

2019 海上實習 - 自計式CTD操作

Department of Oceanography

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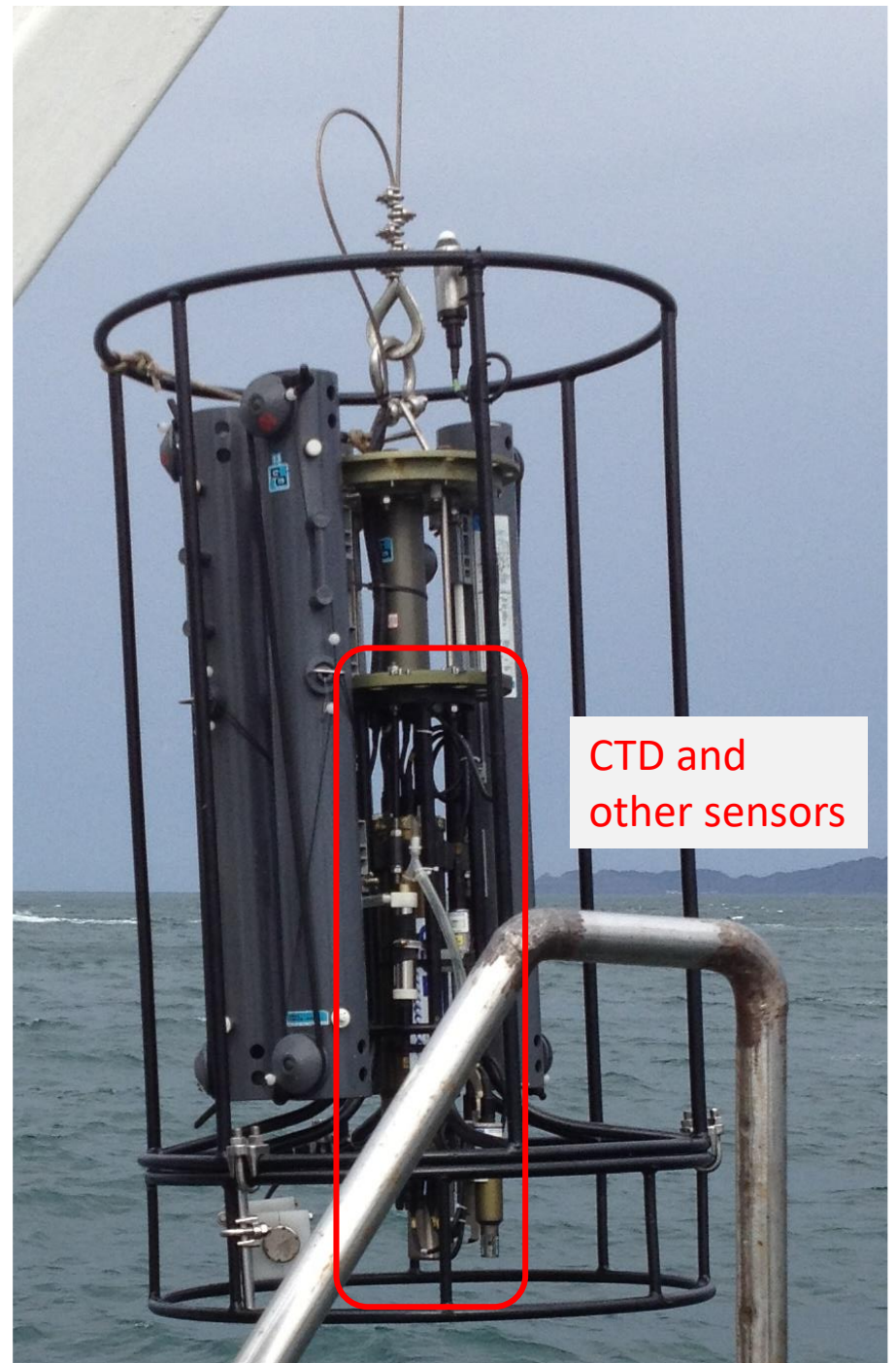


Outline

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



When to use?

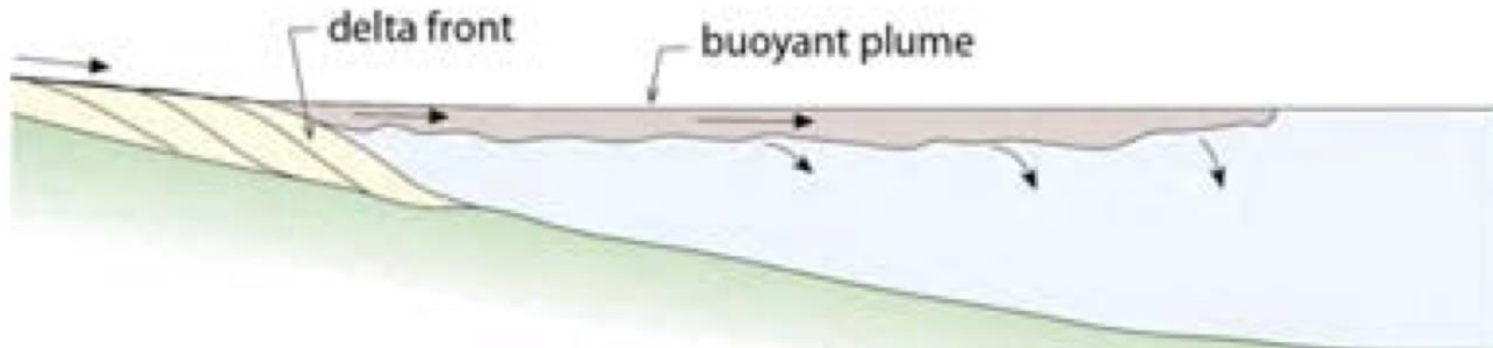


CTD and other sensors

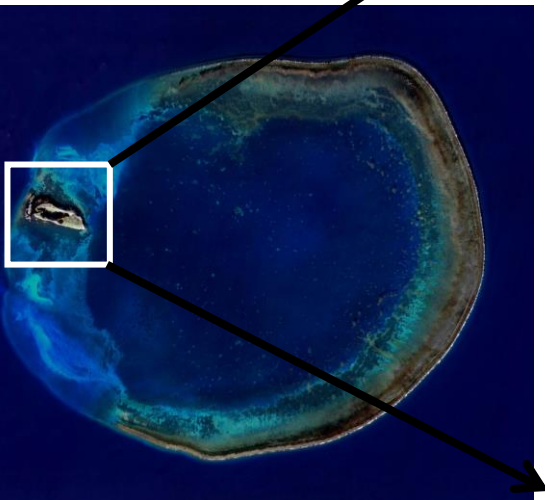
A) Hypopycnal flow

(inflow water density < basin water density)

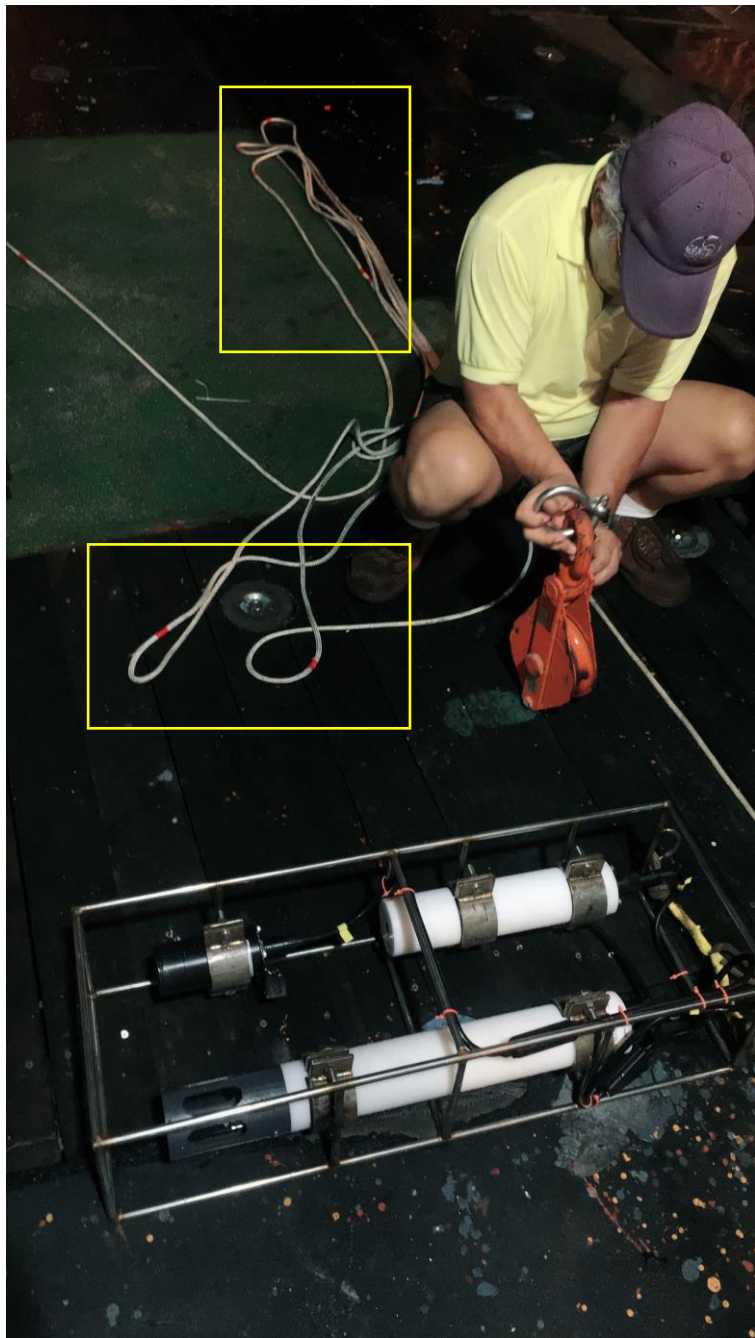
Shipboard expedition
River plume



Extract from Miquel Poyatos-Moré, PhD dissertation



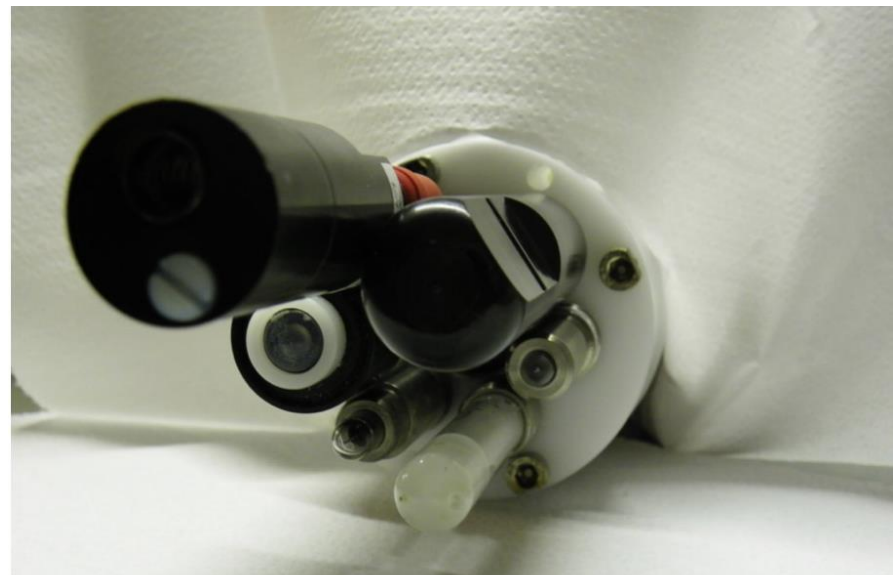
Field expedition
Coastal zone
Lagoon
lake



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} - 10^{14} ohm input impedance. (5) Optional extended range, available upon request

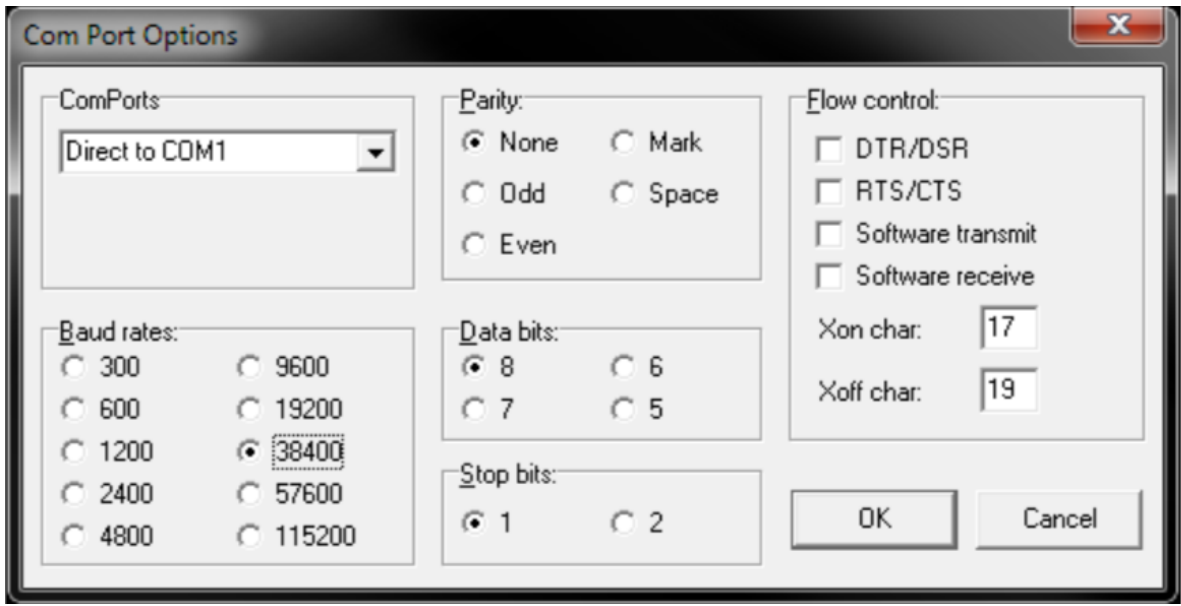
The fundamental properties of seawater like: **Salinity, Sound Speed, Water Density, Oxygen ppm** are obtained using the algorithms described in the UNESCO "Technical papers in marine science no. 44". The fresh water properties like: **TDS (Total Dissolved Solids), Fresh Water Conductivity** corrected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

How to connect the CTD?

Softwares: *iterm*, *realterm*, *teraterm*. (Recommmand **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: <i>Battery</i>	2.9..5.0 VDC; running: 90 mA@3.6V
<i>External power</i>	9..32 VDC.
<i>Data telemetry</i>	Low voltage 18..60 VDC; High voltage: 90..220 VDC.
Software:	REDAS-5 and ITERM.

Iterm interface



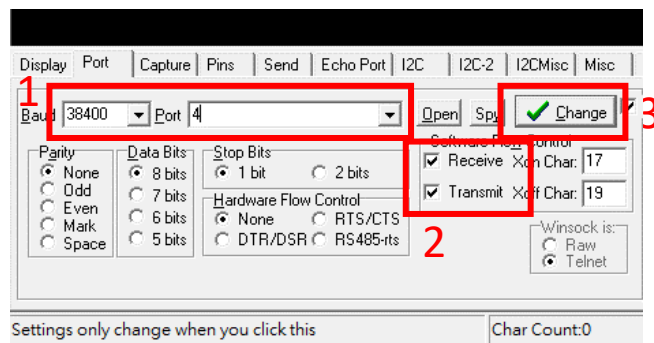
How to connect the CTD?

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 item

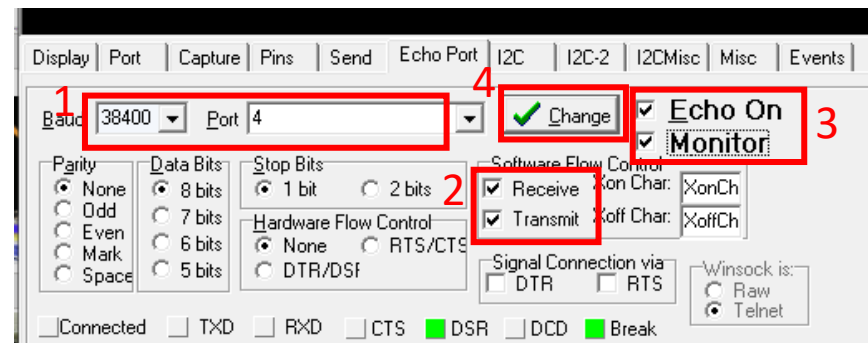
In **Port** screen

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



In **Echo Port** screen

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



Adjusting current time

RealTerm: Serial Capture Program 2.0.0.70

```
<0>[SHUT]-Shutdown CrLf
<1>[DATA]-Data acquisition CrLf
<2>[MEMO]-Memory CrLf
<3>[CALB]-Calibration CrLf
<4>[SERU]-Service CrLf
<5>[OPMD]-Non-Verbose mode CrLf
cmd>4 CrLf
OCEAN SEVEN 310-Id:0218025<USR>[sw]<1.2_12 02/18>Jan 01 01:16:24.90 2000 CrLf
Service menu CrLf
<0>[SUUP]-Leave the service menu CrLf
<1>[CONF]-Configuration CrLf
<2>[DIAG]-Diagnostics CrLf
<3>[RAWC]-Raw data acquisition in counts <bit> CrLf
<4>[RAWM]-Raw data acquisition in mU CrLf
cmd>
```

Step 1 enter 4 (Service)

RealTerm: Serial Capture Program 2.0.0.70

```
<0>[SUUP]-Leave the service menu CrLf
<1>[CONF]-Configuration CrLf
<2>[DIAG]-Diagnostics CrLf
<3>[RAWC]-Raw data acquisition in counts <bit> CrLf
<4>[RAWM]-Raw data acquisition in mU CrLf
cmd>1 CrLf
OCEAN SEVEN 310-Id:0218025<USR>[sw]<1.2_12 02/18>Jan 01 01:16:33.25 2000 CrLf
Configuration menu CrLf
<0>[CNUPI]-Leave configuration menu CrLf
<1>[CNDA]-Data acquisition parameter CrLf
<2>[CNOPI]-Operating parameter CrLf
<3>[CNAP]-Acquired sensor parameters CrLf
<4>[CNDTI]-Change current Date&Time CrLf
<5>[CNES]-External system CrLf
cmd>
```

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

RealTerm: Serial Capture Program 2.0.0.70

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

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

RealTerm: Serial Capture Program 2.0.0.70

```
-0.13 26.600 0.001 0.012 -0.58 -2.13 -4.34 00:45:07.03 CRLF
-0.13 26.601 0.001 0.012 -0.58 -2.13 -4.34 00:45:08.04 CRLF
-0.13 26.605 0.001 0.012 -0.58 -2.13 -4.34 00:45:09.05 CRLF
-0.13 26.608 0.001 0.012 -0.58 -2.13 -4.34 00:45:10.06 CRLF
-0.13 26.609 0.001 0.012 -0.58 -2.13 -4.34 00:45:11.07 CRLF
LFCRLF CR
OCEAN SEVEN 310-Id:0218025<USR>[sw]<1.2_12 02/18>Jan 01 00:45:12.08 2000 LFCR
Main menu CRLF
<0>[SHUT]-Shutdown CRLF
<1>[DATA]-Data acquisition CRLF
<2>[MEMO]-Memory CRLF
<3>[CALB]-Calibration CRLF
<4>[SERU]-Service CRLF
<5>[OPMD]-Non-Verbose mode CRLF
cmd>
```

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

RealTerm: Serial Capture Program 2.0.0.70

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

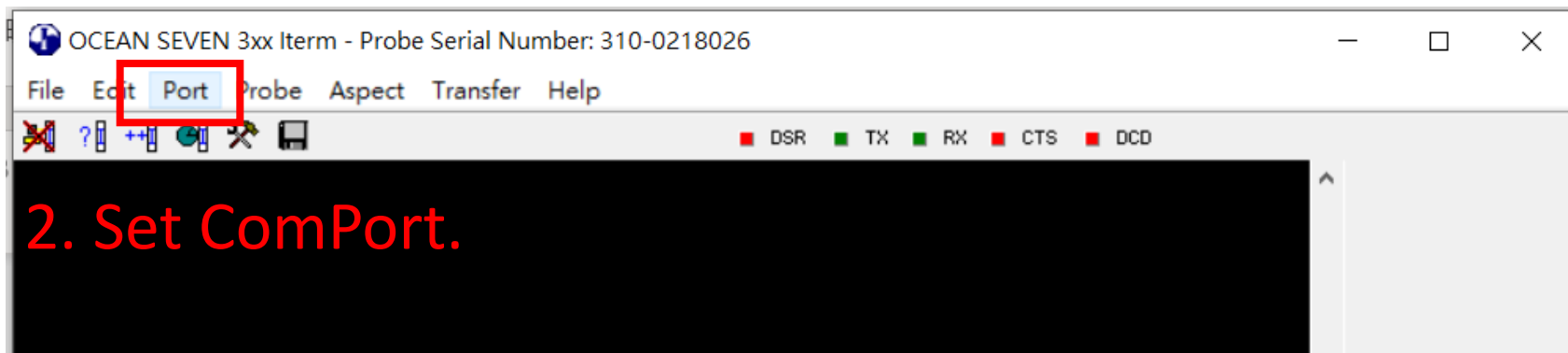
7. Switch CTD on

CTD will start to sample.

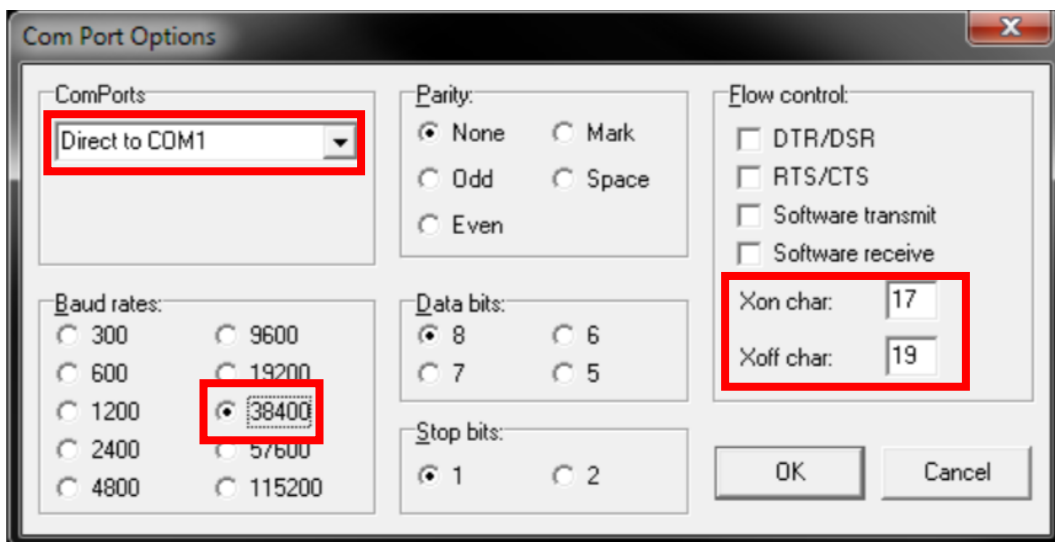
Sample data should be appeared on the screen.

Output data

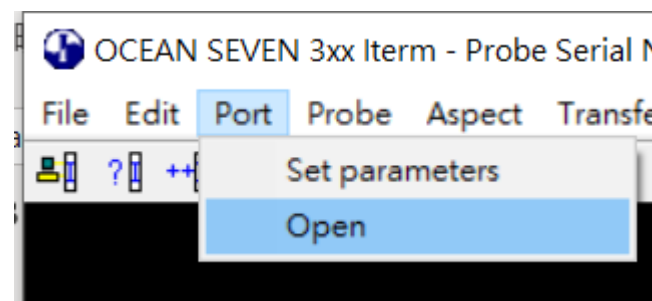
1. Connect CTD to computer and power



3. Set ComPort parameters



4. Choose open



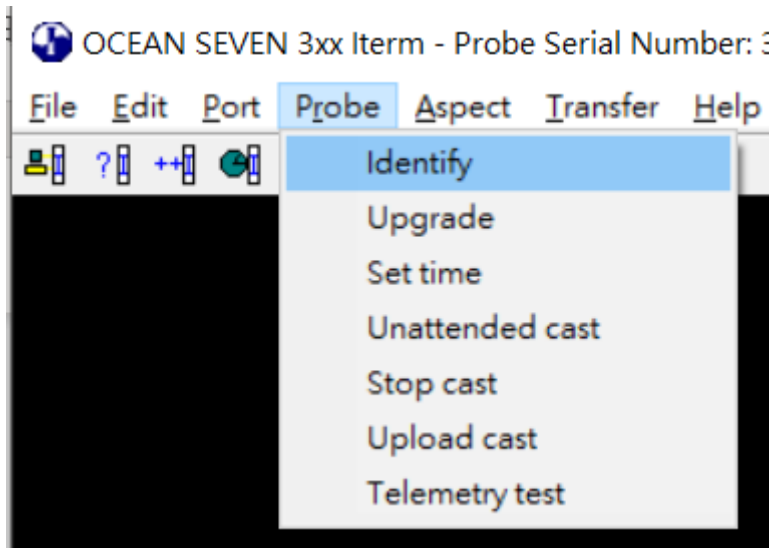
Output data

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

```
OCEAN SEVEN 310-Id:0218026(USR)[su](1.2_12 02/18)Jun 19 02:50:14.74 2021
Memory menu
<0>[HEUP]-Leave memory menu
<1>[HESH]-Show memory status
<2>[HESD]-Show stored data
<3>[HEDM]-Delete data
<4>[HEIM]-Initialize data memory
cmd>
```

Main menu

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



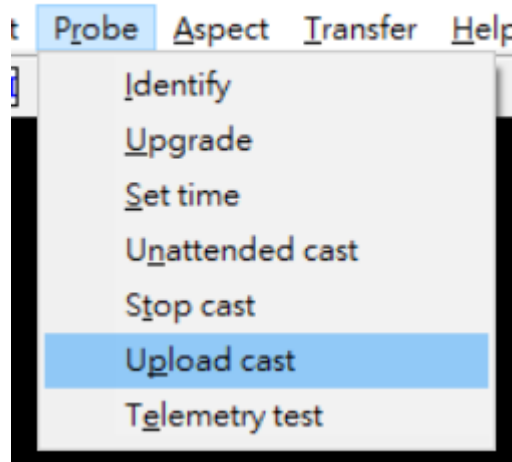
```
Start of Non-Verbose Point To Point protocol--
--return to the verbose mode by means of--
--(UT:1) command where: ^ = CONTROL KEY PRESSED--
ER 000
FR 1.212
OCEAN SEVEN: 310
Revision: 1.0
Product code: 000.000.2016
OCEAN SEVEN: 310
Revision: 1.0
Product code: 000.000.2016
OCEAN SEVEN: 310
Revision: 1.0
Product code: 000.000.2016
SN 310-0218026
ER 000
Verbose mode
```

CTD version

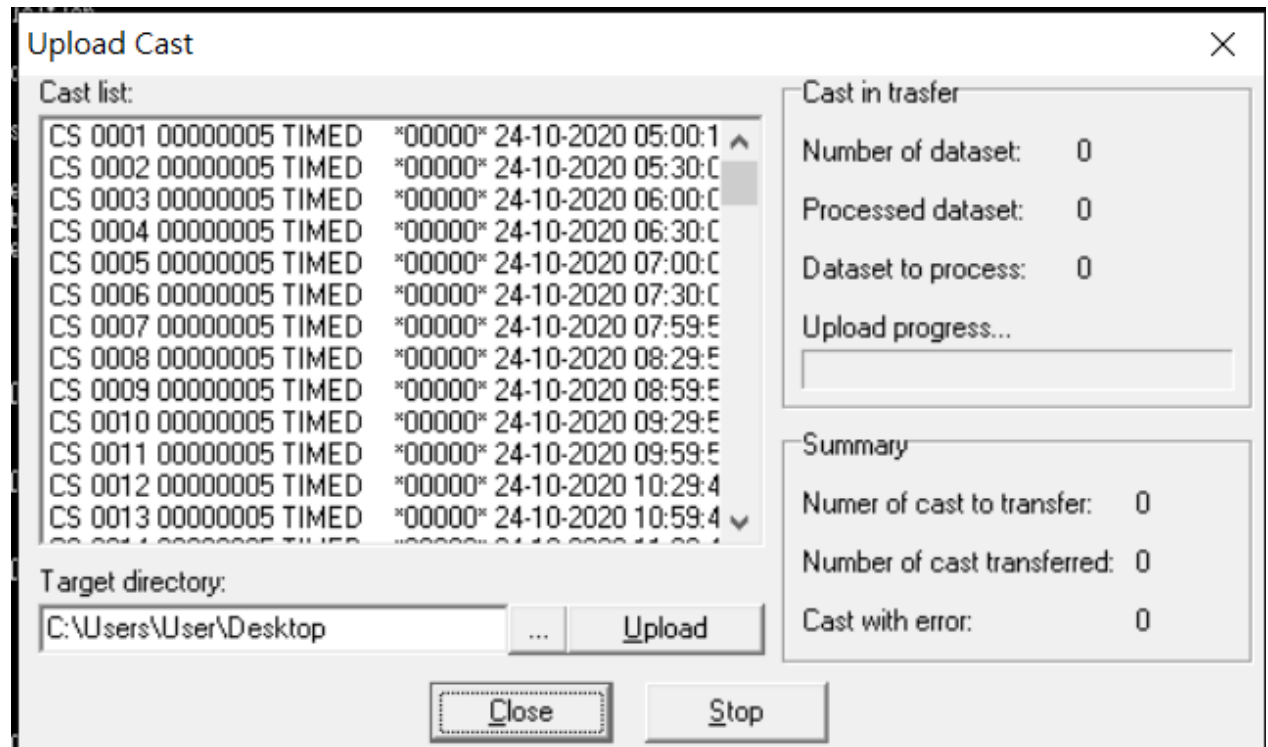
Output data

7. Choose Upload cast

EN 3xx Item - Probe Serial Number:

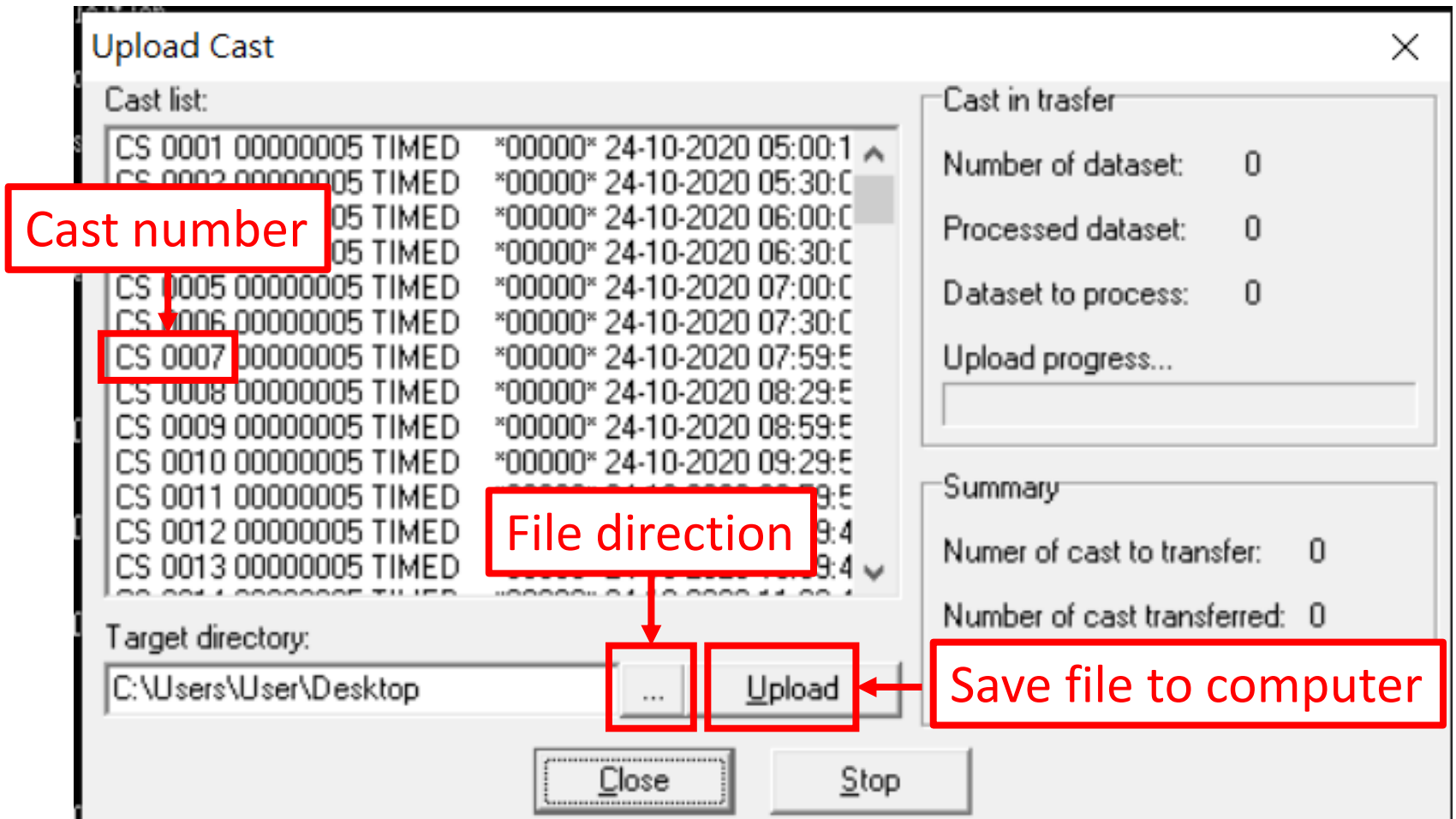


8. Wait a few seconds for casts to show.
Choose the cast we want to upload.



Output data

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



Output data

File direction

The screenshot displays the OCEAN SEVEN 3xx Iterm software interface. The main window shows a data acquisition log with columns for Press, Temp, Cond, Sal, ECOchl, ECOrho, ECOcdom, Time, and Memory. The data is being recorded in real-time.

An "Upload Cast" dialog box is open, showing a list of casts. The selected cast is "CS 0008 00000022 TIMED *00100* 07-03-2018". The dialog includes fields for "Target directory:" and "Upload" button.

A "另存新檔" (Save As) dialog box is also open, showing the file name "CAST" and the save type "Micro:". The dialog includes fields for "檔案名稱(N):" and "存檔類型(T):", and buttons for "存檔(S)" and "取消".

The background window shows the following data:

Press	Temp	Cond	Sal	ECOchl	ECOrho	ECOcdom	Time	Memory
-0.12	26.829	0.001	0.012	-0.58	-2.13	-4.34	22:56:31.55	
-0.12	26.832	0.001	0.012	-0.58	-2.13	-4.34	22:56:32.56	
-0.12	26.836	0.001	0.012	-0.58	-2.13	-4.34	22:56:33.57	
-0.12	26.838	0.001	0.012	-0.58	-2.13	-4.34	22:56:34.61	
-0.12	26.840	0.001	0.012	-0.58	-2.13	-4.34	22:56:35.59	
-0.12	26.841	0.001	0.012	-0.58	-2.13	-4.34	22:56:36.61	
-0.12	26.839	0.001	0.012	-0.58	-2.13	-4.34	22:56:37.62	
-0.12	26.837	0.001	0.012	-0.58	-2.13	-4.34	22:56:38.63	
-0.12	26.840	0.001	0.012	-0.58	-2.13	-4.34	22:56:40.65	
-0.12	26.842	0.001	0.012	-0.58	-2.13	-4.34	22:56:41.66	
-0.12	26.844	0.001	0.012	-0.58	-2.13	-4.34	22:56:42.67	
-0.12	26.846	0.001	0.012	-0.58	-2.13	-4.34	22:56:43.68	
-0.12	26.846	0.001	0.012	-0.58	-2.13	-4.34	22:56:44.69	
-0.12	26.846	0.001	0.012	-0.58	-2.13	-4.34	22:56:45.70	
-0.12	26.847	0.001	0.012	-0.58	-2.13	-4.34	22:56:46.71	
-0.12	26.848	0.001	0.012	-0.58	-2.13	-4.34	22:56:47.72	
-0.12	26.850	0.001	0.012	-0.58	-2.13	-4.34	22:56:48.73	
-0.12	26.850	0.001	0.012	-0.58	-2.13	-4.34	22:56:49.74	
-0.12	26.850	0.001	0.012	-0.58	-2.13	-4.34	22:56:50.75	
-0.12	26.851	0.001	0.012	-0.58	-2.13	-4.34	22:56:51.76	
-0.12	26.851	0.001	0.012	-0.58	-2.13	-4.34	22:56:52.77	
-0.12	26.852	0.001	0.012	-0.58	-2.13	-4.34	22:56:53.78	
-0.12	26.854	0.001	0.012	-0.58	-2.13	-4.34	22:56:54.79	
-0.12	26.854	0.001	0.012	-0.58	-2.13	-4.34	22:56:55.80	
-0.12	26.854	0.001	0.012	-0.58	-2.13	-4.34	22:56:56.81	
-0.12	26.855	0.001	0.012	-0.58	-2.13	-4.34	22:56:57.82	
-0.12	26.855	0.001	0.012	-0.58	-2.13	-4.34	22:56:58.83	
-0.12	26.856	0.001	0.012	-0.58	-2.13	-4.34	22:56:59.84	
-0.12	26.857	0.001	0.012	-0.58	-2.13	-4.34	22:57:00.85	
-0.12	26.860	0.001	0.012	-0.58	-2.13	-4.34	22:57:01.86	

Output data

Upload completed

Upload Cast: CAST0008.txt

Cast list:

CS 0001	00000100	TIMED	*00105*	02-03-2018 17:37:1
CS 0002	00000564	TIMED	*00112*	03-03-2018 16:12:4
CS 0003	00000066	TIMED	*	*
CS 0004	00000088	TIMED	*	*
CS 0005	00000073	TIMED	*	*
CS 0006	00000177	TIMED	*	*
CS 0007	00000004	TIMED	*	*
CS 0008	00000022	TIMED	*	*
CS 0009	00000003	TIMED	*	*
CS 0010	00000876	TIMED	*	*
CS 0011	00000238	TIMED	*	*
CS 0012	00000002	TIMED	*	*
CS 0013	00000419	TIMED	*	*

Cast in transfer

Number of dataset:	22
Completed dataset:	22
Number of dataset to process:	0

progress...

Number of cast to transfer: 1

Number of cast transferred: 1

Cast with error: 0

Target directory:
C:\Users\EIMS\Desktop\給菲翎

Upload

Close Stop

Info

Upload completed

確定

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。