

## For Using Data

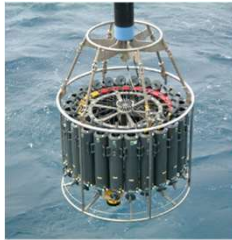
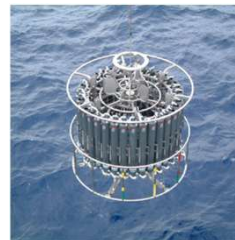
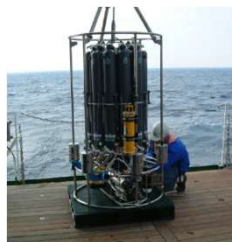
Data Policy	JAMSTEC
Principal Investigator	Data Management Office
Use Constraints	See Terms and Conditions about constrain of use.
Data Citation	See Terms and Conditions about data citation.

## Quality

DMO-Processed

## Instrument

CTD (Conductivity-Temperature-Depth profiler)

Water sampling system with CTD  
(12litters \* 36 bottles)Water sampling system with CTD  
(12litters \* 12 bottles)Water sampling system with CTD  
(30litters \* 24 bottles)

## Overview

CTD(Conductivity-Temperature-Depth profiler) is used to observe the vertical profiles of temperature and conductivity. Usually, this system is operated with multicylinder water sampler.

Observed signal is transmitted from sensor to the operation room on board using wire cable, and electric power is supplied from vessel to sensor.

Details of sensors attached to CTD system for this cruise are presented in "Measurement System".

The following software, developed and supplied by the Sea-Bird Scientific, was used in this cruise.

SEASAVE(ver 7.26.7.121) for data acquisition

SBEDataProcessing(ver 7.26.7.129) for data processing

Data presented on this website is averaged over 1db.

## Measurement System

## 1) Pressure sensor

Manufacturer :	Sea-Bird Scientific
Type :	SBE9plus
Serial No. :	117457
Measurement range :	up ~ 10500 m
Accuracy :	+/- 0.015% of full scale range
Resolution :	0.001% of full scale range

## 2) Temperature sensor

Manufacturer :	Sea-Bird Scientific
Type :	SBE3
Serial No. :	032730
Measurement range :	-5 to +35 deg-C
Accuracy :	+/- 0.001 deg-C
Resolution :	0.0002 deg-C

### 3) Conductivity sensor (Salinity sensor)

Manufacturer : Sea-Bird Scientific  
 Type : SBE4  
 Serial No. : 042435  
 Measurement range : 0 to 7 S/m  
 Accuracy : +/- 0.0003 S/m  
 Resolution : 0.00004 S/m

### 4) Dissolved Oxygen sensor

Manufacturer : Sea-Bird Scientific  
 Type : SBE43  
 Serial No. : 432211  
 Accuracy : 120% of surface saturation  
 Resolution : +/- 2% of saturation

## Calibration Information

### 1) Pressure sensor

Serial No.	Calibration date	Institution	slope	offset (dbar)
117457	9-Jun-2022	JAMSTEC	0.99987708	-1.43396

The observed value is computed as :

Observed value [dbar] = slope \* computed pressure[dbar] + offset[dbar]

### 2) Temperature sensor

Serial No.	Calibration date	Institution
032730	11-Apr-2023	Sea-Bird Scientific

### 3) Conductivity sensor (Salinity sensor)

Serial No.	Calibration date	Institution
042435	2-Sep-2022	Sea-Bird Scientific

### 4) Dissolved Oxygen sensor

Serial No.	Calibration date	Institution
432211	20-Dec-2022	Sea-Bird Scientific

## Use sensors

Sensors used in each cast is as follows.

Cast name	Pressure	Temperature	Salinity	Dissolved Oxygen
001M001	117457	032730	042435	432211
002M001	117457	032730	042435	432211
003M001	117457	032730	042435	432211
003M002	117457	032730	042435	432211
004M001	117457	032730	042435	432211
005M001	117457	032730	042435	432211
006M001	117457	032730	042435	432211
007M001	117457	032730	042435	432211
008M001	117457	032730	042435	432211
009M001	117457	032730	042435	432211
010M001	117457	032730	042435	432211
011M001	117457	032730	042435	432211
012M001	117457	032730	042435	432211
013M001	117457	032730	042435	432211
014M001	117457	032730	042435	432211
014M002	117457	032730	042435	432211
015M001	117457	032730	042435	432211
016M001	117457	032730	042435	432211
017M001	117457	032730	042435	432211
018M001	117457	032730	042435	432211
019M001	117457	032730	042435	432211
020M001	117457	032730	042435	432211
020M002	117457	032730	042435	432211

021M001	117457	032730	042435	432211
021M002	117457	032730	042435	432211
022M001	117457	032730	042435	432211
023M001	117457	032730	042435	432211
024M001	117457	032730	042435	432211
025M001	117457	032730	042435	432211
025M002	117457	032730	042435	432211
026M001	117457	032730	042435	432211
027M001	117457	032730	042435	432211
028M001	117457	032730	042435	432211
029M001	117457	032730	042435	432211
029M002	117457	032730	042435	432211
030M001	117457	032730	042435	432211
031M001	117457	032730	042435	432211
031M002	117457	032730	042435	432211
032M001	117457	032730	042435	432211
032M002	117457	032730	042435	432211
034M001	117457	032730	042435	432211
035M001	117457	032730	042435	432211
036M001	117457	032730	042435	432211
037M001	117457	032730	042435	432211
038M001	117457	032730	042435	432211
039M001	117457	032730	042435	432211
040M001	117457	032730	042435	432211
041M001	117457	032730	042435	432211
042M001	117457	032730	042435	432211
043M001	117457	032730	042435	432211
044M001	117457	032730	042435	432211

## Data processing

1) Data processing sequence for SBEDataProcessing is as follows;

("\*" is not SBEDataProcessing original procedure.)

Modules	Function
datcnv	Convert raw data to engineering units, and store converted data in file.
tcorp*	Corrected the pressure sensitivity of the temperature(SBE3) sensor.
rincor*	Corrected the hysteresis of dissolved oxygen(RINKO III) sensor.
rincorcorros*	Corrected the hysteresis of the dissolved oxygen voltage data (RINKO III) at the time of water sampling.
bottlesum	Summarize data from water sampler bottle .ros file, storing results in .bti file.
alignctd	Align data relative to each sensors.
wildedit	Mark a data value with bad flag to eliminate wild points.
celltm	Perform conductivity thermal mass correction.
filter	Low-pass filter columns of data.
wfilter	Median filter removes spikes such as fluorometer, turbidimeter, transmissometer, nitrate and CDOM data.
sectionu*	Extract rows of data from file.
loopedit	Mark a scan with bad flag if scan fails pressure reversal or minimum velocity tests.
despike	Remove spikes of the temperature, conductivity, and oxygen voltage data.
derive	Calculate salinity, density, oxygen, etc.
binavg	Average data. Bins can be based on pressure, depth, scan number, or time ranges.
bottomcut*	Bottom cut deletes discontinuous scan bottom data if it's created by binavg.
split	Split data in file into downcast and upcast files.

## 2) Quality control

QCed data were added flag according to the NODC (National Oceanographic Data Center) quality control procedure.

- i. The gradient check of adjacent depth data
- ii. The density inversion check
- iii. The broad range check set up at given ocean space and depth

Please see the paper for quality control procedure in detail.

Quality control and processing of historical oceanographic temperature, salinity, and oxygen data.

P. Boyer and Levitus, 1994. NOAA technical report NESDIS ; 81

\* <https://repository.library.noaa.gov/view/noaa/13443>

In addition, an abnormal value is identified by a visual check, and the data after visual QC is released.

### Note

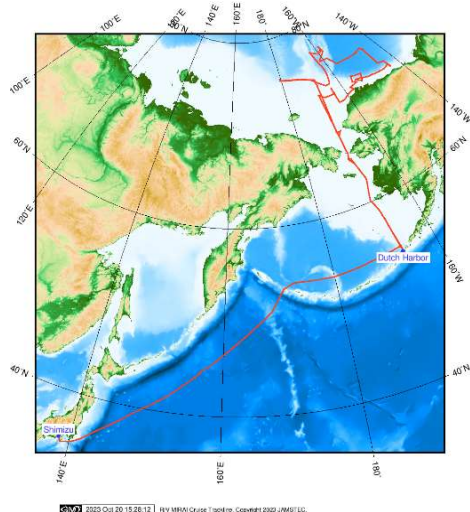
In this cruise, there is extra data (dissolved oxygen (RINKO III), fluorescence intensity, light transmission, CDOM, PAR, nitrate and distance to bottom) in addition to temperature, salinity and dissolved oxygen that has been opened to the public.

Detailed results of sensor calibration are also stored.

If you would like the raw data set, please contact DMO at "dmo@jamstec.go.jp".

## Related Information

R/V MIRAI Cruise Trackline in MR23-06C



### MR23-06C

Ship Name:	MIRAI
Period:	2023/08/25 - 2023/10/04
Chief Scientist:	Amane Fujiwara (JAMSTEC)
Proposal:	Arctic Expedition for Environmental Studies Observational study of the Arctic environmental changes: Pacific-Arctic interaction, biogeochemical transport, mixing and marine ecosystem  Research and development of under-ice observation technology  Quantification of the microplastic inventory in the waters of the western Arctic Ocean and microplastic influx from the Pacific Ocean  Changes in clouds and aerosols over the ice-free Arctic Ocean  Possibility of the expanding distribution in plankton and fishes associated with sea ice reduction in the Pacific sector of the Arctic Ocean  Observation of air-sea-wave-ice interaction over the Pacific Arctic region  Investigating the physical and ecophysiological basis of fall phytoplankton blooms in the Chukchi and Beaufort seas  Nitrogen Fixation in a Changing Arctic Ocean An Overlooked Source of Nitrogen  Exploring microplankton interactions and their functional roles in a changing Arctic  Determining the contribution of siphonophores to mesopelagic backscatter in the Arctic  Better understanding of climate-driven changes of biogeochemical dynamics in the western Arctic Ocean via R/V Mirai 2023 Cruise A perspective of stable carbon isotope  Temporal variations of the carbonate chemical components the Arctic Ocean within summertime  Observation of water vapor isotopic ratios Observation of atmospheric greenhouse gases and related species in the North Pacific region

## Format Description for CTD DMO

### Format Description for the DMO-Processed Data

Each data file contains one line header (meta data) followed by data lines for each cast.

The number of data lines are recorded in the header.

#### Header part

No.	Column	Content	Format	Remarks
1	1	Header ID	a1	fixed as '#'
2	3 - 6	Data ID	a4	CTD
3	8 - 22	Cruise ID	a15	
4	24 - 31	Cast name	a8	
5	33 - 40	Date	i8	YYYYMMDD (UTC)
6	42 - 45	Time	i4	hhmm (UTC)
7	47 - 55	Latitude	i2,a1,f5.2,a1	dd-mm.mmN(S)
8	57 - 66	Longitude	i3,a1,f5.2,a1	ddd-mm.mmE(W)
9	68 - 71	Number of data lines	i4	
10	72 - 73	Terminator	a2	[CR][LF]

#### Data part

No.	Column	Content	Format	Unit	Remarks
1	1 - 11	Pressure	f11.3	dbar	
2	12 - 22	Temperature	f11.4	deg-C	ITS-90
3	23 - 33	Salinity	f11.4	PSU	PSS-78
4	34 - 44	Dissolved oxygen	f11.3	$\mu$ mol/kg	
5	45 - 55	Quality control flag	i11		45 - 51 : space 52 : flag of pressure 53 : flag of temperature 54: flag of salinity 55 : flag of dissolved oxygen
6	56 - 57	Terminator	a2		[CR][LF]

Each contents of the data part is stored in 11 bytes.

Missing value is presented by '-5', and error value is presented by '-9'.

### Definition of Quality Control Flags

#### 1) Depth Flags

- 0 - accepted value
- 1 - error in recorded depth ( same or less than previous depth )
- 2 - density inversion

#### 2) Observed Level Flags

- N - missing value
- 0 - accepted value
- 1 - range outlier ( outside of broad range check )
- 2 - failed inversion check
- 3 - failed gradient check
- 4 - zero anomaly
- 5 - failed combined gradient and inversion checks
- 6 - failed range and inversion checks
- 7 - failed range and gradient checks
- 8 - failed range and zero anomaly checks
- 9 - failed range and combined gradient and inversion checks
- A - failed visual check