

MIRAI MR00-K06 Primary Production

Last Modified: 2013-08-09

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Cruise ID: [MR00-K06](#)

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

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 MR00-K06 cruise were obtained by the following methods :

- Photosynthesis and irradiation curve method during underway (PI_underway)

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 underway (PI_underway) [Outline figure](#)

- 1) Surface sampling : Sea surface water is continuously pumped up at 4.5 meters depth to the sea surface monitoring laboratory and then flowed into each analysis device through a steel pipe and a vinyl-chloride pipe.
- 2) Sampling layer : 1
- 3) Tracer : $\text{NaH}^{13}\text{CO}_3$
- 4) Incubation period : 3hours
- 5) Filtration : Whatman GF/F filter was used at dark place.
- 6) Preservation : Filters were kept to freeze at -20degC and dried in the oven at 45degC.
- 7) Preservation period of frozen filter paper : within 45 days
- 8) Analysis place : MIRAI
- 9) Analysis device : CN mass spectrometer (see section 3 and 4 for detail)
- 10) 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. MR00-K06_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 ‰)

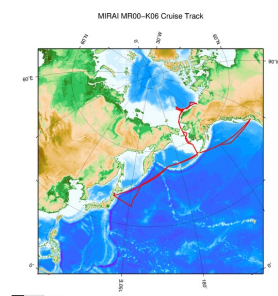
(4) Data processing
Device control and processing soft : ANCA ver.3.5 (former PDZ Europa Ltd.)
Fully compatible with Windows 3.1 or Windows 95.

(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.

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.
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Please contact us if necessary.
dmo@jamstec.go.jp

Related Information



[Enlarge Image](#)

MR00-K06

Ship Name: MIRAI
Period: 2000-08-03 - 2000-10-13
Chief Scientist: Takatoshi Takizawa (JAMSTEC)
Project Name: [Arctic Ocean Climate System Reaserch]

Update History

2013-08-09	An observation data was registerd.
2012-12-25	An observation data was registerd.

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Cruise ID:

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PPD Plu (MR00-K06)

Format information describes column no., column heading mnemonic and comments of PI underway data sheet in MR00-K06.

PI : Photosynthesis and irradiation curve

Missing value is presented by -999.

Column No.	Column Heading Mnemonic	Comments
1	CruiseNO	CruiseID
2	Inc.Type	Incubation method (PI : Photosynthesis and irradiation curve)
3	UTC Date	Sampling start UTC date (refer to Thermosalinograph)
4	UTC Time	Sampling start UTC time (refer to Thermosalinograph)
5	LST Date	Sampling start LST date (LST : Local Ship Time, refer to Thermosalinograph)
6	LST Time	Sampling start LST time (LST : Local Ship Time, refer to Thermosalinograph)
7	Latitude	Sampling start position Latitude degree (refer to Thermosalinograph)
8	Longitude	Sampling start position Longitude degree (refer to Thermosalinograph)
9	Sampling depth	Sampling depth (m)
10	Chlorophyll	Chlorophyll a. quantity (µgC/L)
11	Light intensity	Light intensity (µenstein/m2/sec)
12	Inc.Time	Incubation Time (hour)
13	POC	POC (µg/L)
14	¹³ C	Ratio of ¹³ C (atom%)
15	dPOC	delta POC (µgC/L/H)
16	Pb	dPOC/Chlorophyll a. (mgC/mg Chl.a/H)
17	Flag	Flag of sample (for explanation see Quality flags)
18	Remarks	Flag explanation etc.

about 5)

The same day is generated in LST in the vicinity of the date line on the second.

about 15)

The equation to be used in the calculations.

$dPOC = 1.025 \times POC \times (13C - 1.084) / ((2000 \times 0.01084 + 200) / (2000 + 200) \times 100 - 1.084) / 3$

1.025 : ¹³C Stable Isotope discrimination factor

1.084 : ¹³C ratio of zero time blank POC

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

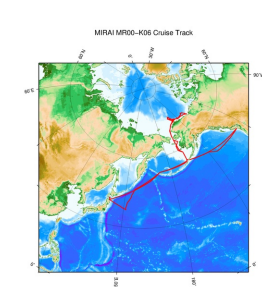
about 16)

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

Literature cited for the equation

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

Related Information



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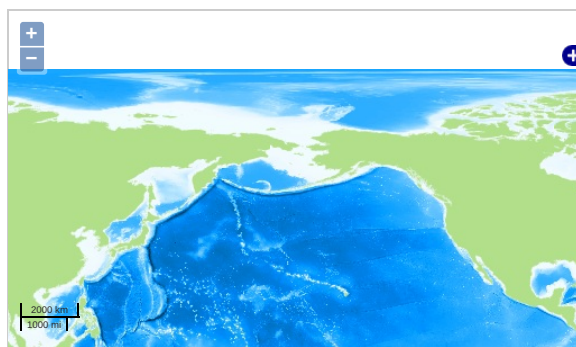
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Observation Map



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

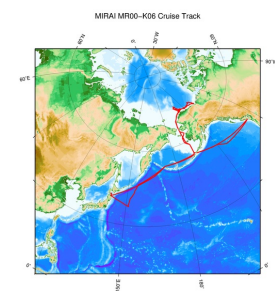
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Data List

File names

☐ MR00-K06_pp_Plu.csv

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