



Sea-Bird Scientific
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 seabird@seabird.com
 www.seabird.com

SENSOR SERIAL NUMBER: 1137
 CALIBRATION DATE: 02-May-18

SBE 9plus PRESSURE CALIBRATION DATA
 10000 psia S/N 127422

DIGIQUARTZ COEFFICIENTS:

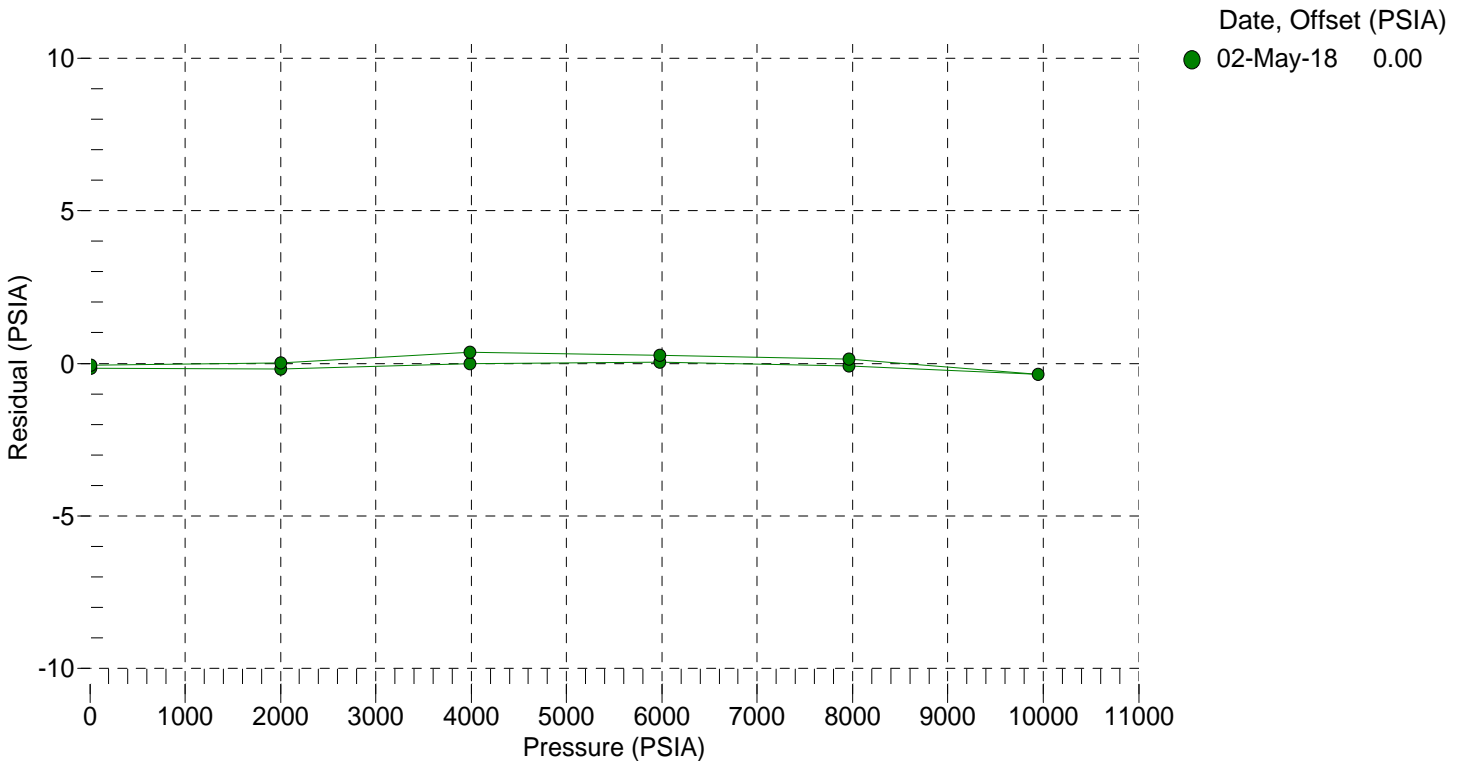
C1 = -4.003692e+004
 C2 = 4.506477e-001
 C3 = 1.326100e-002
 D1 = 3.514900e-002
 D2 = 0.000000e+000
 T1 = 3.019043e+001
 T2 = -7.917310e-005
 T3 = 4.270180e-006
 T4 = 2.945840e-009
 T5 = 0.000000e+000

AD590M, AD590B, SLOPE AND OFFSET:

AD590M = 1.28040e-002
 AD590B = -8.79038e+000
 Slope = 1.00000
 Offset = 0.0247 (dbars)

PRESSURE (PSIA)	INSTRUMENT OUTPUT (Hz)	INSTRUMENT TEMPERATURE (°C)	INSTRUMENT PRESSURE (PSIA)	CORRECTED PRESSURE (PSIA)	RESIDUAL (PSIA)
14.674	33128.60	22.6	14.486	14.522	-0.152
2001.100	33939.10	22.7	2000.882	2000.908	-0.192
3988.337	34728.40	22.8	3988.320	3988.337	-0.000
5975.105	35497.30	22.8	5975.145	5975.152	0.047
7961.906	36247.30	22.8	7961.829	7961.826	-0.080
9950.153	36980.10	22.9	9949.811	9949.799	-0.354
7962.223	36247.50	22.9	7962.373	7962.371	0.148
5975.161	35497.40	22.9	5975.422	5975.429	0.268
3988.247	34728.50	22.9	3988.597	3988.614	0.367
2001.181	33939.20	22.9	2001.168	2001.194	0.013
14.670	33128.60	22.9	14.570	14.606	-0.064

Residual (PSIA) = corrected instrument pressure - reference pressure





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SENSOR SERIAL NUMBER: 5571
 CALIBRATION DATE: 05-Apr-18

SBE 3 TEMPERATURE CALIBRATION DATA
 ITS-90 TEMPERATURE SCALE

COEFFICIENTS:

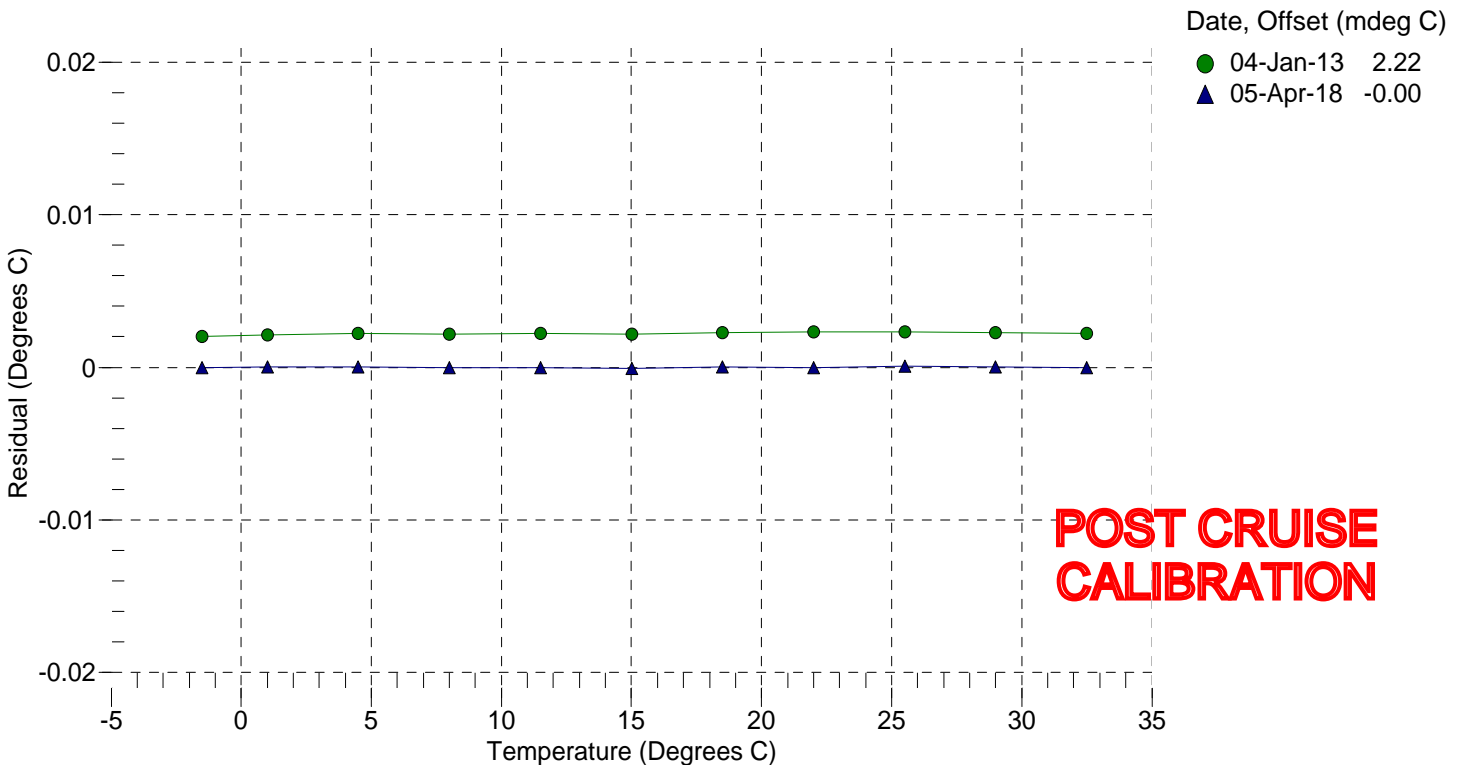
g = 4.33437017e-003
 h = 6.25464907e-004
 i = 1.95115609e-005
 j = 1.49192815e-006
 f0 = 1000.0

BATH TEMP (° C)	INSTRUMENT OUTPUT (Hz)	INST TEMP (° C)	RESIDUAL (° C)
-1.5001	2937.372	-1.5001	-0.00004
0.9999	3110.021	0.9999	0.00005
4.4999	3363.961	4.4999	0.00004
7.9999	3632.570	7.9999	-0.00001
11.4999	3916.283	11.4999	-0.00001
15.0000	4215.516	14.9999	-0.00006
18.4999	4530.669	18.4999	0.00002
22.0000	4862.152	22.0000	-0.00003
25.4999	5210.340	25.5000	0.00006
28.9999	5575.613	28.9999	0.00003
32.4999	5958.334	32.4999	-0.00004

f = Instrument Output (Hz)

$$\text{Temperature ITS-90 (°C)} = 1 / \{g + h[\ln(f_0 / f)] + i[\ln^2(f_0 / f)] + j[\ln^3(f_0 / f)]\} - 273.15$$

$$\text{Residual (°C)} = \text{instrument temperature} - \text{bath temperature}$$





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SENSOR SERIAL NUMBER: 5571
 CALIBRATION DATE: 20-Apr-18

SBE 3 TEMPERATURE CALIBRATION DATA
 ITS-90 TEMPERATURE SCALE

COEFFICIENTS:

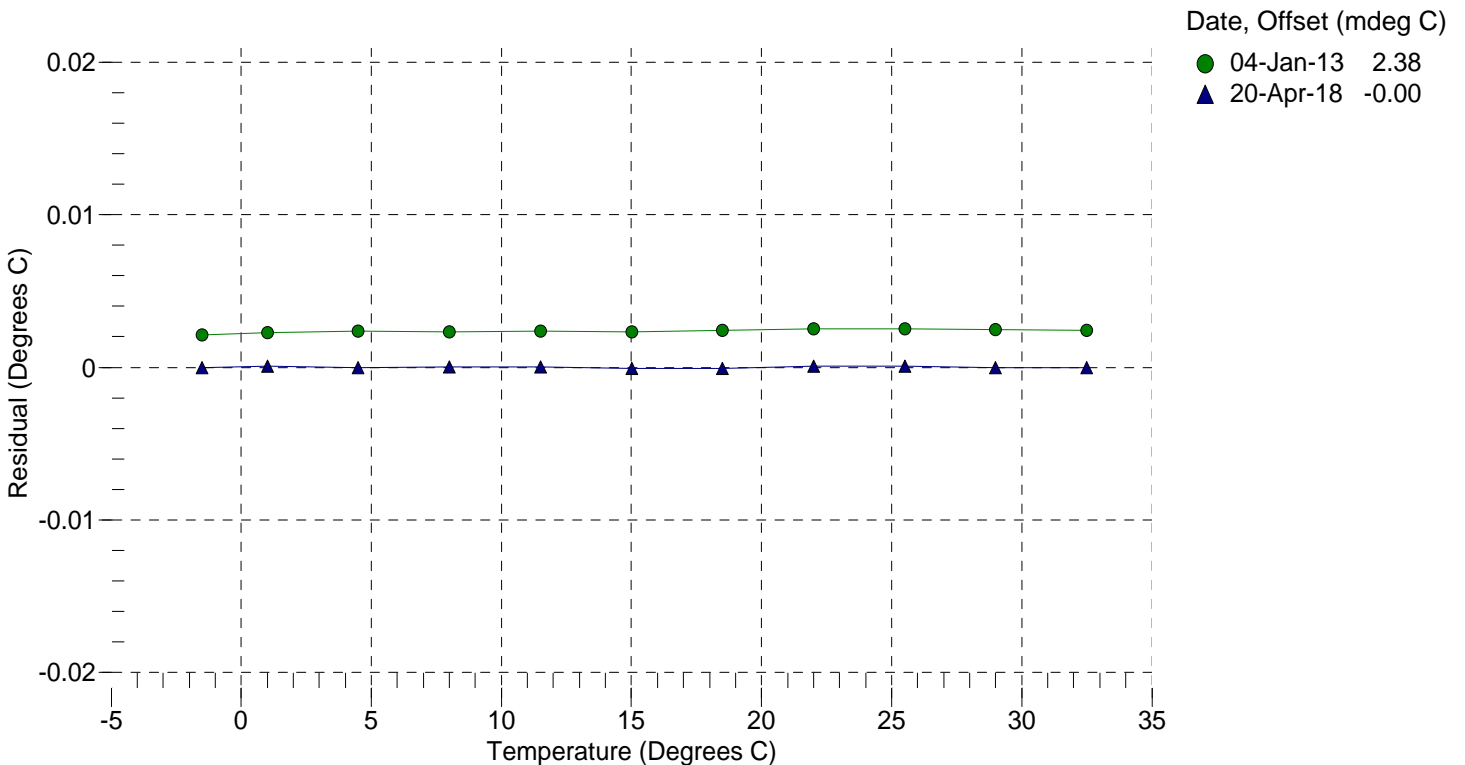
g = 4.33438203e-003
 h = 6.25497939e-004
 i = 1.95378386e-005
 j = 1.49880491e-006
 f0 = 1000.0

BATH TEMP (° C)	INSTRUMENT OUTPUT (Hz)	INST TEMP (° C)	RESIDUAL (° C)
-1.5001	2937.363	-1.5001	-0.00004
0.9999	3110.012	1.0000	0.00006
4.5000	3363.954	4.5000	-0.00001
7.9999	3632.563	7.9999	0.00004
11.4999	3916.272	11.4999	0.00000
15.0000	4215.504	14.9999	-0.00005
18.5000	4530.655	18.4999	-0.00008
21.9999	4862.134	22.0000	0.00005
25.4999	5210.323	25.5000	0.00007
29.0000	5575.599	29.0000	-0.00000
32.5000	5958.320	32.5000	-0.00003

f = Instrument Output (Hz)

$$\text{Temperature ITS-90 (°C)} = 1 / \{g + h[\ln(f_0 / f)] + i[\ln^2(f_0 / f)] + j[\ln^3(f_0 / f)]\} - 273.15$$

$$\text{Residual (°C)} = \text{instrument temperature} - \text{bath temperature}$$





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SENSOR SERIAL NUMBER: 5693
 CALIBRATION DATE: 06-Apr-18

SBE 3 TEMPERATURE CALIBRATION DATA
 ITS-90 TEMPERATURE SCALE

COEFFICIENTS:

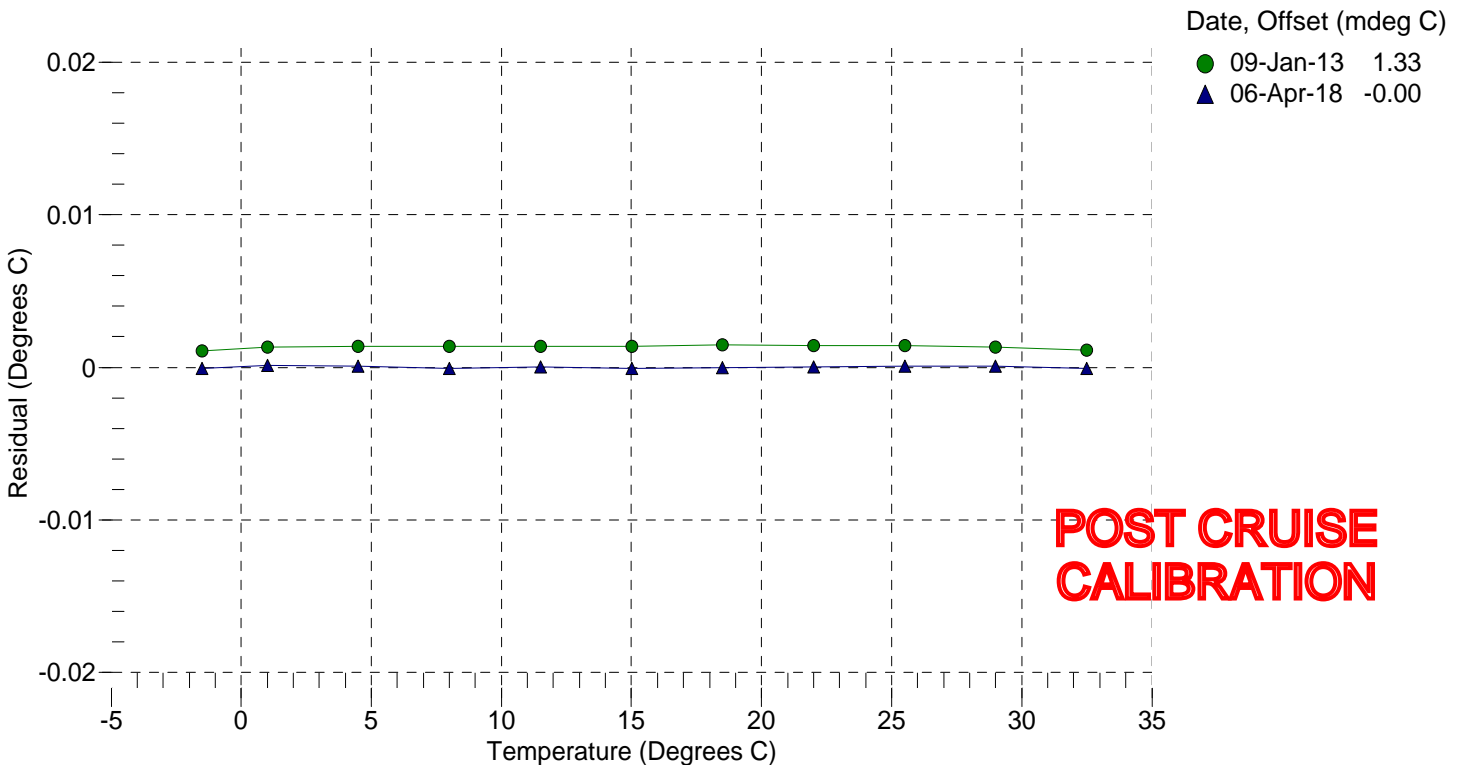
g = 4.37656748e-003
 h = 6.30160497e-004
 i = 1.94143299e-005
 j = 1.34179695e-006
 f0 = 1000.0

BATH TEMP (° C)	INSTRUMENT OUTPUT (Hz)	INST TEMP (° C)	RESIDUAL (° C)
-1.5001	3127.919	-1.5002	-0.00009
0.9999	3310.975	1.0000	0.00011
4.4999	3580.133	4.5000	0.00006
8.0000	3864.758	7.9999	-0.00007
11.4999	4165.297	11.4999	0.00002
15.0000	4482.190	14.9999	-0.00006
18.5000	4815.865	18.5000	-0.00005
22.0000	5166.746	22.0000	0.00002
25.5000	5535.236	25.5001	0.00006
28.9999	5921.719	29.0000	0.00007
32.5000	6326.600	32.4999	-0.00007

f = Instrument Output (Hz)

$$\text{Temperature ITS-90 (°C)} = 1 / \{g + h[\ln(f_0 / f)] + i[\ln^2(f_0 / f)] + j[\ln^3(f_0 / f)]\} - 273.15$$

$$\text{Residual (°C)} = \text{instrument temperature} - \text{bath temperature}$$





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SENSOR SERIAL NUMBER: 4207
 CALIBRATION DATE: 06-Apr-18

SBE 4 CONDUCTIVITY CALIBRATION DATA
 PSS 1978: C(35,15,0) = 4.2914 Siemens/meter

COEFFICIENTS:

g = -9.75873396e+000
 h = 1.24344777e+000
 i = -2.36294556e-003
 j = 2.26607721e-004

CPcor = -9.5700e-008 (nominal)
 CTcor = 3.2500e-006 (nominal)

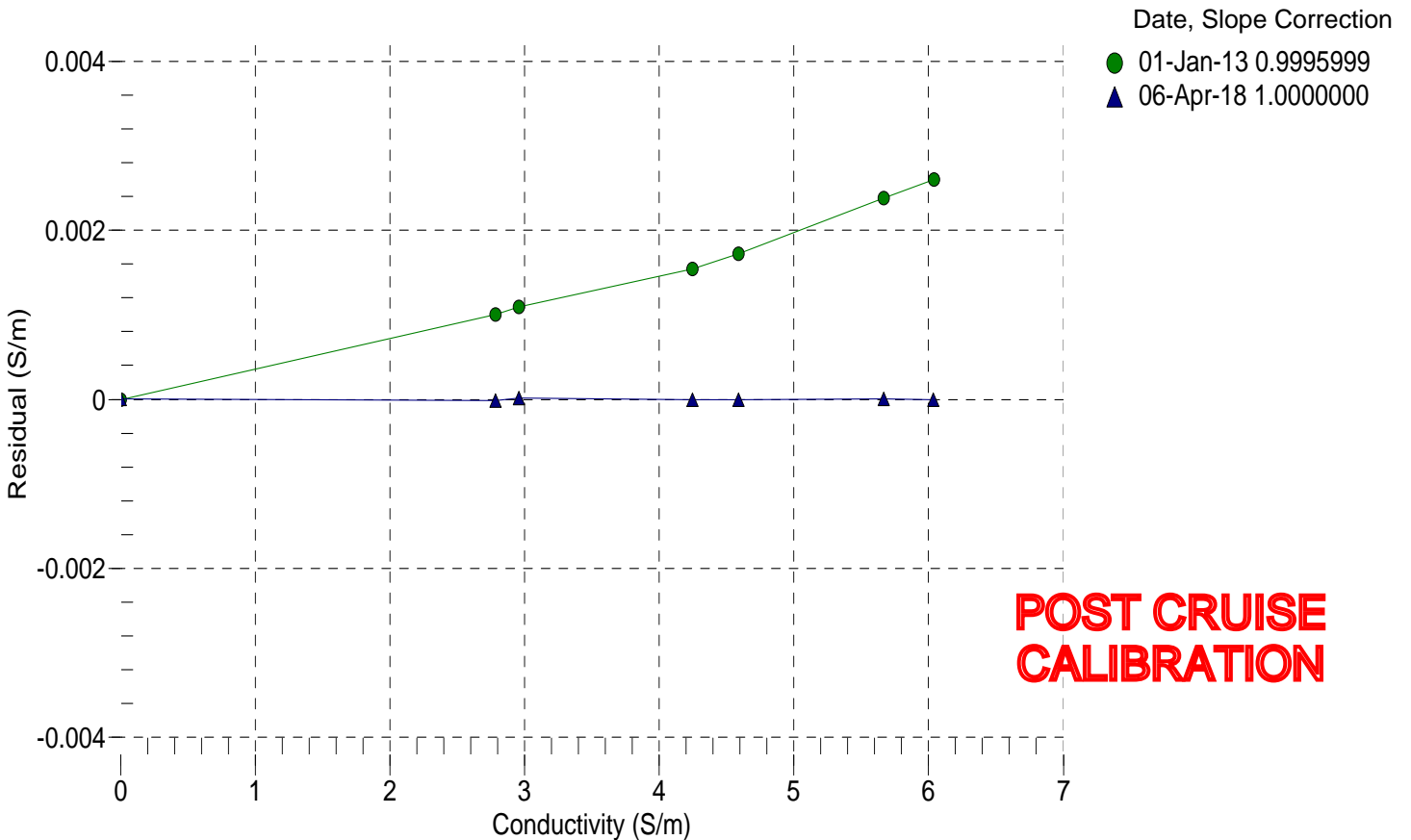
BATH TEMP (° C)	BATH SAL (PSU)	BATH COND (S/m)	INSTRUMENT OUTPUT (kHz)	INSTRUMENT COND (S/m)	RESIDUAL (S/m)
0.0000	0.0000	0.00000	2.80693	0.00000	0.00000
-1.0000	34.5787	2.78721	5.51483	2.78720	-0.00002
1.0000	34.5792	2.95762	5.63830	2.95764	0.00002
15.0000	34.5793	4.24560	6.49538	4.24560	-0.00000
18.5000	34.5785	4.59021	6.70597	4.59021	-0.00001
29.0000	34.5710	5.66665	7.32439	5.66665	0.00001
32.5000	34.5554	6.03562	7.52449	6.03561	-0.00000

f = Instrument Output (kHz)

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

Conductivity (S/m) = $(g + h * f^2 + i * f^3 + j * f^4) / 10 (1 + \delta * t + \epsilon * p)$

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





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SENSOR SERIAL NUMBER: 4209
 CALIBRATION DATE: 06-Apr-18

SBE 4 CONDUCTIVITY CALIBRATION DATA
 PSS 1978: C(35,15,0) = 4.2914 Siemens/meter

COEFFICIENTS:

g = -9.86733910e+000
 h = 1.45493085e+000
 i = -2.46368959e-003
 j = 2.71018807e-004

CPcor = -9.5700e-008 (nominal)
 CTcor = 3.2500e-006 (nominal)

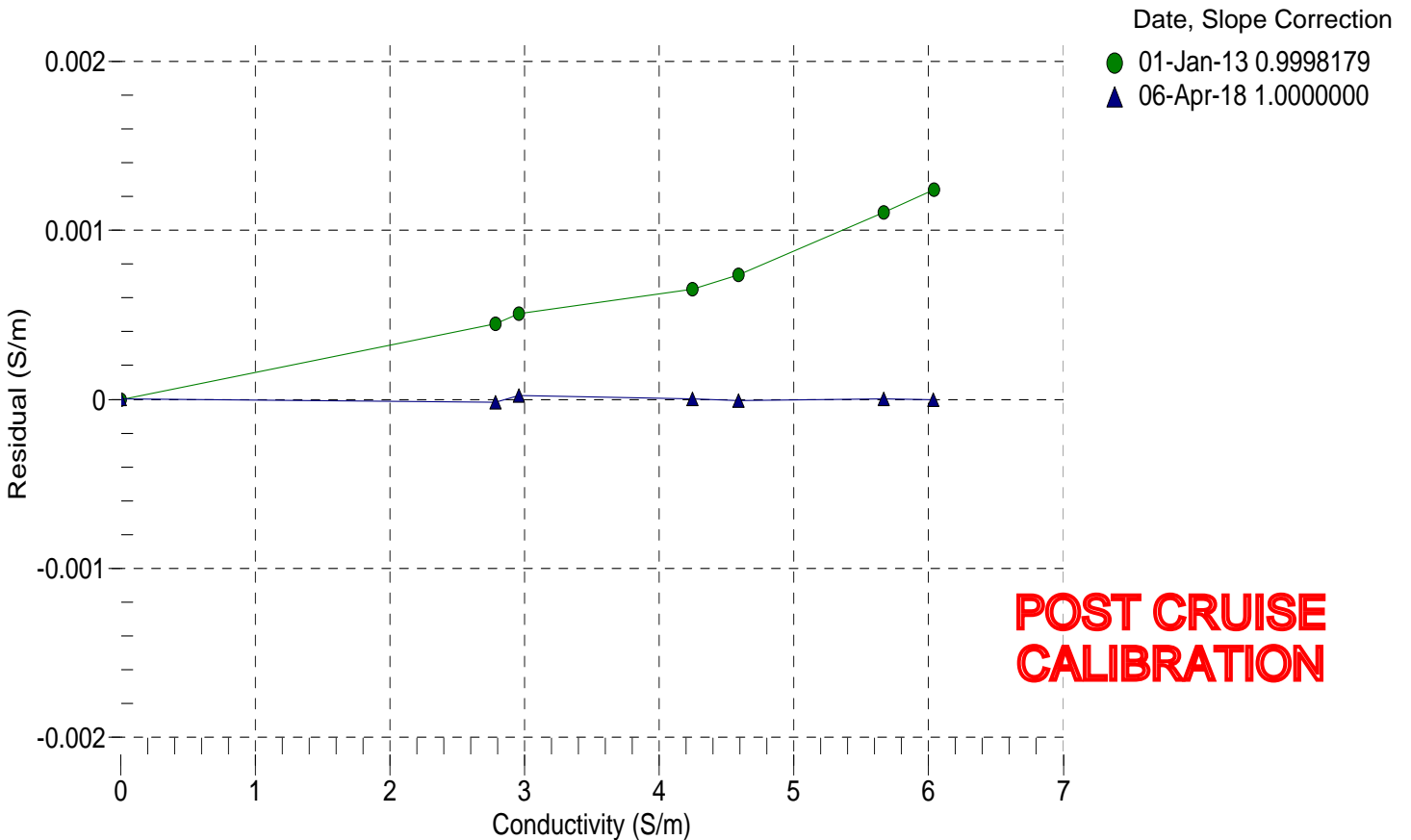
BATH TEMP (° C)	BATH SAL (PSU)	BATH COND (S/m)	INSTRUMENT OUTPUT (kHz)	INSTRUMENT COND (S/m)	RESIDUAL (S/m)
0.0000	0.0000	0.00000	2.60834	0.00000	0.00000
-1.0000	34.5787	2.78721	5.10270	2.78719	-0.00002
1.0000	34.5792	2.95762	5.21660	2.95764	0.00002
15.0000	34.5793	4.24560	6.00739	4.24561	0.00000
18.5000	34.5785	4.59021	6.20174	4.59021	-0.00001
29.0000	34.5710	5.66665	6.77257	5.66665	0.00000
32.5000	34.5554	6.03562	6.95730	6.03562	-0.00000

f = Instrument Output (kHz)

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

Conductivity (S/m) = $(g + h * f^2 + i * f^3 + j * f^4) / 10 (1 + \delta * t + \epsilon * p)$

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





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SENSOR SERIAL NUMBER: 2526
 CALIBRATION DATE: 30-Mar-18

SBE 43 OXYGEN CALIBRATION DATA

COEFFICIENTS: A = -3.6343e-003
 Soc = 0.4389 B = 2.2283e-004
 Voffset = -0.4947 C = -3.3287e-006
 Tau20 = 1.52 E nominal = 0.036

NOMINAL DYNAMIC COEFFICIENTS
 D1 = 1.92634e-4 H1 = -3.300000e-2
 D2 = -4.64803e-2 H2 = 5.00000e+3
 H3 = 1.45000e+3

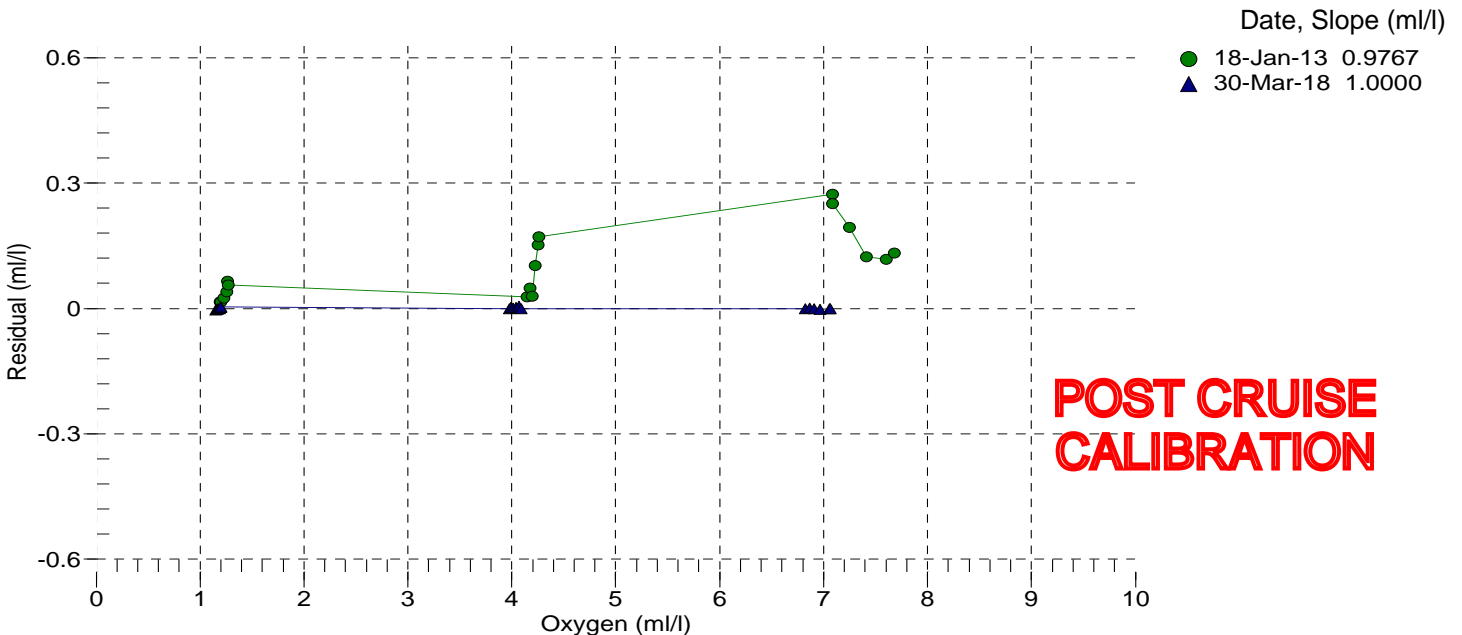
BATH OXYGEN (ml/l)	BATH TEMPERATURE (° C)	BATH SALINITY (PSU)	INSTRUMENT OUTPUT (volts)	INSTRUMENT OXYGEN (ml/l)	RESIDUAL (ml/l)
1.15	2.00	0.00	0.767	1.15	-0.00
1.17	6.00	0.00	0.803	1.16	-0.00
1.17	12.00	0.00	0.855	1.17	-0.00
1.19	20.00	0.00	0.923	1.18	-0.00
1.20	26.00	0.00	0.977	1.20	0.00
1.20	30.00	0.00	1.014	1.21	0.00
3.97	2.00	0.00	1.436	3.97	-0.00
3.99	6.00	0.00	1.554	3.99	0.00
4.01	12.00	0.00	1.729	4.01	0.00
4.04	20.00	0.00	1.958	4.05	0.00
4.07	26.00	0.00	2.135	4.08	0.01
4.09	30.00	0.00	2.255	4.09	-0.00
6.82	2.00	0.00	2.111	6.82	-0.00
6.87	6.00	0.00	2.317	6.87	0.00
6.91	12.00	0.00	2.618	6.91	-0.00
6.96	20.00	0.00	3.013	6.96	-0.00
7.06	30.00	0.00	3.530	7.06	-0.00
7.06	26.00	0.00	3.335	7.06	-0.00

V = instrument output (volts); T = temperature (°C); S = salinity (PSU); K = temperature (°K)

Oxsol(T,S) = oxygen saturation (ml/l); P = pressure (dbar)

$$\text{Oxygen (ml/l)} = \text{Soc} * (\text{V} + \text{Voffset}) * (1.0 + \text{A} * \text{T} + \text{B} * \text{T}^2 + \text{C} * \text{T}^3) * \text{Oxsol}(\text{T},\text{S}) * \exp(\text{E} * \text{P} / \text{K})$$

Residual (ml/l) = instrument oxygen - bath oxygen





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SENSOR SERIAL NUMBER: 2526
 CALIBRATION DATE: 17-Apr-18

SBE 43 OXYGEN CALIBRATION DATA

COEFFICIENTS: A = -3.8507e-003
 Soc = 0.4689 B = 1.8073e-004
 Voffset = -0.4952 C = -2.6104e-006
 Tau20 = 1.03 E nominal = 0.036

NOMINAL DYNAMIC COEFFICIENTS
 D1 = 1.92634e-4 H1 = -3.300000e-2
 D2 = -4.64803e-2 H2 = 5.00000e+3
 H3 = 1.45000e+3

BATH OXYGEN (ml/l)	BATH TEMPERATURE (° C)	BATH SALINITY (PSU)	INSTRUMENT OUTPUT (volts)	INSTRUMENT OXYGEN (ml/l)	RESIDUAL (ml/l)
1.15	2.06	0.00	0.750	1.14	-0.00
1.15	6.00	0.00	0.781	1.15	0.00
1.16	12.11	0.00	0.831	1.15	-0.00
1.17	20.00	0.00	0.898	1.17	-0.00
1.18	26.00	0.00	0.950	1.18	0.00
1.18	30.00	0.00	0.985	1.19	0.00
3.93	2.01	0.00	1.368	3.93	0.00
3.94	6.00	0.00	1.477	3.94	-0.00
3.95	12.04	0.00	1.643	3.95	0.00
3.98	20.00	0.00	1.862	3.97	-0.01
4.00	26.00	0.00	2.035	4.00	0.00
4.01	30.00	0.00	2.151	4.01	-0.00
6.72	2.00	0.00	1.987	6.72	-0.00
6.81	30.00	0.00	3.303	6.80	-0.00
6.81	6.00	0.00	2.193	6.81	0.00
6.84	12.02	0.00	2.478	6.84	0.00
6.93	20.00	0.00	2.879	6.93	-0.00
6.97	26.01	0.00	3.180	6.97	0.01

V = instrument output (volts); T = temperature (°C); S = salinity (PSU); K = temperature (°K)

Oxsol(T,S) = oxygen saturation (ml/l); P = pressure (dbar)

Oxygen (ml/l) = Soc * (V + Voffset) * (1.0 + A * T + B * T² + C * T³) * Oxsol(T,S) * exp(E * P / K)

Residual (ml/l) = instrument oxygen - bath oxygen

