure](#)

- 2.1) Vertical sampling : Niskin
- 2.2) Surface sampling : Bucket
- 2.3) Sampling layer : 3
- 2.4) Tracer : $\text{NaH}^{13}\text{CO}_3$
- 2.5) Incubation period : 24hours
- 2.6) Filtration : Whatman GF/F filter was used at dark place.
- 2.7) Preservation : Filters were kept to freeze at -20degC and dried in the oven at 45degC.
- 2.8) Preservation period of frozen filter paper : within 100 days
- 2.9) Analysis place : YOKOSUKA JAMSTEC, MIRAI
- 2.10) Analysis device : CN mass spectrometer (see section 3 and 4 for detail)
- 2.11) Analysis method : Dumas method, Mass spectrometry

About CN mass spectrometer

CN mass spectrometer system equipped with R/V Mirai can measure stable isotope ratios of ^{13}C and ^{15}N comprised in liquid, solid, and gas states of biological or biogenic samples, simultaneously and continuously. This system consists of two devices, preprocessing equipment "ROBOPLEP-SL" and stable isotope ratio mass spectrometer "EUROPA20-20".

(1) ROBOPLEP-SL

A tin capsule containing the sample falls into the combustion tube and is converted in the presence of oxygen to CO_2 , N_2 , NO_x and H_2O .

An elemental copper stage reduces NO_x , a MgClO_4 trap removes water vapour,

a switchable Carbosorb trap can be used to remove CO₂ (for ¹⁵N only analyses) and a GC column separates CO₂ from N₂ (allowing dual isotope analysis). And then, it is introduced into the "EUROPA20-20".

(2) EUROPA20-20

CO₂ and N₂ are collided with thermion and ionized in the high vacuum ion source. When the generated ions are accelerated by constant voltage and pass through the analysis tube, differences in mass (m) and electric charge (z) of isotope ions make the different orbits by the magnetic field in the analysis tube. Thus, isotopes can be separated by the displacement of the orbits. These signals are converted into the frequency at the detector, and transmitted to control PC. Blank and drift corrections are conducted on the control software.

see flow diagram. MR02-K06 Leg34_pp_ANCA-SL [PDF file](#)

Specifications of CN mass spectrometer

(1) ROBOPREP-SL

Manufacturer : SerCon Ltd. (former PDZ Europa Ltd.)

Instruments : ANCA-SL ROBOPREP-SL

S/N : 17001-051

Sample Range Solids/Liquids : 10 to 1000 µgN, 10 to 1000 µgC.

Autosampler : 60 position pneumatic autosampler that takes (standard) capsules with up to 47mm in diameter.

(2) EUROPA 20-20

Manufacturer : SerCon Ltd. (former PDZ Europa Ltd.)

Instruments : ANCA-SL EUROPA 20-20

S/N : 9007-075

Analyzer and Analysis tube : 120° extended geometry with an 11 cm radius magnetic sector

Resolution : m/Δm=95 (N₂) 10% valley definition

Sensitivity : Inside Vacuum level is 4×10⁻⁶mbar in an atmosphere of helium

20 nmol CO₂

15 nmol N₂

Abundance Sensitivity : Inside Vacuum level is 4×10⁻⁶mbar in an atmosphere of helium

30 ppm for CO₂ at 4×10⁻⁶mbar in continuous flow mode.

5 ppm for N₂ at 4×10⁻⁶mbar in continuous flow mode.

(3) Precision

All specifications are for n=5 samples.

It is a natural amount and five time standard deviation of the analysis as for amount 100 µg of the sample.

¹³C (0.2 ‰)

¹⁵N (0.5 ‰)

(4) Data processing

Device control and processing soft : ANCA ver.3.5 (former PDZ Europa Ltd.)

Fully compatible with Windows 3.1 or Windows 95.

(5) Reference material

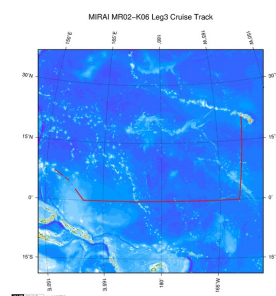
The third-order reference materials whose data values were decided by the second reference materials (IAEA-N-1, IAEA-N-2, and IAEA-CH-6) dealt in International Atomic Energy Agency (IAEA) were used.

Note

In this cruise, there is an observation log sheet at the time of the data acquisitions.

If necessary, please contact us from "Contact Us" above.

Related Information



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MR02-K06 Leg3

Ship Name: MIRAI

Period: 2003-01-13 - 2003-01-31

Chief Scientist: Kazuhiko Matsumoto (JAMSTEC)

Update History

2016-10-11

An observation data was registerd.

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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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MIRAI MR02-K06 Leg3 Primary Production

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PPD IS (MR02-K06 Leg3-4)

Format information describes column no., column heading mnemonic and comments of In-situ incubation data sheet in MR02-K06 Leg3 and Leg4.
 Missing value is presented by -999.

Column No.	Column Heading Mnemonic	Comments
1	CruiseNO	CruiseID
2	STNNBR	Station number
3	CASTNO	Cast number (refer to CTD cast table of cruise report)
4	Inc.Type	Incubation method (IS : in-situ incubation)
5	UTC Date	CTD start UTC date (refer to CTD cast table of cruise report)
6	UTC Time	CTD start UTC time (refer to CTD cast table of cruise report)
7	Latitude	CTD start position Latitude degree (refer to CTD cast table of cruise report)
8	Longitude	CTD start position Longitude degree (refer to CTD cast table of cruise report)
9	BTLNBR	Bottle identification number
10	BTLNBR_FLAG	Bottle quality flag
11	CTD Depth	CTD Depth (m)
12	CTD PRS	CTD Pressure (dbar)
13	W-Chl	Chlorophyll a. quantity (Non-acidification method) (mg/m3)
14	H-Chl	Chlorophyll a. quantity (Acidification method) (mg/m3)
15	Inc.Depth	Incubation depth (m)
16	Inc.Time	Incubation time (hour)
17	POC-A	POC (Sample A) (µg/L)
18	POC-B	POC (Sample B) (µg/L)
19	13C-A	Ratio of 13C (Sample A) (atom%)
20	13C-B	Ratio of 13C (Sample B) (atom%)
21	Flag-A	Flag of Sample A (for explanation see Quality flags)
22	Flag-B	Flag of Sample B (for explanation see Quality flags)
23	dPOC/d-A	delta POC of Sample A (µgC/L/day)
24	dPOC/d-B	delta POC of Sample B (µgC/L/day)
25	AVE of dPOC	Average of dPOC (µgC/L/day)
26	Flag-AVE	Flag of AVE of dPOC (for explanation see Quality flags)
27	Int-PP	Initial Primary Production (µgC/day)

about 23 and 24)

The equation to be used in the calculations of dPOC/d-A and dPOC/d-B.

$$dPOC/d = 1.025 \times POC \times (13C - 1.084) / [100 \times (2000 \times 0.01084 + 200) / (2000 + 200) - 1.084]$$

 1.025 : ¹³C Stable Isotope discrimination factor

 1.084 : ¹³C ratio of zero time blank POC

 100×(2000×0.01084+200)/(2000+200) : Amount of ¹³C in which 10% of Total dissolved inorganic carbon in seawater was added as tracer.

about 25)

Only the "Flag 1" data in "dPOC/d-A" and "dPOC/d-B" are used for the calculation of "AVE of dPOC".

(see column No.21 and No.22)

about 27)

The equation to be used in the calculations.

ex.) 0m

$$Int-PP = (AVE \text{ of } dPOC \text{ at } 10m + AVE \text{ of } dPOC \text{ at } 0m) \times (10m - 0m) / 2$$

ex.) 150m

$$Int-PP = Total \text{ Int-PP from } 0m \text{ to } 120m$$

Literature cited for the equation

Meteorological Agency. 1990. Manuals for oceanographic observation. Japan Weather Association. 253-256pp.

PPD SIS (MR02-K06 Leg3-4)

Format information describes column no., column heading mnemonic and comments of Simulated in-situ incubation data sheet in MR02-K06 Leg3 and Leg4.
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Column No.	Column Heading Mnemonic	Comments
1	CruiseNO	CruiseID
2	STNNBR	Station number
3	CASTNO	Cast number (refer to CTD cast table of cruise report)
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5	UTC Date	CTD start UTC date (refer to CTD cast table of cruise report)
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9	BTLNBR	Bottle identification number
10	BTLNBR_FLAG	Bottle quality flag (for explanation see Quality flags)
11	CTD Depth	CTD Depth (m)
12	CTD PRS	CTD Pressure (dbar)

Column No.	Column Heading Mnemonic	Column Description
14	Incubator	Optical transmittance (%)
15	Inc.Time	Incubation time (hour)
16	POC	POC (μg/L)
17	13C	Ratio of 13C (atom%)
18	Carbon uptake	delta POC (μgC/L/day)
19	Flag	Flag of sample (for explanation see Quality flags)

about 18)

The equation to be used in the calculations.

Carbon uptake= $1.025 \times \text{POC} \times (13\text{C} - 1.084) / (100 \times (2000 \times 0.01084 + 200) / (2000 + 200) - 1.084)$

1.025 : ¹³C Stable Isotope discrimination factor

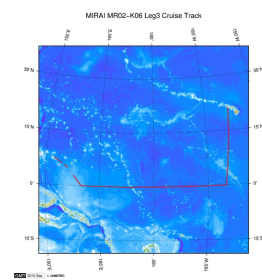
1.084 : ¹³C ratio of zero time blank POC

$100 \times (2000 \times 0.01084 + 200) / (2000 + 200)$: Amount of ¹³C in which 10% of Total dissolved inorganic carbon in seawater was added as tracer.

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Related Information



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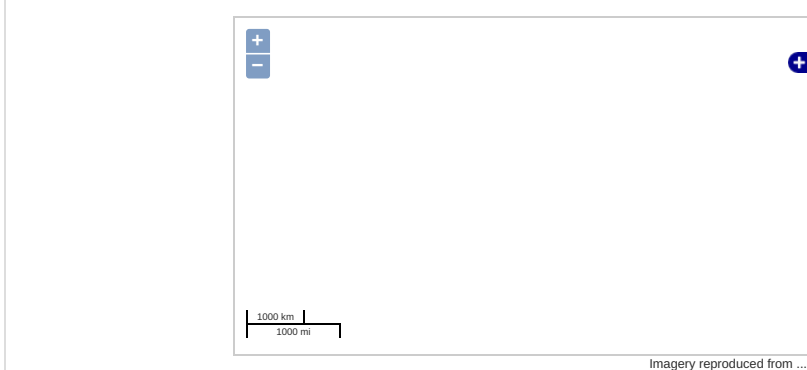
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Observation Items: POC

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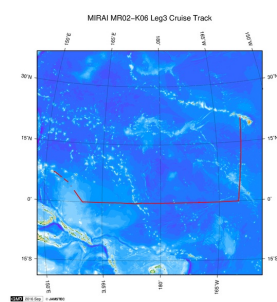
Observation Map



Data List

☐ File names
☐ MR02-K06_leg34_pp_IS.csv
☐ MR02-K06_leg34_pp_SIS.csv

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