

MIRAI MR05-01 Primary Production

Last Modified: 2013-08-23

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Cruise ID: [MR05-01](#)

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/MR05-01_all.pdf

For Using Data

Principal Investigator

Makio Honda (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 MR05-01 cruise were obtained by the following methods :

- 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

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

- 1) Vertical sampling : Niskin
- 2) Surface sampling : Bucket
- 3) Sampling layer : 8
- 4) Tracer : $\text{NaH}^{13}\text{CO}_3$
- 5) Incubation period : 24hours
- 6) Filtration : Whatman GF/F filter was used at dark place.
- 7) Preservation : Filters were kept to freeze at -20degC and dried in the oven at 45degC.
- 8) Preservation period of frozen filter paper : within 30 days
- 9) Analysis place : MIRAI
- 10) Analysis device : CN mass spectrometer (see section 3 and 4 for detail)
- 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 CO_2 (for ^{15}N only analyses)

and a GC column separates CO_2 from N_2 (allowing dual isotope analysis).

And then, it is introduced into the "EUROPA20-20".

(2) EUROPA20-20

CO_2 and N_2 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. MR05-01_pp_ANCA-SL [PDF file](#)

Specifications of CN mass spectrometer

(1) ROBOPLEP-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 : $m/\Delta m=95$ (N_2) 10% valley definition

Sensitivity : Inside Vacuum level is 4×10^{-6} mbar in an atmosphere of helium

20 nmol CO_2

15 nmol N_2

Abundance Sensitivity : Inside Vacuum level is 4×10^{-6} mbar in an atmosphere of helium

30 ppm for CO_2 at 4×10^{-6} mbar in continuous flow mode.

5 ppm for N_2 at 4×10^{-6} mbar 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.

^{13}C (0.2 ‰)

^{15}N (0.5 ‰)

(4) Data processing

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

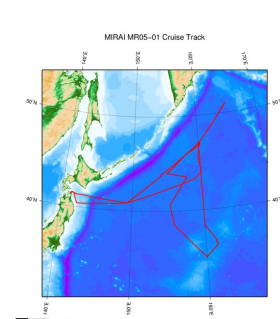
Fully compatible with Windows 3.1 or Windows 95.

(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.

Related Information



[Enlarge Image](#)

MR05-01

Ship Name: MIRAI

Period: 2005-02-28 - 2005-03-24

Chief Scientist: Makio Honda (JAMSTEC)

Project Name: [Station K2, Station KNOT]

Update History

2013-08-23	An observation data was registered.
2012-11-25	An observation data was registered.

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PPD SIS (MR05-01)

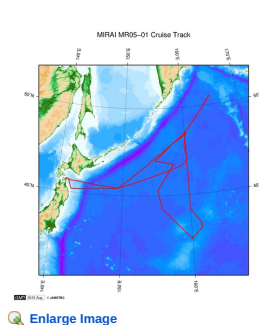
Format information describes column no., column heading mnemonic and comments of In-situ incubation data sheet in MR05-01. Missing value is presented by -999.

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	Chlorophyll	Chlorophyll a. quantity (Welschmeyer method) (µg/L)
14	Light intensity	Optical transmittance (%)
15	Inc.Time	Incubation time (hour)
16	POC-A	POC (Sample A) (µg/L)
17	POC-B	POC (Sample B) (µg/L)
18	13C-A	Ratio of 13C (Sample A) (atom%)
19	13C-B	Ratio of 13C (Sample B) (atom%)
20	Flag-A	Flag of Sample A (for explanation see Quality flags)
21	Flag-B	Flag of Sample B (for explanation see Quality flags)
22	dPOC-A	delta POC of Sample A (µg/L/day)
23	dPOC-B	delta POC of Sample B (µg/L/day)
24	AVE of dPOC	Average of dPOC (µg/L/day)
25	Flag-AVE	Flag of AVE of dPOC (for explanation see Quality flags)
26	PP	Primary productivity (mg/m2/day)
27	d POC-A/t	delta POC of Sample A per hour (µg/L/h)
28	d POC-B/t	delta POC of Sample B per hour (µg/L/h)
29	PB-A	d POC-A/t/Chl.a (mgC/mg chl.a/h)
30	PB-B	d POC-B/t/Chl.a (mgC/mg chl.a/h)
31	Remarks	Flag explanation etc.

about 22, 23, 26, 27, 28, 29 and 30)
For calculations, please see Cruise Report.

about 24)
Only the "Flag 1" data in "dPOC-A" and "dPOC-B" are used for the calculation of "AVE of dPOC".
(see column No.20 and No.21)

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POWER GRAB
SAMPLER (SHELL)
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BMS

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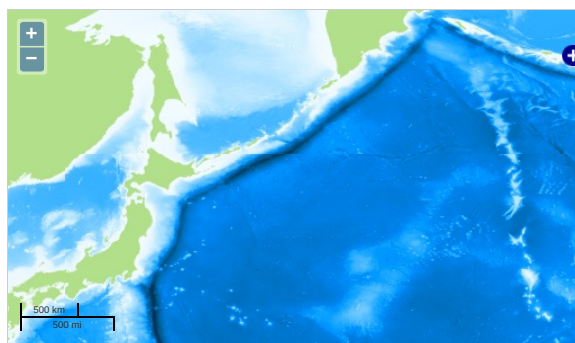
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Observation Map



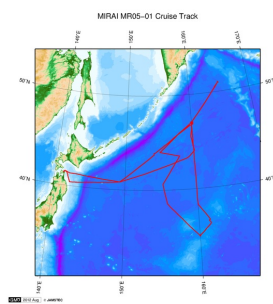
... Observation Line ... Navigation ... Observation, Dive Point, Hole

Data List

File names

☐ MR05-01_pp_SIS.csv

Related Information



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