SEA·BIRD SCIENTIFIC
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SENSOR SERIAL NUMBER: 0061
CALIBRATION DATE: 13-Jun-17

Slocum Payload CTD TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

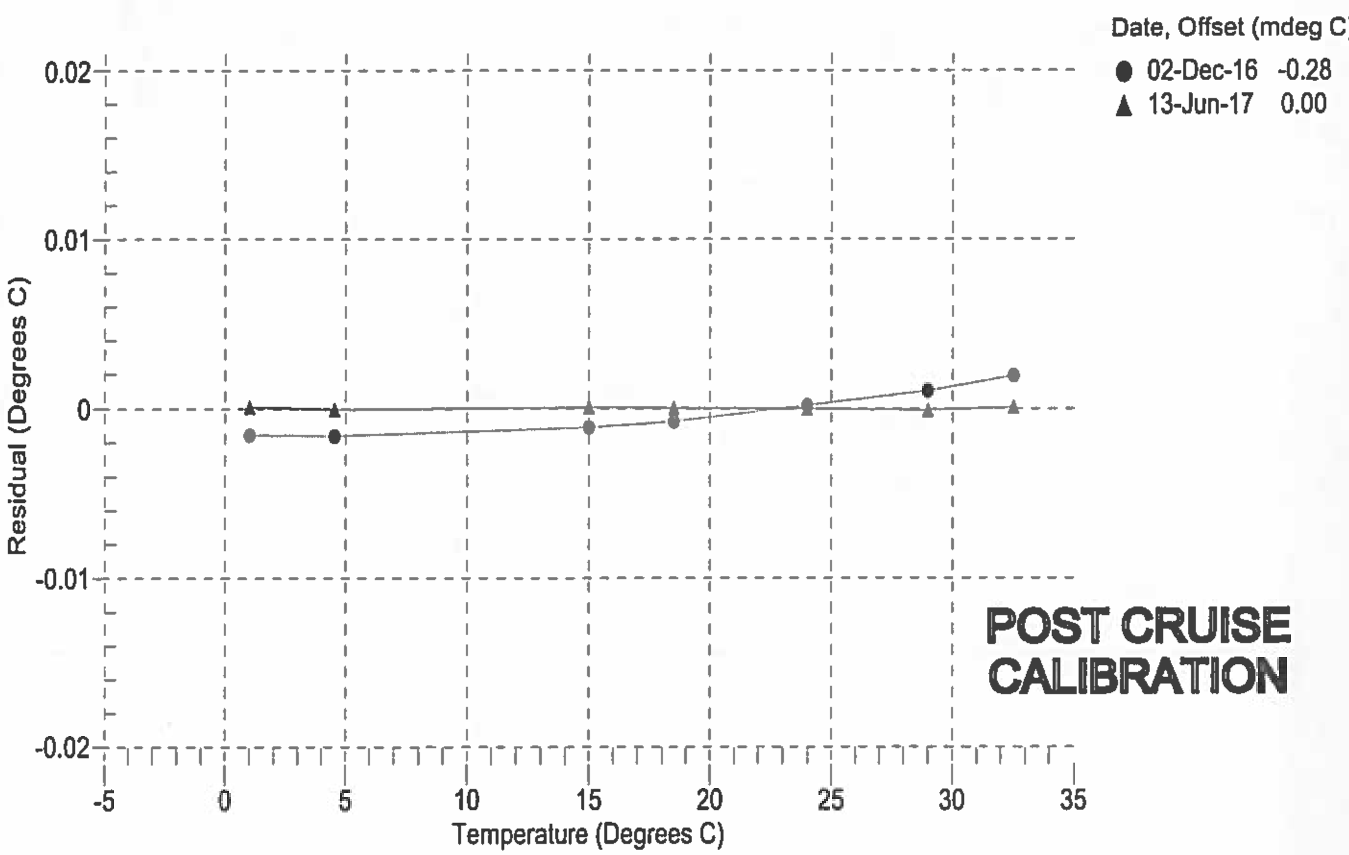
COEFFICIENTS:
a0 = -8.330832e-005
a1 = 2.970481e-004
a2 = -3.571221e-006
a3 = 1.793140e-007

BATH TEMP (° C)	INSTRUMENT OUTPUT (counts)	INST TEMP (° C)	RESIDUAL (° C)
1.0000	577541.4	1.0001	0.0001
4.5000	494558.5	4.4999	-0.0001
15.0000	316652.3	15.0001	0.0001
18.5000	274618.9	18.5000	0.0000
24.0000	220856.1	24.0000	-0.0000
29.0000	182273.1	28.9999	-0.0001
32.5000	159876.1	32.5001	0.0001

n = Instrument Output (counts)

Temperature ITS-90 (°C) = $1/\{a0 + a1[ln(n)] + a2[ln^2(n)] + a3[ln^3(n)]\} - 273.15$

Residual (°C) = instrument temperature - bath temperature



POST CRUISE CALIBRATION

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SENSOR SERIAL NUMBER: 0061
CALIBRATION DATE: 13-Jun-17

Slocum Payload CTD CONDUCTIVITY CALIBRATION DATA
PSS 1978: C(35,15,0) = 4.2914 Siemens/meter

COEFFICIENTS:

```
g =  -1.038980e+000
h =   1.741284e-001
i =  -5.729199e-004
j =   7.499098e-005

CPcor = -9.5700e-008
CTcor =  3.2500e-006
WBOTC =  6.8040e-007
```

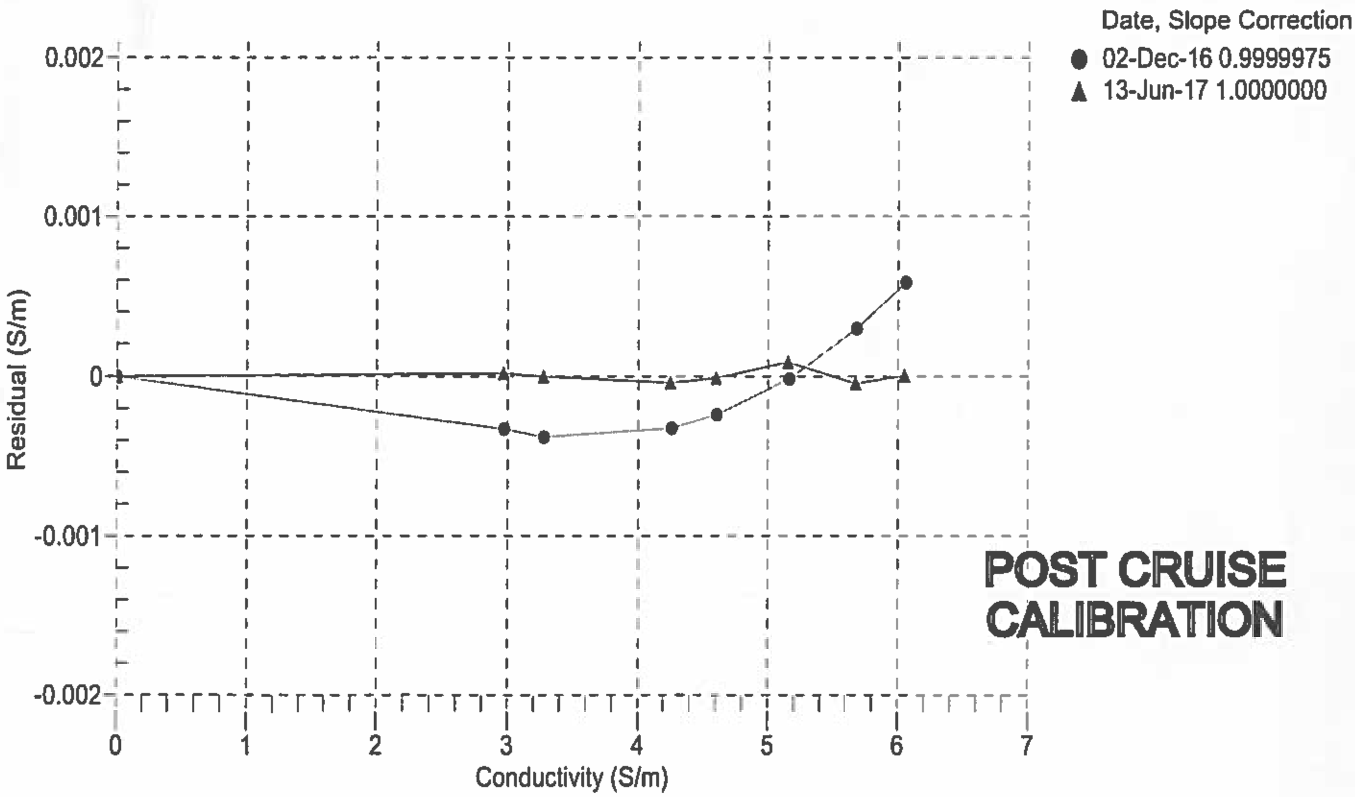
BATH TEMP (° C)	BATH SAL (PSU)	BATH COND (S/m)	INSTRUMENT OUTPUT (Hz)	INSTRUMENT COND (S/m)	RESIDUAL (S/m)
22.0000	0.0000	0.00000	2449.39	0.00000	0.00000
1.0000	34.7030	2.96720	4810.70	2.96722	0.00002
4.5000	34.6834	3.27342	4990.75	3.27342	-0.00000
15.0000	34.6422	4.25251	5526.54	4.25247	-0.00004
18.5000	34.6336	4.59674	5702.73	4.59673	-0.00001
24.0000	34.6243	5.15321	5976.30	5.15330	0.00009
29.0000	34.6195	5.67370	6220.88	5.67366	-0.00004
32.5000	34.6165	6.04508	6389.54	6.04508	0.00000

f = Instrument Output(Hz) * sqrt(1.0 + WBOTC * t) / 1000.0

t = temperature (°C); p = pressure (decibars); δ = CTcor; ε = CPcor;

Conductivity (S/m) = $(g + h * f^2 + i * f^3 + j * f^4) / (1 + \delta * t + \varepsilon * p)$

Residual (Siemens/meter) = instrument conductivity - bath conductivity



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SENSOR SERIAL NUMBER: 0061
CALIBRATION DATE: 08-Jun-17

Slocum Payload CTD PRESSURE CALIBRATION DATA
1450 psia S/N 3253734

COEFFICIENTS:

PA0 =	5.683279e-001	PTCA0 =	5.247619e+005
PA1 =	4.960801e-003	PTCA1 =	7.378341e+000
PA2 =	-2.787777e-011	PTCA2 =	-1.077867e-001
PTEMPA0 =	-7.162729e+001	PTCB0 =	2.536613e+001
PTEMPA1 =	4.936329e-002	PTCB1 =	-5.750000e-004
PTEMPA2 =	-2.291043e-007	PTCB2 =	0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE (PSIA)	INSTRUMENT OUTPUT (counts)	THERMISTOR OUTPUT (volts)	COMPUTED PRESSURE (PSIA)	RESIDUAL (%FSR)
14.47	527687.5	1928.6	14.53	0.00
301.31	585482.9	1932.5	301.29	-0.00
588.61	643428.8	1933.3	588.61	-0.00
875.86	701404.8	1934.2	875.89	0.00
1163.09	759412.1	1934.9	1163.13	0.00
1450.32	817436.4	1935.3	1450.28	-0.00
1163.16	759419.3	1935.5	1163.17	0.00
875.87	701403.9	1935.2	875.88	0.00
588.63	643430.2	1935.1	588.61	-0.00
301.42	585497.2	1936.4	301.36	-0.00
14.48	527676.9	1936.8	14.48	-0.00

THERMAL CORRECTION

TEMP (°C)	THERMISTOR OUTPUT (volts)	INSTRUMENT OUTPUT (counts)
32.50	2130	527934.40
29.00	2058	527940.30
24.00	1955	527935.20
18.50	1842	527912.90
15.00	1769	527894.60
4.50	1553	527841.90
1.00	1482	527824.10

TEMPERATURE (°C)	SPAN (mV)
-5.00	25.37
35.00	25.35

y = thermistor output (counts)

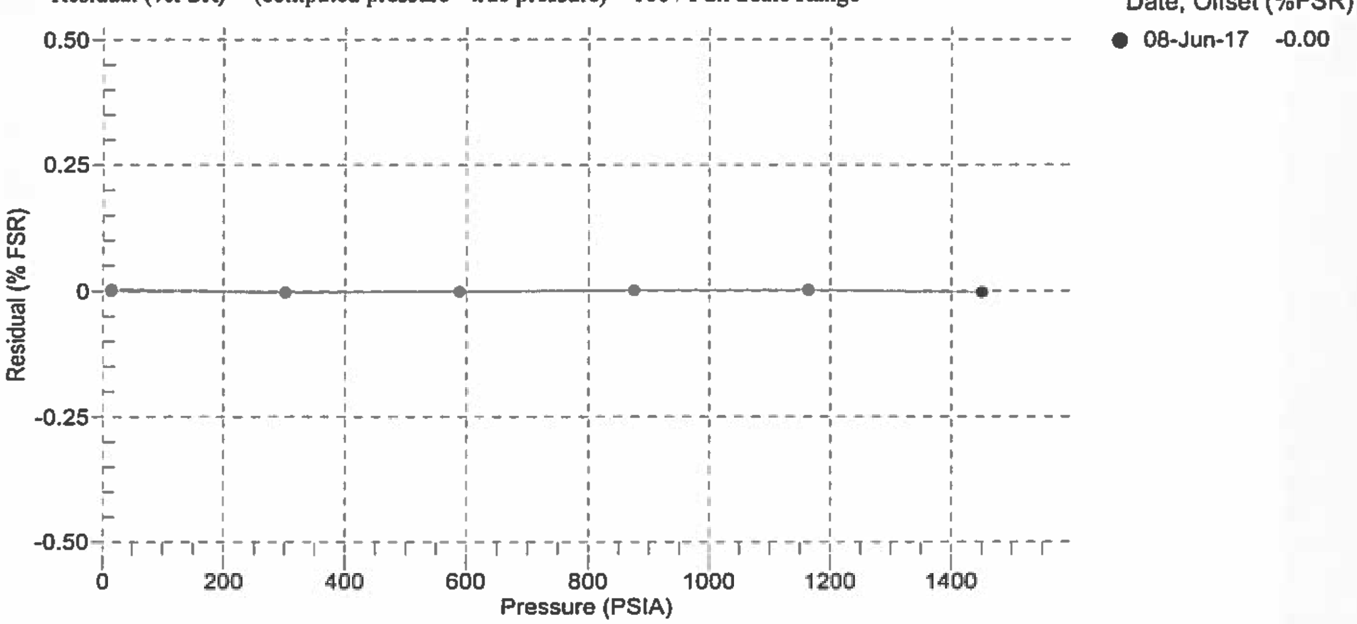
$t = PTEMPA0 + PTEMPA1 * y + PTEMPA2 * y^2$

$x = \text{instrument output} - PTCA0 - PTCA1 * t - PTCA2 * t^2$

$n = x * PTCB0 / (PTCB0 + PTCB1 * t + PTCB2 * t^2)$

$\text{pressure (PSIA)} = PA0 + PA1 * n + PA2 * n^2$

Residual (%FSR) = (computed pressure - true pressure) * 100 / Full Scale Range



```
Unit 238 Payload Bay Functional Test 7/5/2017


-----------------------------------------------------------------------
  Opening port 3:UART4:Chan D  SBMB:J6
  9600 baud, N81, line buf: 0, no input data timeout(secs): disabled
  in queue size: 204800, out queue size: 2048
Doing one-time uart hardware Initialization:
  UART4  channel 1 at FFFF0000
  U4SOEM channel 5 at FFFF9400
sci_uart_drain_input(3):

sci_uart_drain_input:Drained 0 chars
DIGITAL BIT PIN LOCATION:
   Looking down at persistor pins with 5x2 white box on left:
       2 .............................. 50
       1 .............................. 49
   All the pins with white boxes:
       2 4 6 8 10     20    30    40    50
       1 3 5 7  9  15    25    35    45
  Opening Bit(30) for output
bit_shared_raise(): Raising bit(30).
All the setup is done. Beginning emulation....
To exit this program:
  Drop Carrier Detect for 3 seconds (i.e. unpower freewave)
  --or--Type Ctrl-C and hit NO keys for 1 secs.
-----------------------------------------------------------------------
<!--start logging-->

    0.07, 22.9963, 0.00000

    0.07, 22.9966,-0.00002

    0.07, 22.9966, 0.00002

    0.07, 22.9962,-0.00004

    0.07, 22.9962,-0.00000

    0.07, 22.9964,-0.00001

    0.07, 22.9960,-0.00000

    0.07, 22.9961, 0.00003

    0.07, 22.9972,-0.00000

    0.07, 22.9969,-0.00001

    0.07, 22.9972, 0.00001


Heard exit char, Leaving emulation_loop()
sci_uart_close(3): Closing UART4:Chan D  SBMB:J6
Restoring bit[s] to initial state.
Lowering bit: 30
bit_close(30)
return 0; from main()
-----------------------------------------------------------------------
(SCI)C:\>u4stalk 4 19200 c 34
U4STALK: Program Version 1.1
Version 7.16  SBMB2
Using uart port 4 at 19200 baud
Raising a total of 1 bit(s):
  34
-----------------------------------------------------------------------
```

```
  Opening port 4:U4SOEM pins Tx:2 Rx:4 (2 is UL)
  19200 baud, N81, line buf: 0, no input data timeout(secs): disabled
  in queue size: 204800, out queue size: 2048
Doing one-time uart hardware Initialization:
  UART4  channel 1 at FFFF0000
  U4SOEM channel 5 at FFFF9400
sci_uart_drain_input(4):

sci_uart_drain_input:Drained 0 chars
DIGITAL BIT PIN LOCATION:
   Looking down at persistor pins with 5x2 white box on left:
       2 ............................. 50
       1 ............................. 49
   All the pins with white boxes:
       2 4 6 8 10     20    30    40    50
       1 3 5 7  9  15    25    35    45
  Opening Bit(34) for output
bit_shared_raise(): Raising bit(34).
All the setup is done. Beginning emulation....
To exit this program:
  Drop Carrier Detect for 3 seconds (i.e. unpower freewave)
  --or--Type Ctrl-C and hit NO keys for 1 secs.
---------------------------------------------------------------------
```

99/99/99	99:99:99	695	48	700	216	460	49	533
99/99/99	99:99:99	695	46	700	215	460	49	533
99/99/99	99:99:99	695	46	700	220	460	47	532
99/99/99	99:99:99	695	47	700	319	460	49	532
99/99/99	99:99:99	695	3532	700	3278	460	51	532
99/99/99	99:99:99	695	4130	700	4130	460	61	532
99/99/99	99:99:99	695	1214	700	991	460	203	531
99/99/99	99:99:99	695	47	700	220	460	50	531
99/99/99	99:99:99	695	320	700	2528	460	673	531
99/99/99	99:99:99	695	478	700	4130	460	139	531
99/99/99	99:99:99	695	1115	700	4130	460	78	531
99/99/99	99:99:99	695	54	700	539	460	69	531
99/99/99	99:99:99	695	47	700	217	460	47	531
99/99/99	99:99:99	695	45	700	217	460	44	531

```
Heard exit char, Leaving emulation_loop()
sci_uart_close(4): Closing U4SOEM pins Tx:2 Rx:4 (2 is UL)
Restoring bit[s] to initial state.
Lowering bit: 34
bit_close(34)
return 0; from main()
---------------------------------------------------------------------
```