2019 海上實習
- 自計式CTD操作

Department of Oceanography

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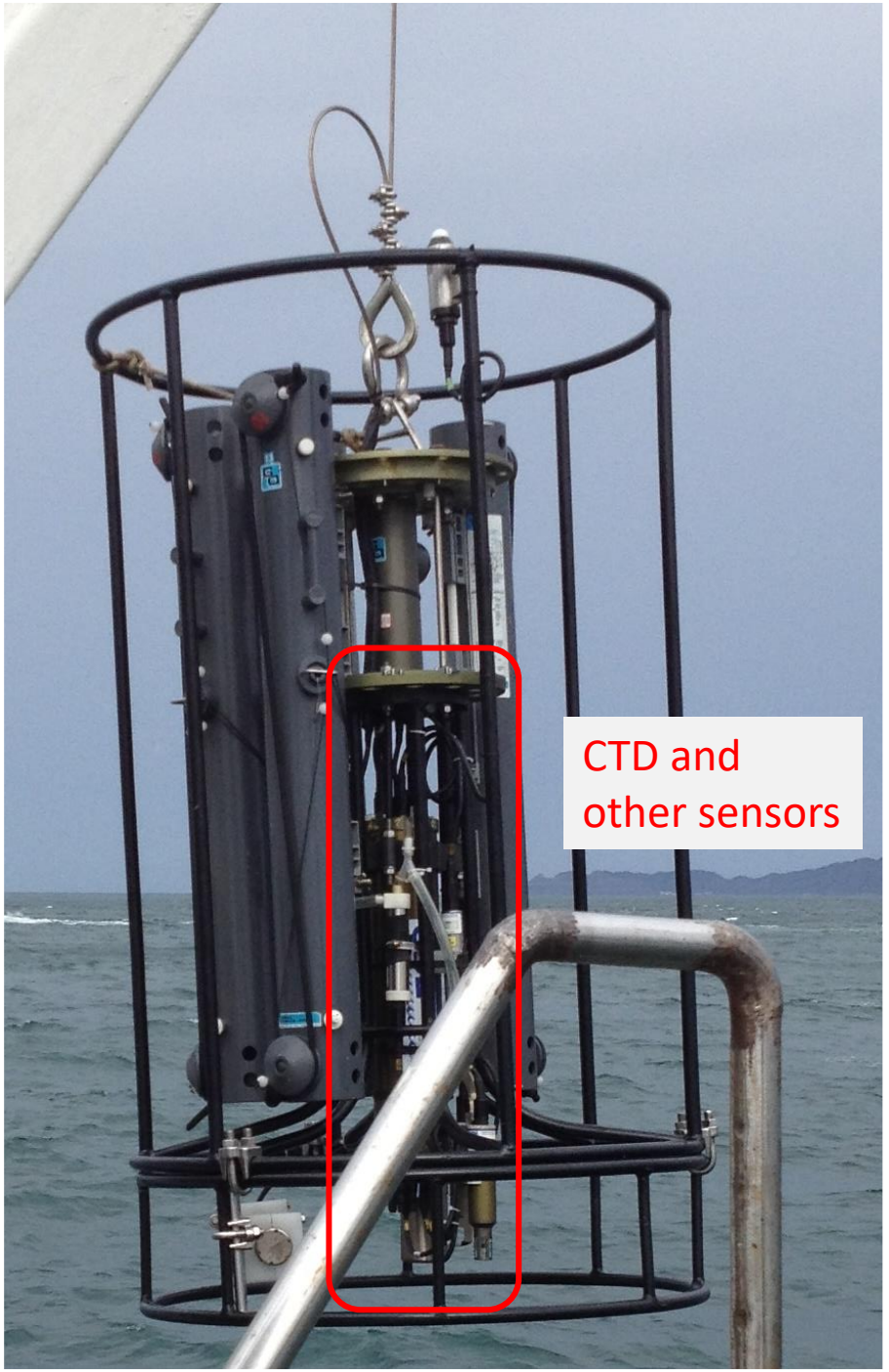
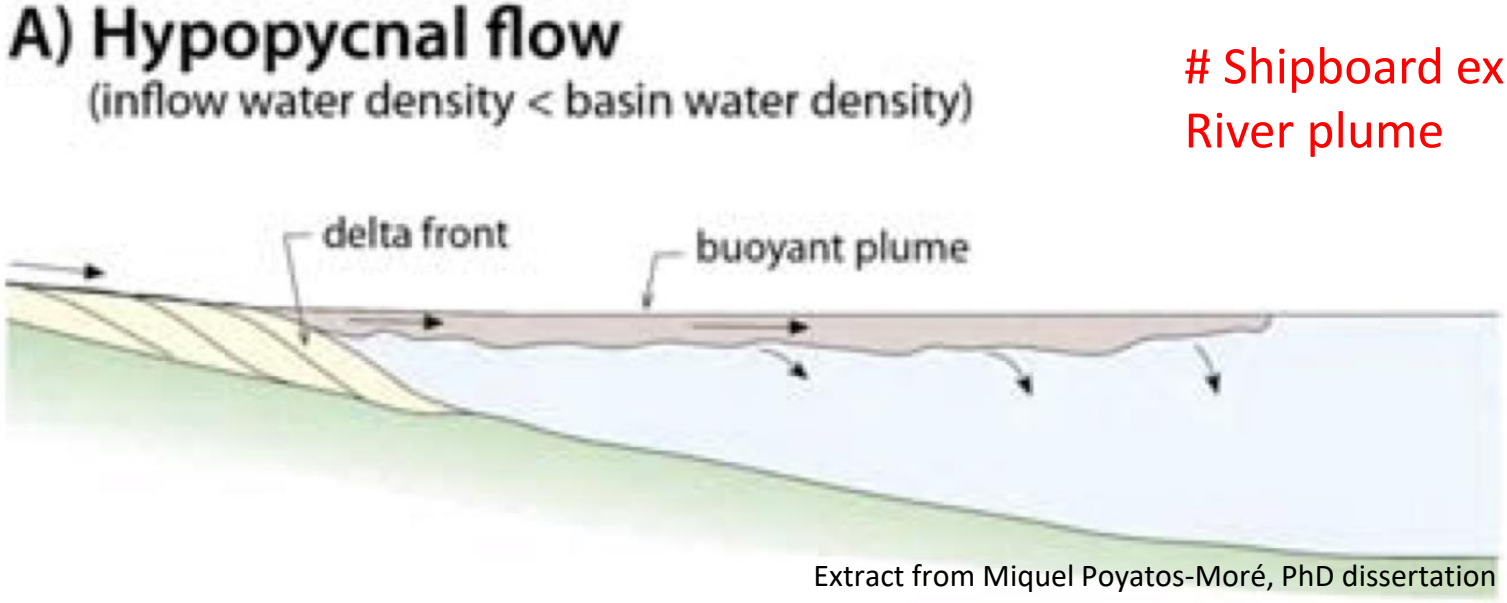
Outline

- When to use?
- Basic information of CTD
- Setting CTD
  - Frequency of measurement
  - Adjusting current time
- Output data

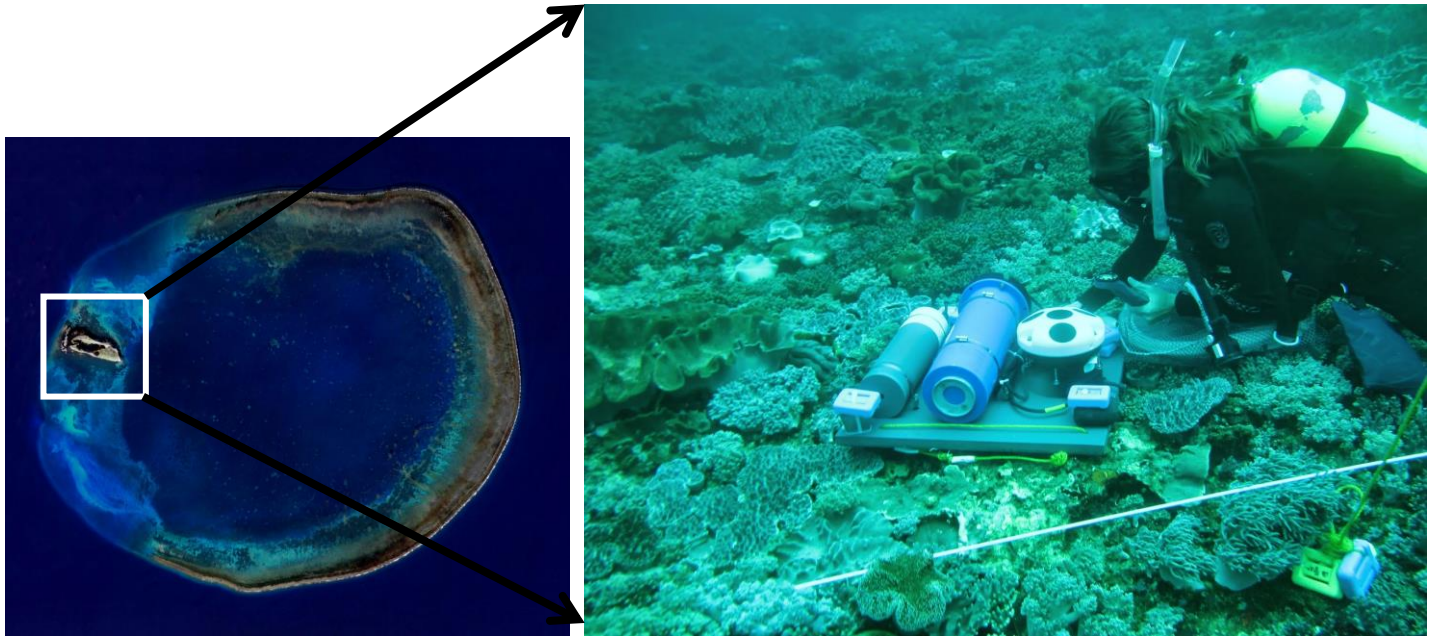
When to use?





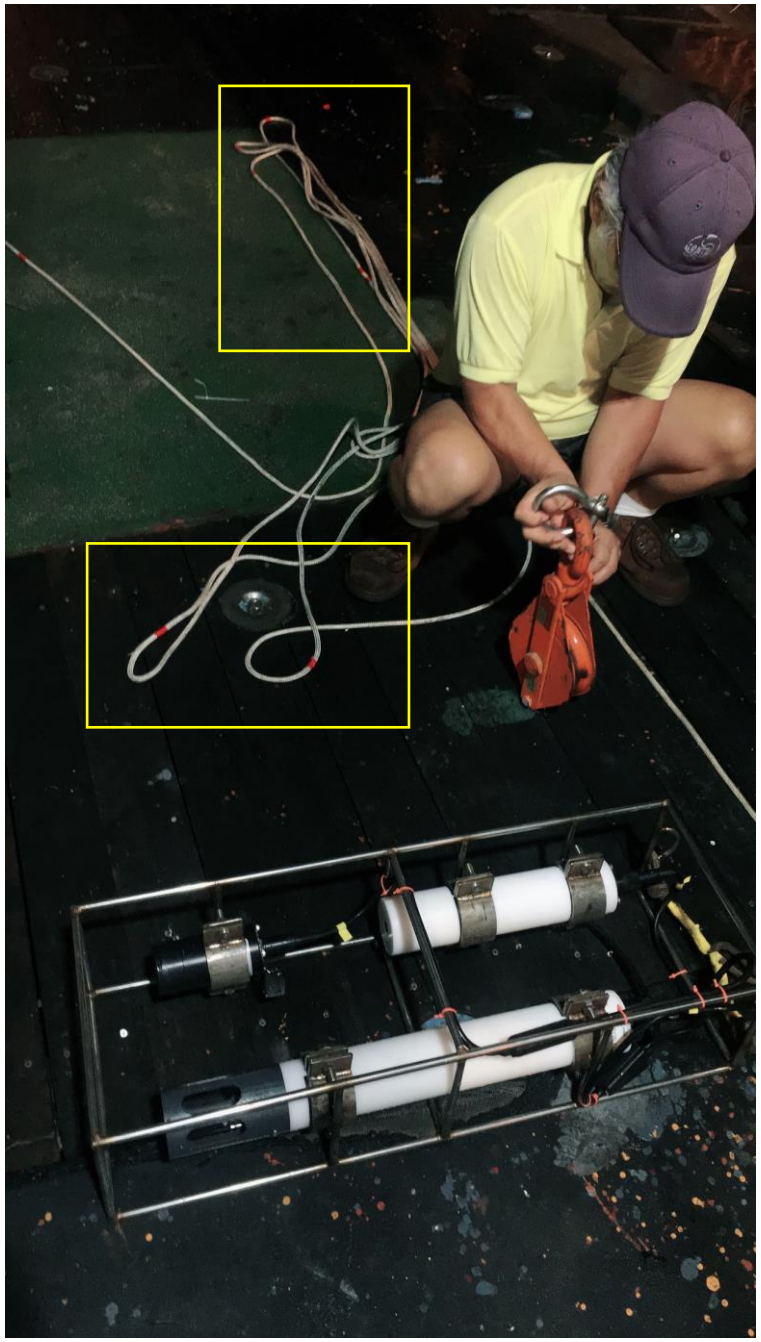
Extract from Miquel Poyatos-Moré, PhD dissertation

Shipboard expedition
River plume



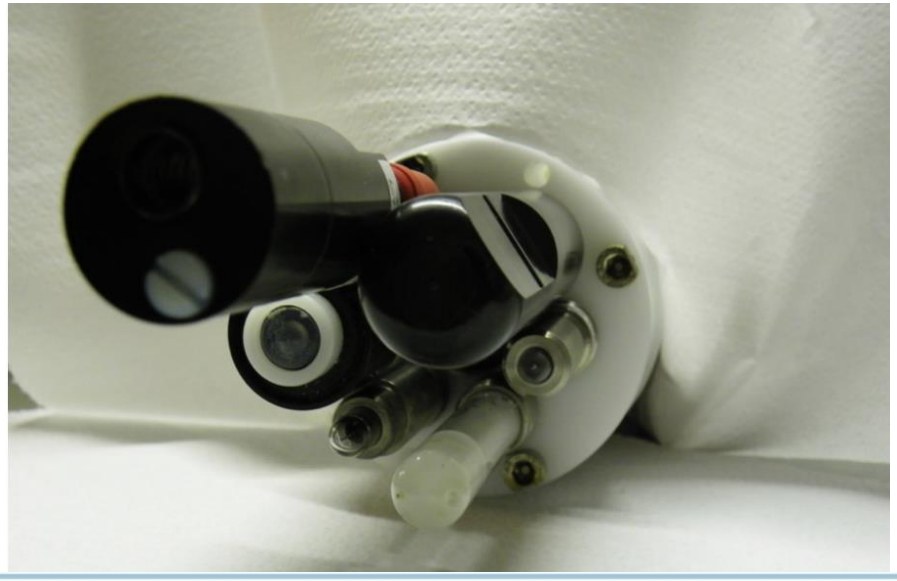
Field expedition
Coastal zone
Lagoon
lake

http://dongsha2014.blogspot.com/2014/06/heavy-duty.html



Basic information

-Ocean Seven 310 Multiparameter CTD



Parameter	Range	Accuracy	Resolution	Time Constant
Pressure	0..7000 dbar(3)	0.05 % FS	0.0015 % FS	50 ms
Temperature	-5..+50 °C	0.0015 °C	0.0001 °C	50 ms
Conductivity salt water	0..90 mS/cm	0.0015 mS/cm	0.0001 mS/cm	50 ms (1)
fresh water	0..7000 µS/cm	5 µS/cm	0.1 µS/cm	50 ms (1)
brine	0..350 mS/cm(5)	0.010 mS/cm	0.0001 mS/cm	50 ms
Oxygen (polarographic)	0..50 ppm	0.1 ppm	0.01 ppm	3 s 2)
	0..500 %sat.	1 %sat.	0.1 %sat.	3 s 2)
Oxygen (optical)	0..45 mg/l	0.1 mg/l	0.025 mg/l	5 s
	0..250 %sat.	±0.2 %sat.	0.05 %sat.	5 s
pH	0..14 pH	0.01 pH	0.1 mpH	3 s 4)
Redox	-1000..+1000 mV	1 mV	0.1 mV	3 s

(1) At 1 m/second flow rate. **(2)** From nitrogen to air. **(3)** Other standard pressure transducers: 10, 40, 100, 200, 500, 1000, 2000, 4000, 7000, 10000 dbar. **(4)** Differential pH preamplifier, $10^{13} \div 10^{14}$ ohm input impedance. **(5)** Optional extended range, available upon request

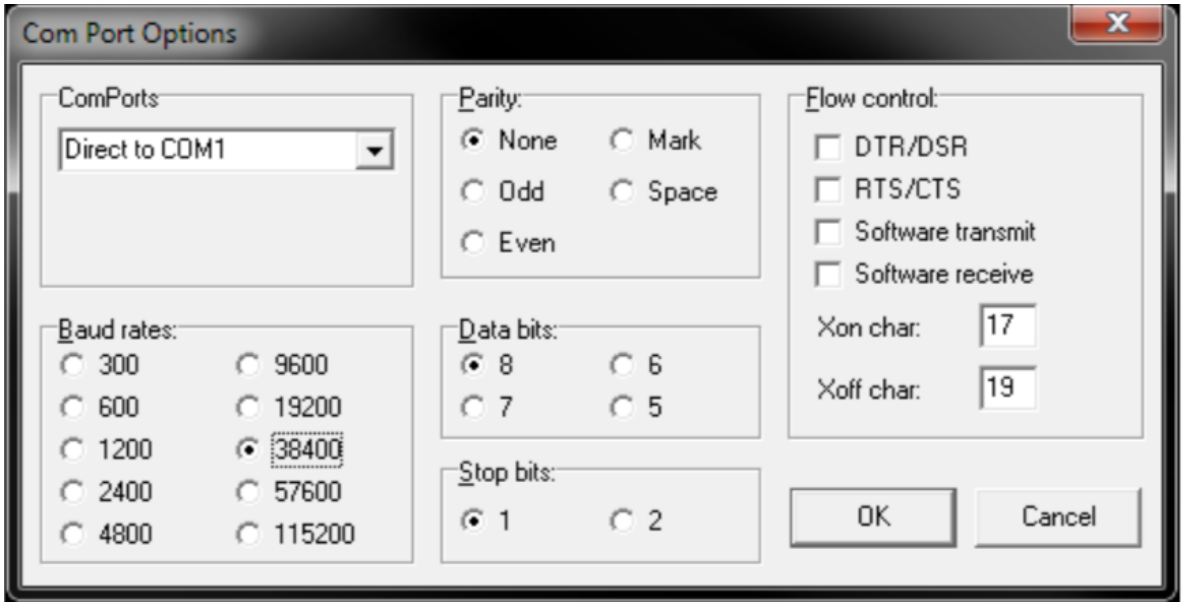
The fundamental properties of seawater like: **Salinity, Sound Speed, Water Density, Oxygen ppm** are obtained using the algorithms described in the UNESCO "**Technical papers in marine science no.** 44". The fresh water properties like: **TDS (Total Dissolved Solids), Fresh Water Conductivity** corrected at 20°C and 25°C are automatically calculated.

How to connect the CTD?

Softwares: iterm, realterm, teraterm. (Recommand **iterm** and realterm)

ELECTRONIC SPECIFICATIONS:	
Real-time and logging:	Up to 28 Hz;
Interfaces:	RS232C, RS485, TTL, Data Telemetry (QAM up to 10 Km) and Wireless.
Data memory:	2 Gbytes.
Real-time clock accuracy:	3 ppm/year.
Power Supply: *Battery*	2.9..5.0 VDC; running: 90 mA@3.6V
External power	9..32 VDC.
Data telemetry	Low voltage 18..60 VDC; High voltage: 90..220 VDC.
Software:	REDAS-5 and ITERM.

Iterm interface



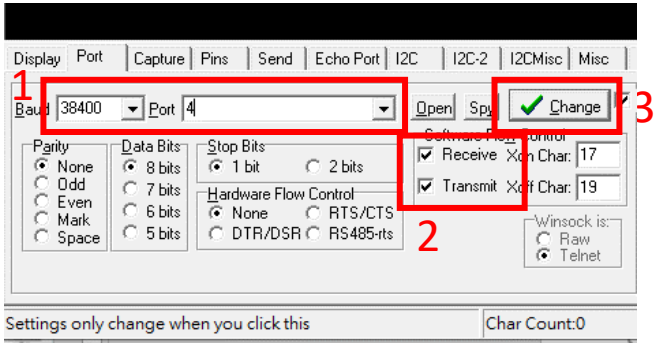
How to connect the CTD?

Software: realterm

1. Connect CTD with power and connect CTD with RS232 to USB for computer communication
2. Connect CTD with Fluorescent Probe
3. Check CTD port
4. Operate realterm or iterm

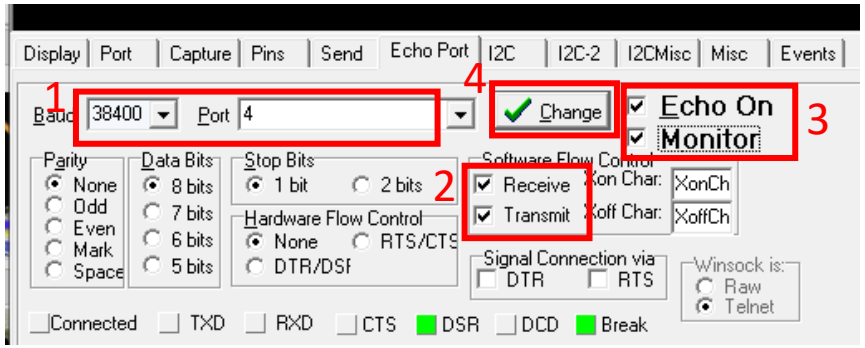
In **Port** screen

1. Baud rate: 38400
   Port: depend
2. V **Receive**
   V **Transmit**
3. Click **Change**



In **Echo Port** screen

1. Baud rate: 38400
   Port: depend
2. V **Receive**
   V **Transmit**
3. V **Echo On**
   V **Monitor**
4. Click **Change**



Adjusting current time

RealTerm: Serial Capture Program 2.0.0.70

```
<0>[SHUT]-Shutdown
<1>[DATA]-Data acquisition
<2>[MEMO]-Memory
<3>[CALB]-Calibration
<4>[SERV]-Service
<5>[OPMD]-Non-Verbose mode
cmd>4

OCEAN SEVEN 310-Id:0218025<USR>[sw]<1.2_12 02/18>Jan 01 01:16:24.90 2000
Service menu
<0>[SVUP]-Leave the service menu
<1>[CONF]-Configuration
<2>[DIAG]-Diagnostics
<3>[RAWC]-Raw data acquisition in counts (bit)
<4>[RAWM]-Raw data acquisition in mV
cmd>
```

Step 1 enter 4 (Service)

RealTerm: Serial Capture Program 2.0.0.70

```
<0>[SVUP]-Leave the service menu
<1>[CONF]-Configuration
<2>[DIAG]-Diagnostics
<3>[RAWC]-Raw data acquisition in counts (bit)
<4>[RAWM]-Raw data acquisition in mV
cmd>1

OCEAN SEVEN 310-Id:0218025<USR>[sw]<1.2_12 02/18>Jan 01 01:16:33.25 2000
Configuration menu
<0>[CNUP]-Leave configuration menu
<1>[CNDA]-Data acquisition parameter
<2>[CNOP]-Operating parameter
<3>[CNAP]-Acquired sensor parameters
<4>[CNDT]-Change current Date&Time
<5>[CNES]-External system
cmd>
```

Step 2 enter 1 (Configuration)
Step 3 enter 4 (Change current Date & Time)

RealTerm: Serial Capture Program 2.0.0.70

```
<2>[CNOP]-Operating parameter
<3>[CNAP]-Acquired sensor parameters
<4>[CNDT]-Change current Date&Time
<5>[CNES]-External system
cmd>4
Enter Date&Time: 01/01/2000 01:16:38 07
enter Date&Time[dd/mm/yyyy hh:mm:ss wday]
[1..31/1..12/1970..2069 0..23:0..59:0.59 1..7 < 10/30
value outside acceptable boundaries,[1-12]
Enter Date&Time: 10/01/2000 01:16:38 07
enter Date&Time[dd/mm/yyyy hh:mm:ss wday]
[1..31/1..12/1970..2069 0..23:0..59:0.59 1..7 < 10/30
value outside acceptable boundaries,[1-12]
Enter Date&Time: 10/01/2000 01:16:38 07
enter Date&Time[dd/mm/yyyy hh:mm:ss wday]
[1..31/1..12/1970..2069 0..23:0..59:0.59 1..7 < 30/10/2019 20:22:22
```

Step 4 enter current time (dd/mm/yyyy_hh:mm:ss_wday)
e.g., 17/16/2021 14:30:00 4

Setting frequency of measurement

RealTerm: Serial Capture Program 2.0.0.70

1. Press **ESC** (Back to Main menu)

```
  -0.13 26.600   0.001   0.012   -0.58   -2.13   -4.34 00:45:07.03CRLF
  -0.13 26.601   0.001   0.012   -0.58   -2.13   -4.34 00:45:08.04CRLF
  -0.13 26.605   0.001   0.012   -0.58   -2.13   -4.34 00:45:09.05CRLF
  -0.13 26.608   0.001   0.012   -0.58   -2.13   -4.34 00:45:10.06CRLF
  -0.13 26.609   0.001   0.012   -0.58   -2.13   -4.34 00:45:11.07CRLF
LFCRLFCR

OCEAN SEVEN 310-Id:0218025<USR>[sw]<1.2_12 02/18>Jan 01 00:45:12.08 2000LFCR
Main menuCRLF
<0>[SHUT]-ShutdownCRLF
<1>[DATA]-Data acquisitionCRLF
<2>[MEMO]-MemoryCRLF
<3>[CALB]-CalibrationCRLF
<4>[SERV]-ServiceCRLF
<5>[OPMD]-Non-Verbose modeCRLF
cmd>
```

2. Enter **1** (Data acquisition)

RealTerm: Serial Capture Program 2.0.0.70

```
Timed data acquisition configurationLF
Data acquisition step: 00:00:00.00CRLF CR
enter time [hh:mm:ss.hh]< 60CRLF
value outside acceptable boundaries,[0-23]LF
Data acquisition step: 00:00:00.00CRLF        CR
enter time [hh:mm:ss.hh]< 00:00:1Esc[HEsc[JLF
OCEAN SEVEN 310-Id:0218025<USR>[sw]<1.2_12 02/18>Jan 01 00:49:25.88 2000LF
Data acquisition menuLF                                                  CR
<0>[DAUP]-Leave data acquisition menuCRLF
<1>[DAMD]-RealTime data acquisitionCRLF
<2>[DALD]-Linear data acquisitionCRLF
<3>[DATD]-Timed data acquisitionCRLF
<4>[DACN]-Conditional data acquistionCRLF
<5>[DACO]-Continuous data acquistionCRLF
<6>[DABU]-Burst data acquisitionCRLF
cmd>
```

3. Enter 5 (Continuous data acquisition)

Setting frequency of measurement

1/Sample rate = [35..60000ms]:50

4. Press the sample rate we need (e.g., 1000), unit in mini-second.

1000 mini-second (ms) = 1 second
(CTD will sample every 1 second)

5. Press ENTER

Then, CTD will shutdown itself.

6. Switch CTD off

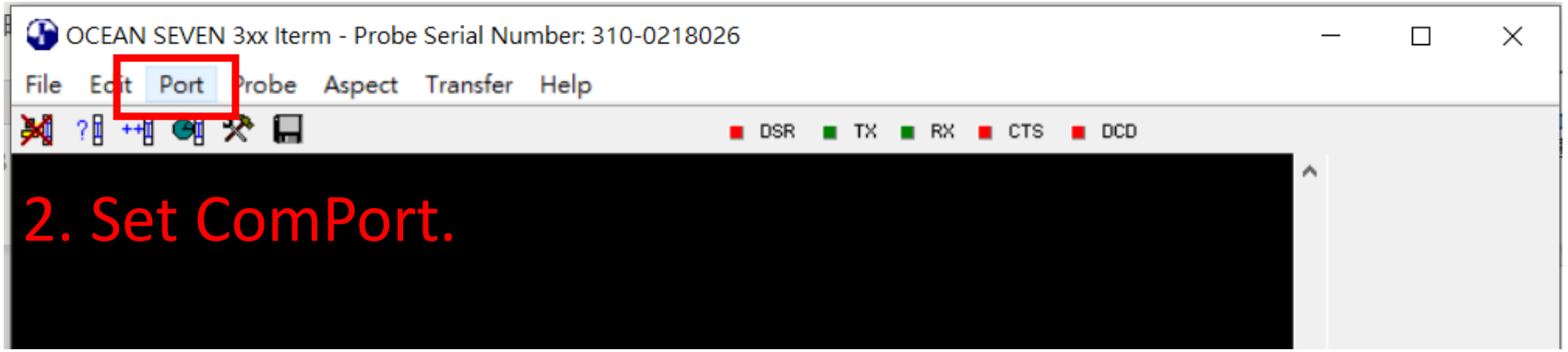
7. Switch CTD on

CTD will start to sample.

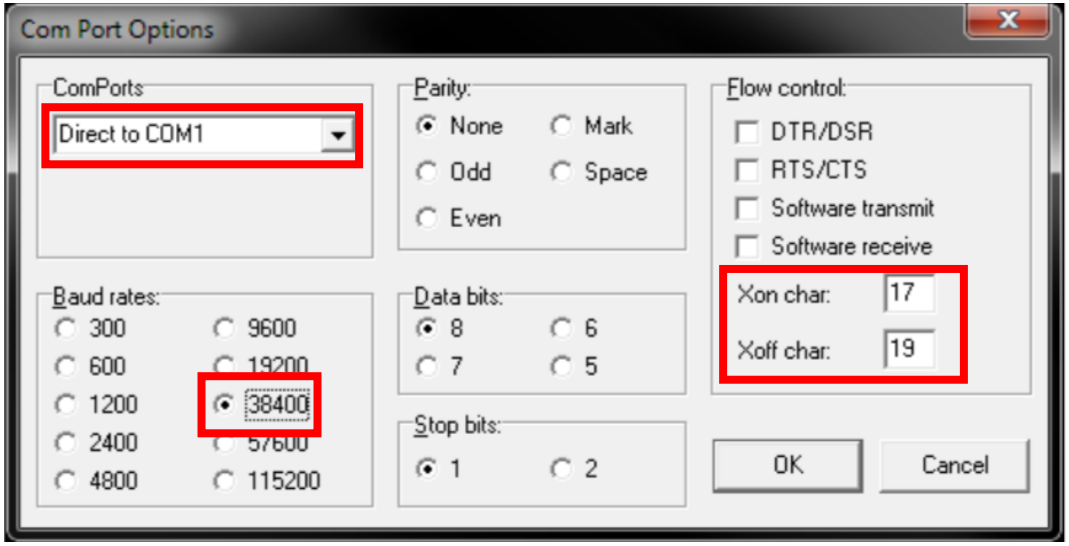
Sample data should be appeared on the screen.

Output data

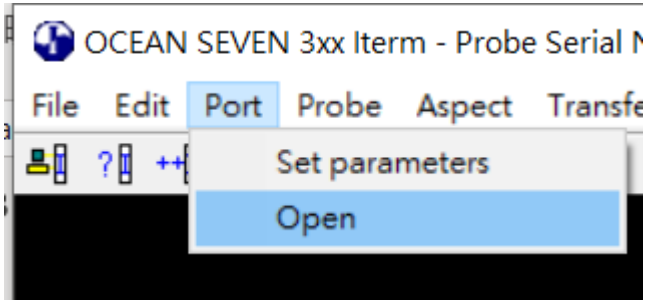
1. Connect CTD to computer and power



3. Set ComPort parameters



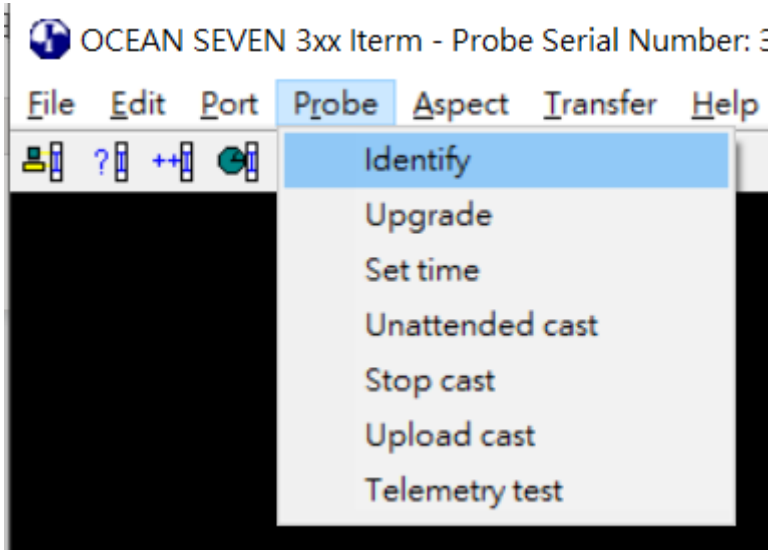
4. Choose **open**

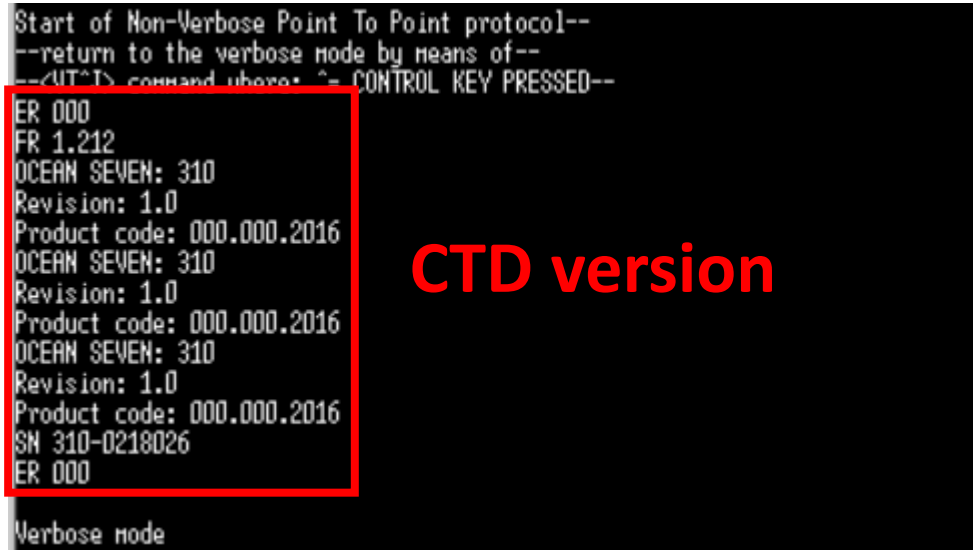


Output data

5. If CTD is still recording, please press **ESC** for backing to main menu.

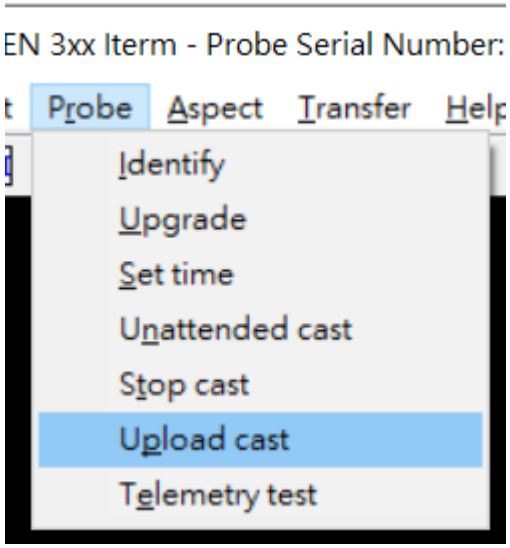
6. Choose **identify.** The code will show the CTD version.



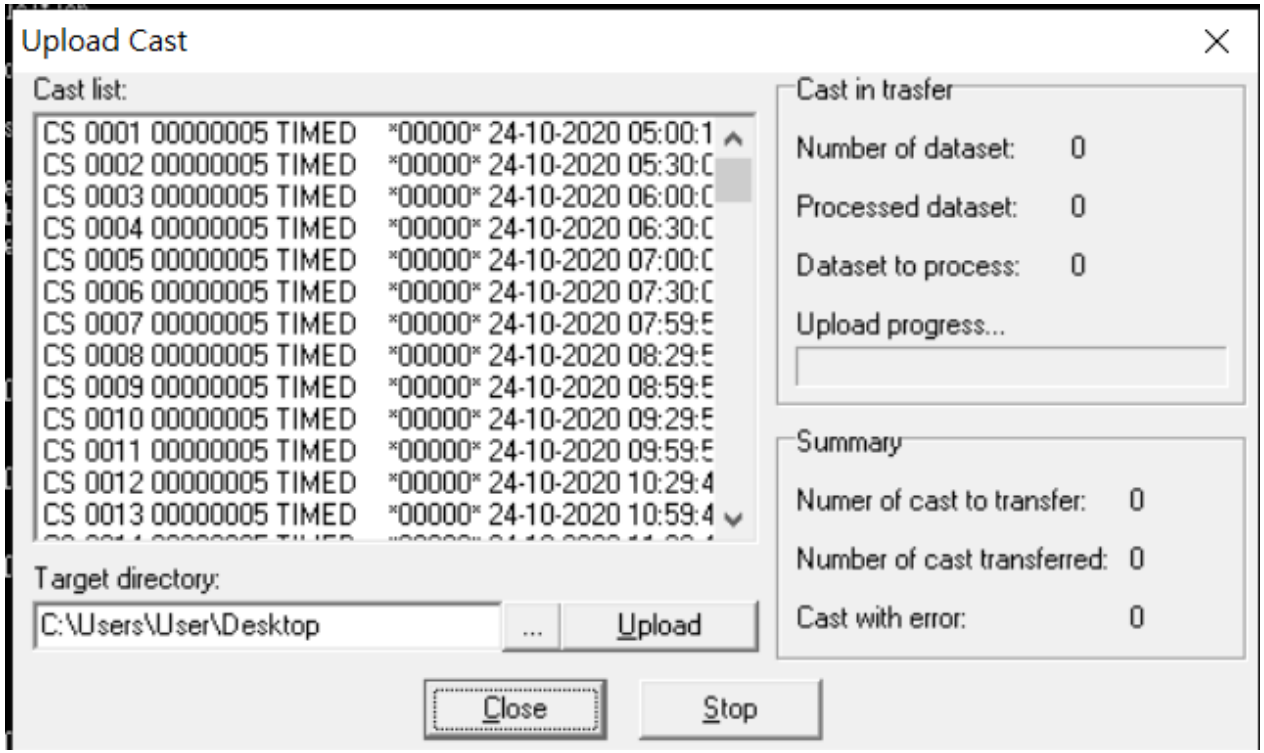


Output data

7. Choose **Upload cast**



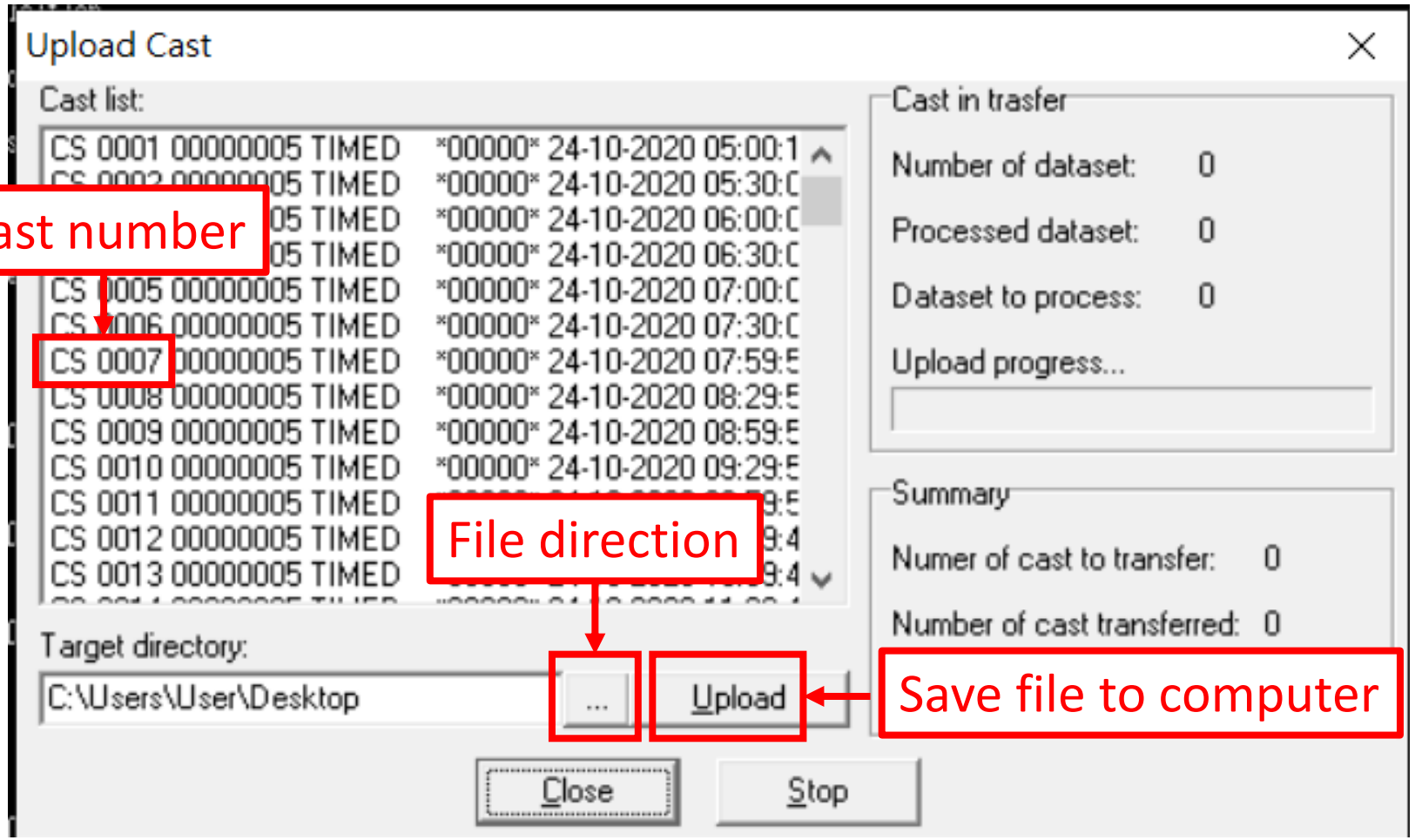
8. Wait a few seconds for casts to show. Choose the cast we want to upload.



Output data

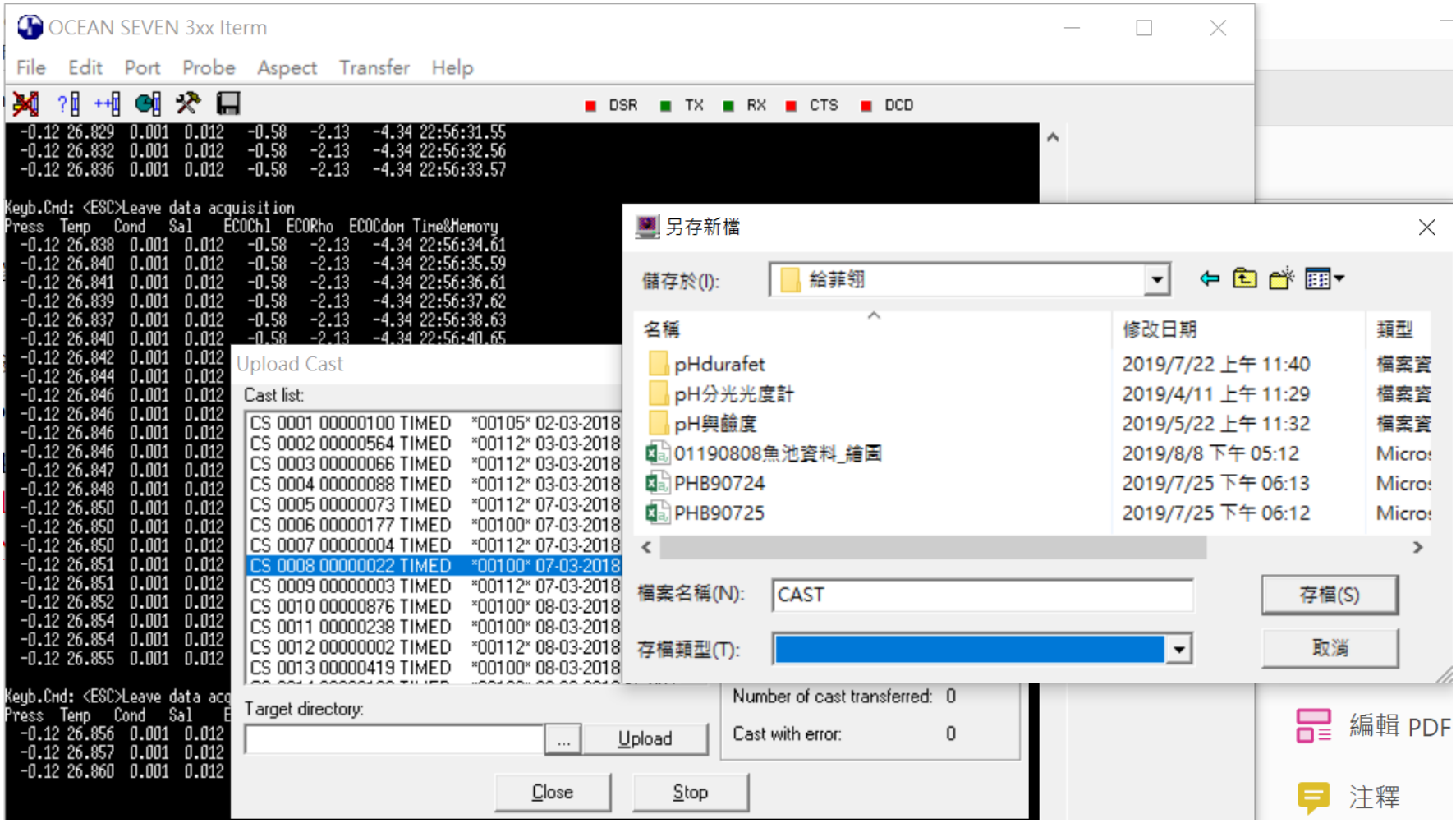
8. Wait a few seconds for casts to show.

Choose the cast we want to upload.



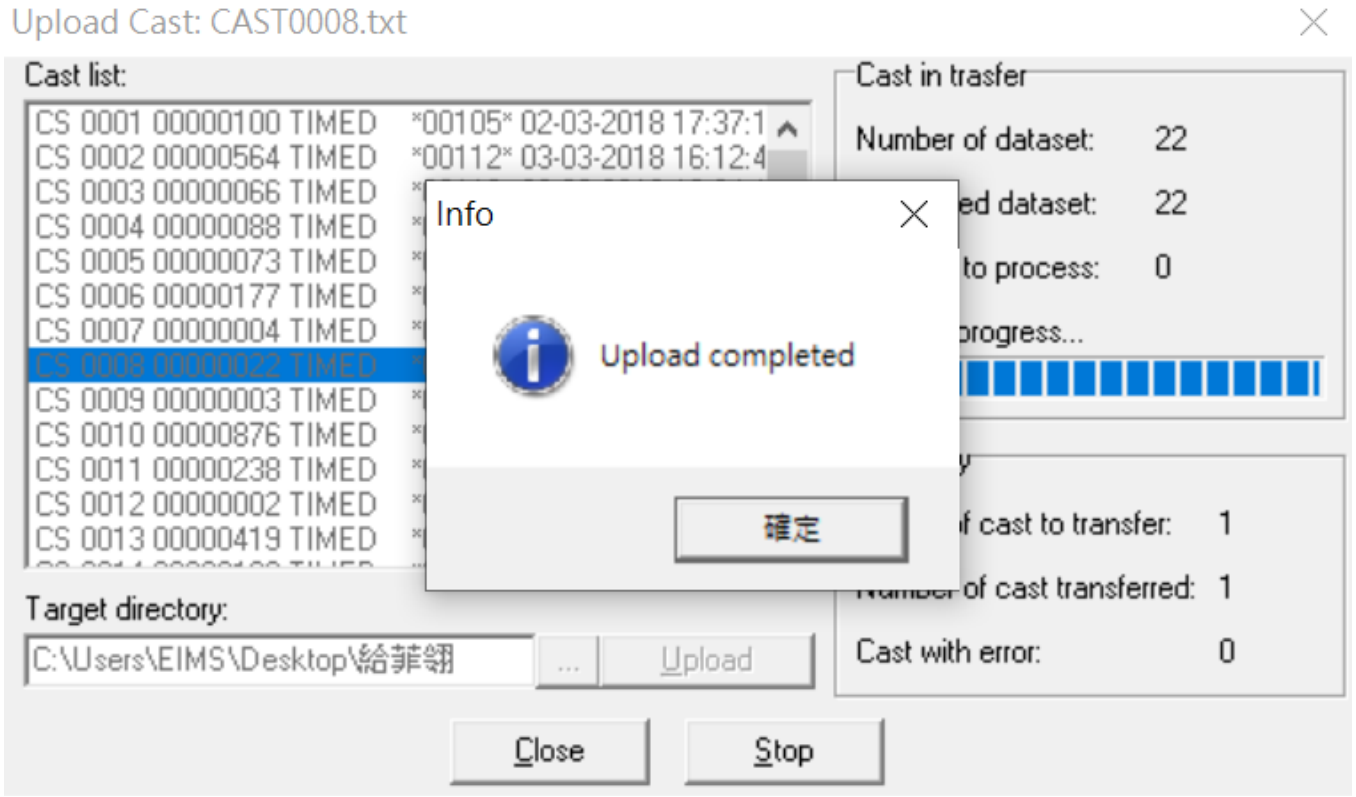
Output data

File direction



Output data

Upload completed



Output data

Data will be saved as txt file.

CAST0008 - 記事本

檔案(F) 編輯(E) 格式(O) 檢視(V) 說明

Date	Time	Pres	Temp	Cond	Sal			
07-03-2018	16:03:22.42	0.11	22.563	50.317	34.829	0.71	0.17	17.81
07-03-2018	16:03:22.45	0.11	22.563	50.317	34.830	0.71	0.17	17.81
07-03-2018	16:03:23.45	0.11	22.562	50.317	34.831	0.71	0.17	17.81
07-03-2018	16:03:24.45	0.11	22.562	50.318	34.831	0.96	0.00	18.35
07-03-2018	16:03:25.45	0.11	22.561	50.318	34.832	0.65	-0.13	18.53
07-03-2018	16:03:26.45	0.11	22.561	50.318	34.832	0.98	0.09	17.36
07-03-2018	16:03:27.45	0.11	22.561	50.319	34.833	0.61	-0.13	19.53
07-03-2018	16:03:28.45	0.11	22.561	50.319	34.833	0.80	-0.25	17.18
07-03-2018	16:03:29.45	0.11	22.561	50.319	34.832	0.74	0.43	20.16
07-03-2018	16:03:30.45	0.11	22.561	50.318	34.832	1.09	0.30	16.54
07-03-2018	16:03:31.45	0.11	22.561	50.319	34.832	0.79	-0.38	17.36
07-03-2018	16:03:32.45	0.11	22.561	50.319	34.832	0.79	-0.38	17.36
07-03-2018	16:03:33.45	0.11	22.562	50.319	34.832	0.51	0.00	20.43
07-03-2018	16:03:34.45	0.11	22.562	50.318	34.831	0.58	-0.04	20.34
07-03-2018	16:03:35.45	0.11	22.562	50.318	34.832	0.44	-0.47	20.16
07-03-2018	16:03:36.45	0.11	22.561	50.318	34.832	0.57	0.17	21.06
07-03-2018	16:03:37.45	0.11	22.561	50.318	34.832	0.45	-0.21	19.89
07-03-2018	16:03:38.45	0.11	22.561	50.319	34.832	0.50	-0.04	20.88
07-03-2018	16:03:39.45	0.11	22.561	50.318	34.832	0.69	0.30	20.52
07-03-2018	16:03:40.45	0.11	22.561	50.318	34.832	0.69	0.30	20.52
07-03-2018	16:03:41.45	0.11	22.561	50.319	34.833	0.71	0.17	20.34
07-03-2018	16:03:42.45	0.11	22.560	50.318	34.832	0.59	0.09	20.16

第 1 列，第 1 行 100% Windows (CRLF) UTF-8

下午 09:01
2019/10/30

Thanks for your attention!

Setting CTD

- 將 CTD 以 RS232C 傳輸線與電腦相連接，並開啟 CTD。
- 此時主畫面將出現於螢幕中。
- 於主畫面中選擇<1>Acquisition，接著選擇<3>Timed。
- 輸入所需參數
- Acq. step: 00:00:05.00 [hh:mm:ss.hh]< 00:00:01 時間間隔每 1 秒擷取

  DataSet per Acq.:1< 每筆擷取資料數:1 個
  Number of Acquisitions:3 < 3 時間間隔擷取資料數目:3 筆
  First Acq. time 00:00:00 [hh:mm:ss.hh] 輸入取樣時間

  Do you confirm the setup ?[1](yes,0[No]:0<

Output data

- 選擇指令列「Probe」，「Identify」此時軟體會自動偵測 CTD 的型號及序號。
- 偵測完畢後選擇「Probe」下「Upload cast」，此時會出現 Upload Cast 視窗。
- 選擇所欲 download cast，再選擇存放目錄 Target directory。
- 最後按下[Upload]，等候完成下載。