

## SHINKAI 6500 6K 00659 Submersible Conductivity-Temperature-Depth Profiler (CTD)

Last Modified: 2014-12-10

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Dive No.: **6K 00659**

Submersible Conductivity-Temperature-Depth Profiler (CTD): Processed (DMO)-QCed

Data Policy: **JAMSTEC**

Observation Items: Depth/Pressure, Temperature, Salinity, Dissolved oxygen

Science Keywords:

OCEANS > OCEAN CHEMISTRY > OXYGEN  
OCEANS > OCEAN TEMPERATURE > WATER TEMPERATURE  
OCEANS > SALINITY/DENSITY > SALINITY

### **For Using Data**

#### Principal Investigator

Data Management Office

#### Use Constraints

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

#### Data Citation

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

### Instrument

Instrument:

CTD/DO measurement system  
equipped on the deep submergence  
research vehicle "SHINKAI 6500"



Position of the CTD system

### Overview

The CTDO system mounted on the submersible research vehicle "SHINKAI 6500" is mainly composed of four instruments: a CTDO primary detection element, a current meter/CTDO processing part, a current meter/CTDO display part, and a control PC.

The CTDO primary detection element is consisted of SBE-19 SEACAT PROFILER CTD and SBE43 DO of Sea-Bird Electronics, Inc. The primary detection element is installed vertically on the port side of the submersible vehicles hatch. Its withstand depth is 10050m and its maximum depth of use is 6500m. Each parameter of conductivity, water temperature, pressure, and dissolved oxygen (DO) can be measured in 2Hz and is transmitted to the CTDO processing part. In the processing part, ASCII conversions and data corrections are conducted. The control PC can set up data management in the primary detecting element and control time and other environmental settings, via the display and processing parts.

### Specifications

SBE-19 SEACAT PROFILER CTD and SBE43 DO, Sea-Bird Electronics, Inc.

Sensor	Measurement range	Accuracy	Model	S/N
Temperature	-5 to +35 deg-C	0.01 deg-C	SBE 19-04	1921545-2861
Conductivity	0 to 7 S/m	0.001 S/m		1921545-2862
Pressure	0 to 15000 psia	0.02% of full scale rang		
Dissolved oxygen	120% of surface saturation	2% of saturation	SBE 43	0697, 0736

### Data collection and situations

The data collection in each dive starts from, the moment before it submerges and ends immediately after it comes up to the sea surface.

Because of the installed position of the primary detecting element, actual observation depth of the CTDO will be approximately 3m higher than the depth of the sea bottom even when the submersible vehicle is on the seabed.

Temperature data while descending is tended to be influenced by the heating from the withstand pressure hull of the submersible vehicle, so the temperature data while ascending is recommended to use.

The internal clock of CTD is synchronized, in each dive, with the clock inside the submersible vehicle which is also synchronized with the management system of its sound navigation device.

### Data processing

After the submersible vehicle comes up to the sea surface, the hexadecimal form HEX file data recorded in the processing part is copied to a PC to be edited . Calculations of sound velocity and salinity, data edits, and proofreading are conducted by SEASOFT software which makes two types of data in ASCII format: 1-dbar pressure bin data and 1-sec time interval data.

Data processing sequence for SEASOFT used for the CTD data correction is as follows.

Module	Function
DATA CONVERSION	Converts raw data to pressure, temperature, conductivity, and oxygen.
FILTER	Performs a low pass filter on conductivity.
ALIGNCTD	Converts the time-sequence of conductivity and oxygen sensor outputs into pressure sequence.
DERIVE	Computes salinity, density ( $\sigma_\theta$ ), and sound velocity.
ASCII OUT	Divides data into the data part and the header part and reads out on ASCII format.

### Data available here

The data available on this web site is 1-sec mean CTDO data integrated with SHINKAI 6500 (hereafter, the submersible vehicle) positioning data in latitude and longitude. The SSBL (Super Short Base Line) method is used to measure the submersible vehicle's position, which requires transponder mounted on the submersible vehicle and an array of transducers equipped on the bottom of the mother ship. The position is measured by both phase lag measured from angles of received sound waves and distance calculated from travelling period of them. Because the baseline length (i.e., a distance between transducers and the

transponder) is short, a horizontal error is about 1.5% of slant range (i.e., a distance between the submersible vehicle and the mother ship). The SSBL method has a characteristic that it is a little less accurate but easier to operate than the LBL (Long Base Line) method because it doesn't need to deploy sea-bed mounted transponder(s). Vertical profile of sound velocity is needed to calculate accurate distance from the travelling period. Therefore, the temperature measurement using XBT etc. of each sea area is executed.

The submersible vehicle positioning data was calculated by adding the relative distance to the mother ship's position. The simplified equation with the area-dependent coefficients every 30 degrees in latitude and longitude was applied to the distance (XY) to Lon/Lat conversion, which provided by Japan Coast Guard. Here, the original time interval of position data is more than 10 seconds. The noises remaining in the position data are manually eliminated and linearly interpolated when the speed calculated from adjacent two position data is greater than 2.5 knot which is the maximum operation speed of the submersible vehicle. Moreover, noises remained in the depth, temperature, salinity, and oxygen data are visually checked and replaced to missing values only when the data seemed to be obviously abnormal.

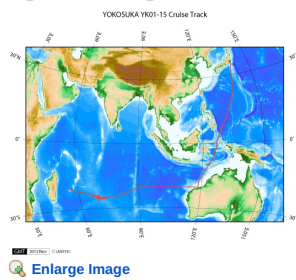
The CTDO system was installed as one of the navigation equipment to monitor the ambient environmental conditions of the submersible vehicle, whose sensor calibration is normally executed about every two years.

After considering the accuracy of the sensors, the significant digit of data was changed as in the following list.

Data	Raw	On this web site
Pressure	0.001 [dbar]	0.1 [dbar]
Temperature	0.0001 [deg-C]	0.01 [deg-C]
Salinity	0.0001 [PSU]	0.01 [PSU]
Dissolved oxygen	0.00001 [ml/l]	0.1 [ml/l]

#### Related Information

☒ Cruise Data ☐ Dive Data



#### YK01-15

Ship Name: YOKOSUKA  
Period: 2002-01-30 - 2002-03-17  
Chief Scientist: Ken Takai (JAMSTEC)

#### Update History

2014-12-10	An observation data was registered.
2014-11-18	An observation data was registered.
2014-10-31	An observation data was registered.

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KAIYO  
YOKOSUKA  
MIRAI  
KAIREI  
CHIKYU  
KAIMEI  
SHINSEI MARU  
HAKUHO MARU

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KAIKO  
SHINKAI 2000  
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)  
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Dive ID:

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### Submersible CTD Qced (6K)\_1sec

Header part

No.	Column	Item	Format	Remarks
1	1	Header ID	a1	fixed as '#'
2	3 - 37	Submersible vehicle	a35	SHINKAI-6500
3	39 - 48	Data ID	a10	CTD
4	50 - 70	Cruise ID	a21	YKYY-XX(_legx)
5	78 - 81	Dive number	a4	

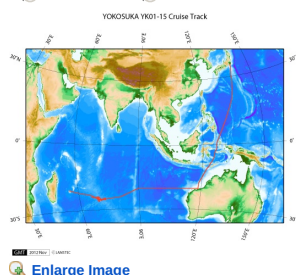
Data part

No.	Column	Item	Unit	Format	Remarks
1	1 - 8	Date	-	i8	YYYYMMDD (LST)
2	10 - 15	Time	-	i6	hhmmss (LST)
3	17 - 26	Latitude	degree	f10.5	No sign for the northern hemisphere. Negative for the southern hemisphere.
4	28 - 37	Longitude	degree	f10.5	No sign for the eastern hemisphere. Negative for the western hemisphere.
5	39 - 48	Pressure	dbar	f10.1	
6	50 - 59	Temperature	deg-C	f10.2	ITS-90
7	61 - 70	Salinity	PSU	f10.2	PSS-78
8	72 - 81	Dissolved oxygen	ml/l	f10.1	
9	83 - 92	Sound velocity	m/s	f10.1	
10	94 - 103	Altitude	m	i10	
11	105 - 114	Roll	degree	f10.1	
12	116 - 125	Pitch	degree	f10.1	
13	127 - 136	Vehicle heading	degree	f10.1	
14	138 - 147	Current direction	degree	f10.1	
15	149 - 158	Current velocity	cm/s	f10.1	
16	160 - 169	Depth	m	f10.1	

Missing value is presented by '-999'.

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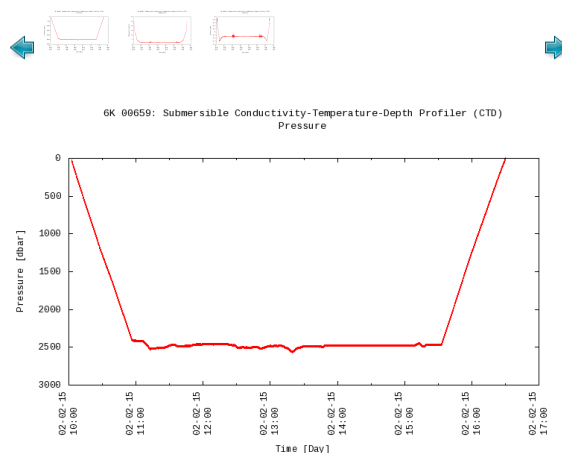
### Observation Map



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

Imagery reproduced from ...

### Figures



### Data List

☐ File names

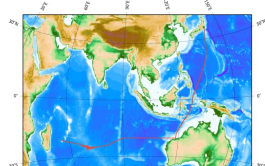
☐ 6K0659\_0.event

☐ 6K\_0659.txt

### Related Information

[Cruise Data](#) [Dive Data](#)

YOKOSUKA YK01-15 Cruise Track



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