

MIRAI MR98-K02 Primary Production

Last Modified: 2013-08-09

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Cruise ID: [MR98-K02](#)

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/MR98-K02_all.pdf

For Using Data

Principal Investigator

Takeshi Kawano (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 MR98-K02 cruise were obtained by the following methods :

- Photosynthesis and irradiation curve method at stations (PI_at stations)

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

Photosynthesis and irradiation curve at stations (PI_at stations) [Outline figure](#)

- 1) Vertical sampling : -
- 2) Surface sampling : Bucket
- 3) Sampling layer : 0m
- 4) Tracer : $\text{NaH}^{13}\text{CO}_3$
- 5) Incubation period : 3hours
- 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 120 days
- 9) Analysis place : JAMSTEC
- 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. MR98-K02_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 : $m/\Delta m=95$ (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

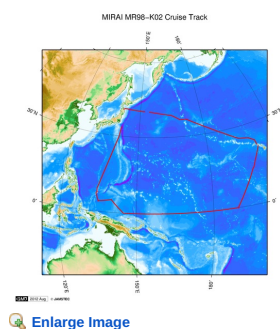
(IAEA-N-1, IAEA-N-2, and IAEA-CH-6) dealt in International Atomic Energy Agency (IAEA) were used.

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



MR98-K02

Ship Name: MIRAI

Period: 1998-12-22 - 1999-01-31

Chief Scientist: Takeshi Kawano (JAMSTEC)

Update History

2013-08-09	An observation data was registered.
2013-02-01	An observation data was registered.

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PPD PI (MR98-K02)

Format information describes column no., column heading mnemonic and comments of PI at stations data sheet in MR98-K02.

PI: Photosynthesis and irradiation curve

Missing value is presented by -999.

Column No.	Column Heading Mnemonic	Comments
1	CruiseNO	CruiseID
2	STNNBR	Station number
3	CASTNO	Cast number
4	Inc.Type	Incubation method (PI : Photosynthesis and irradiation curve)
5	UTC Date	Sampling start UTC date
6	UTC Time	Sampling start UTC time
7	LST Date	Sampling start LST date
8	LST Time	Sampling start LST time
9	Latitude	Sampling start position Latitude degree
10	Longitude	Sampling start position Longitude degree
11	BTLNBR	Bottle identification number
12	BTLNBR_FLAG	Bottle quality flag
13	CTD Depth	CTD Depth (m)
14	CTD PRS	CTD Pressure (dbar)
15	Chlorophyll	Chlorophyll a. quantity (mg/m3)
16	Layer	Sampling layer
17	Light Intensity	Light intensity (μeinstein/m2/sec)
18	Inc. Time	Incubation Time (hour)
19	POC	POC (mgC/L)
20	13C	Ratio of 13C (atom%)
21	dPOC	delta POC (mgC/h)
22	Pb	delta POC/Chlorophyll a./hour (mgC/mgChl/h)
23	Flag	Flag of sample (for explanation see Quality flags)
24	Remarks	Flag explanation etc.

about 21)

The equation to be used in the calculations.

$dPOC = 1.025 \times POC \times (13C - 1.084) / ((2000 \times 0.01084 + 200) / 22 - 1.084) / 3$

1.025 : ¹³C Stable Isotope discrimination factor

1.084 : ¹³C ratio of zero time blank POC

$(2000 \times 0.01084 + 200) / 22$: Amount of ¹³C in which 10% of Total dissolved inorganic carbon in seawater was added as tracer.

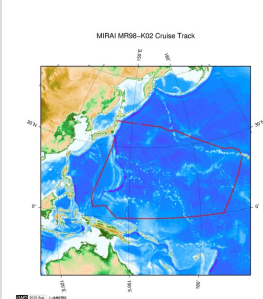
about 22)

$Pb = dPOC / \text{Chlorophyll a.}$

Literature cited for the equation

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

Related Information



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BMS

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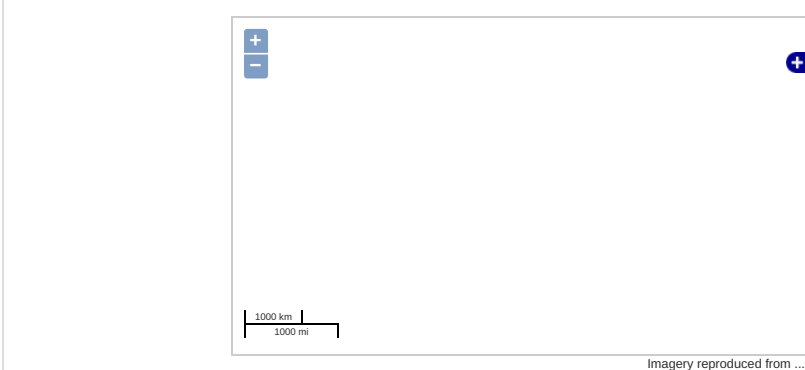
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Observation Map

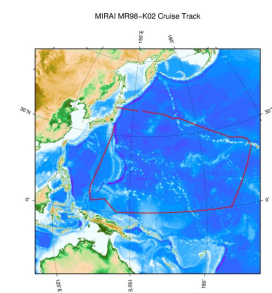


Data List

File names

☐ MR98-K02_pp_PI.csv

Related Information



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