1902RL CTD Processing Notes

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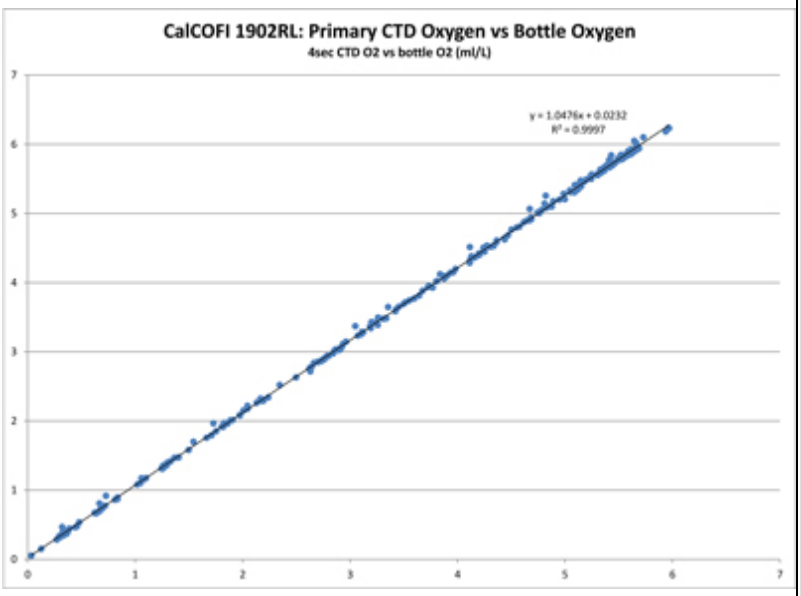
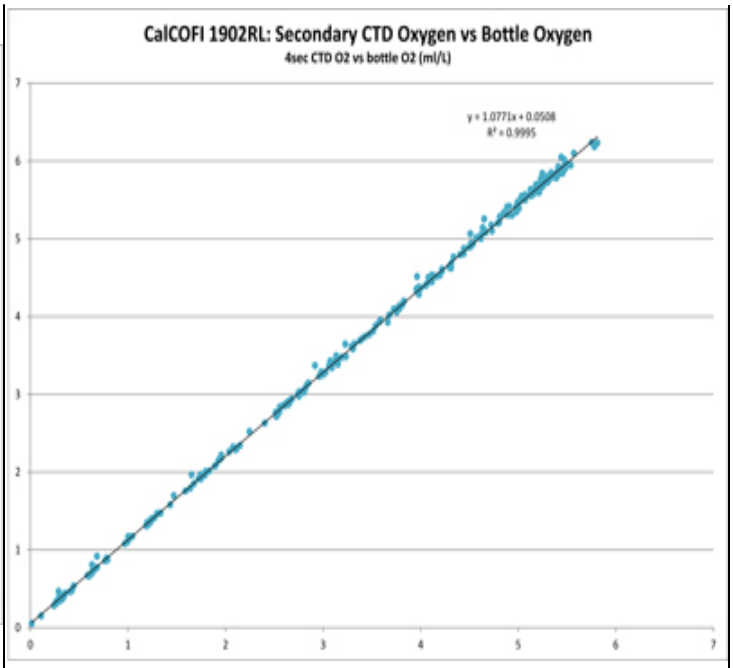
CTD Processing Summary CalCOFI 1902RL CTD Preliminary Data		
Download 1902RL CTD raw cast files zipped (http://cappuccino.ucsd.edu/downloads/2019/20-1902RL_CTDCast.zip)		Download 1902RL Preliminary CTD + bottle data (http://cappuccino.ucsd.edu/downloads/2019/20-1902RL_CTDPrelim.zip)
General CTD Notes - data acquisition notes, logistics, processing - see below. **Please note that these regressions are generated from preliminary CTD vs bottle data** and will be reprocessed once final bottle data are available. CTD temperatures and salinities do not usually change but oxygen, estimated chlorophyll-a, estimated nitrate may change significantly after point-checking. Questionable or mistrip bottle data are removed from these comparisons but may be visible on the CTD.csv plots. For this cruise and future cruises, both primary & secondary sensor profiles vs bottle data will be generated and archived in the downloadable CTD+Bottle data files. These plots are under the "csv-plots\Primary" & "csv-plots\Secondary" subdirectories.		
CTD sensor corrections derived by comparing CTD sensor data, 4sec averages prior-to-bottle closure, to bottle samples		
Dual T, S, & O2	Primary Sensor	Secondary Sensor
Salinity offset (bottle - CTD salinity; > 350m only; Seabird SBE4)	0.0010	-0.0044
Oxygen ml/L (dual Seabird SBE43)	y = 1.0476x + 0.0232 R^2 = 0.9997	y = 1.0771x + 0.0508 R^2 = 0.9995
Oxygen umol/Kg (dual Seabird SBE43)	y =1.0486x + 1.1006 R^2 = 0.9997	y = 1.0782x + 2.302 R^2 = 0.9995
Single sensors	Linear	Polynomial
Nitrate - ISUS 4sec ave voltage vs Bottle NO3 (Satlantic ISUS v3 SN111)	y = 27.466x - -24.236 R^2 = 0.9523	Note: ISUS lamp was replaced, burn-in drift will be dealt with by regressing individual casts vs bottle NO3 samples - see individual plots.
Fluorometer - linear & polynomial regressions	y= 11.58x - 0.445 R^2 = 0.8652	y = 14.315x2+ 7.3383x - 0.2484 R^2 = 0.8652

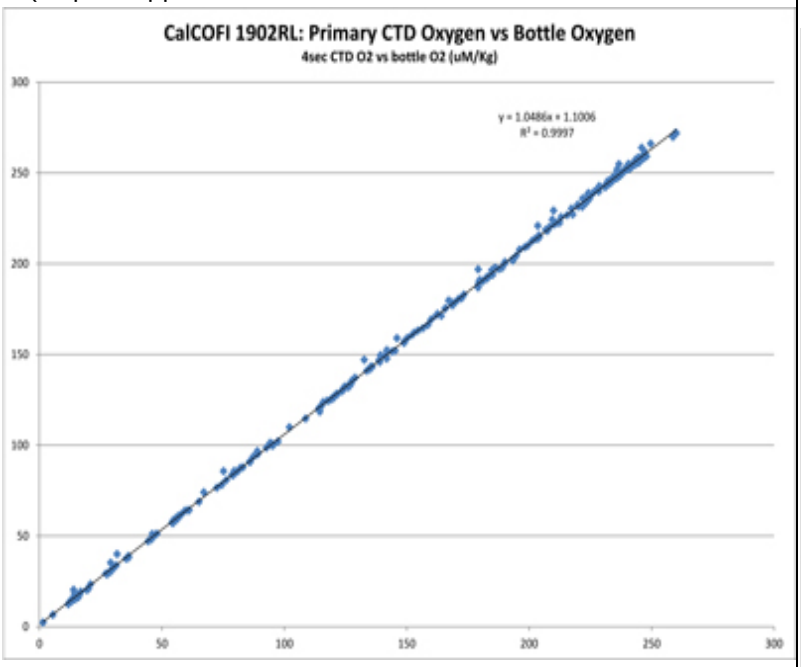


(http://cappuccino.ucsd.edu/downloads/2019/1902RL/1902RL_Ox1MLvsOxBML.jpg)



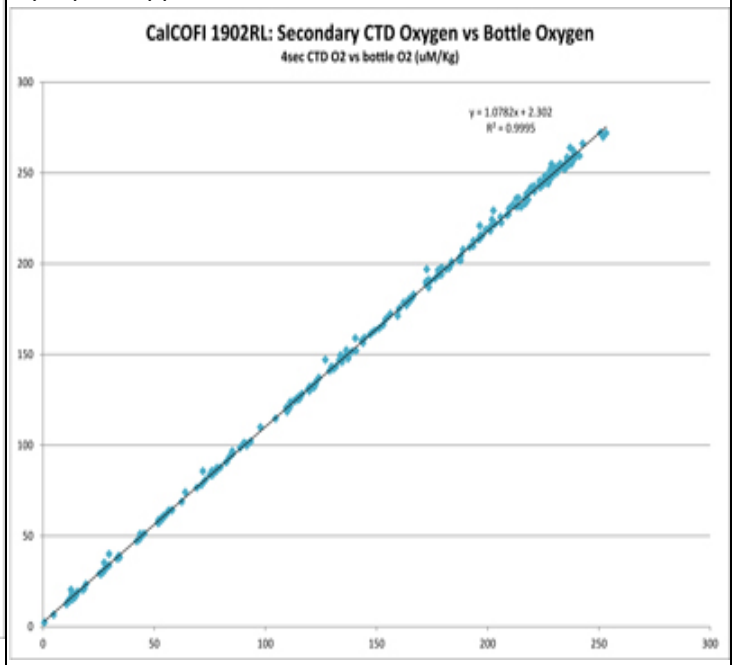
(http://cappuccino.ucsd.edu/downloads/2019/1902RL/1902RL_Ox2MLvsOxBML.jpg)

(http://cappuccino.ucsd.edu/downloads/2019/1902RL



/1902RL_Ox1UMvsOxBUM.jpg)

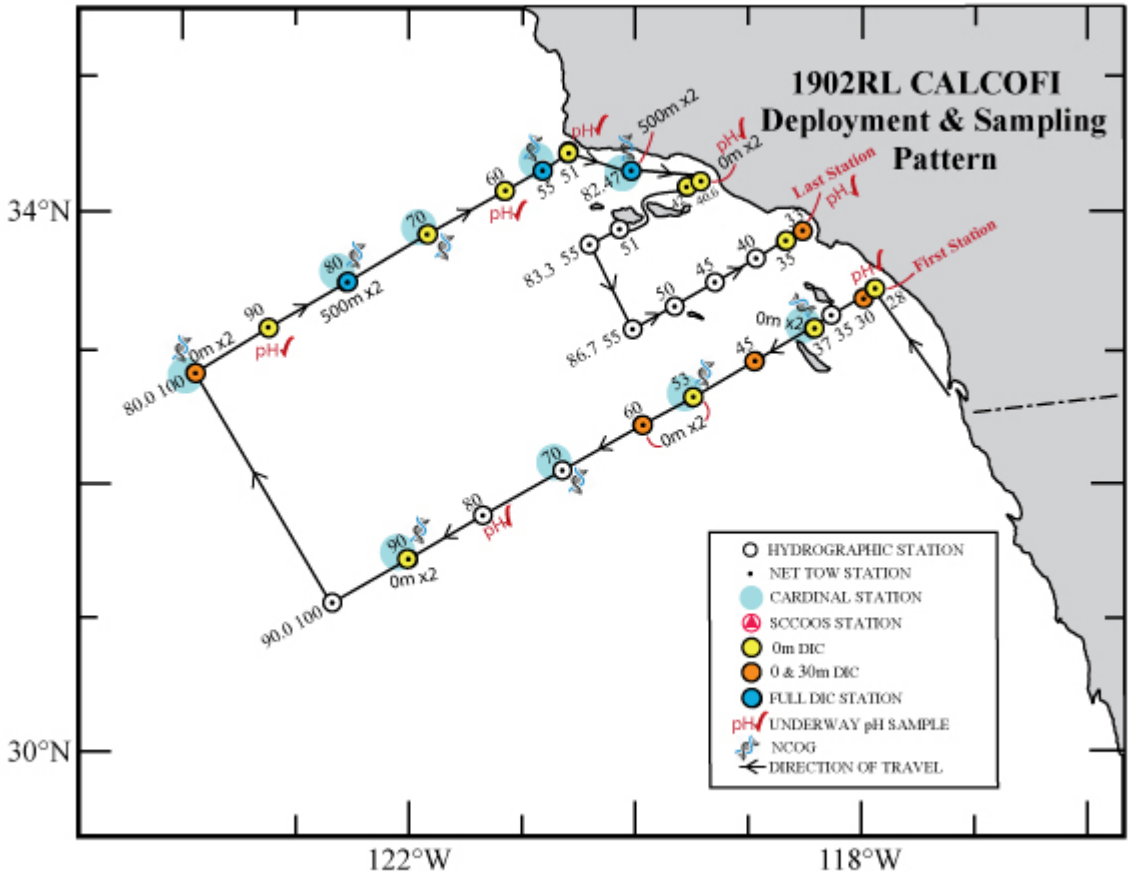
(http://cappuccino.ucsd.edu/downloads/2019/1902RL



/1902RL_Ox2UMvsOxBUM.jpg)

(http://cappuccino.ucsd.edu/downloads/2019/1902RL/1902RL_ISUSVvsNO3.jpg)	(http://cappuccino.ucsd.edu/downloads/2019/1902RL/1902RL_FlVvsChla.jpg)

General notes: These are cast & preliminary CTD Processing Notes from 1902RL cruise



(http://cappuccino.ucsd.edu/downloads/2019/1802SH/1802ActualCruiseTrack.jpg)

CalCOFI 1902RL General Cruise & Cast Notes:

CalCOFI Winter Cruise 1902RL was scheduled to occupy 75 stations from San Diego to Pt Conception. But due to the government shutdown from Dec 2018 - Feb 2019, the cruise schedule was reduced to 8 days at sea, Feb 6 - 13 2019. Thirty-one stations were scheduled and 29 occupied due to time lost to bad weather. No SCCOOS stations were scheduled or occupied this cruise. Primary productivity 14C uptake incubation experiments were not performed this cruise.

CTD General Notes and Problems:

CalCOFI used their 24-10L CTD-rosette on most of FSV Reuben Laskers' CTD system - their two-pin termination, cable grip, deck unit, monitor, mouse & remote depth readout box were used. SIO-CalCOFI installed their CTD blade PC (Win7), surface PAR (newly calibrated & cabled) and wired/wireless data network. SIO-CalCOFI's Seabird 911+, 24-bottle epoxy-coated rosette with standard bridle (LARS bridle removed) was deployed by the aft winch system. Standard sensor configuration: dual T, C, & O2 on separately plumbed & pumped horizontal arrays; Wetlabs ECO-Fl fluorometer; C-Star transmissometer; Biospherical PAR & Surface PAR (mounted on the LTER GP van); MBARI-ISUS v3 w/ battery; SBE18 pH; altimeter. Refer to .hdr files for serial & model numbers or the table below. Primary & secondary T, C, & O2 sensors were not changed from the last cruise, 1804SH, since their calibration & agreement were still on target. ISUS was DI lab calibrated prior to the cruise. Both sensor sets worked fine throughout the cruise and no changes were necessary.

Setup: Using SIO-CalCOFI's 24-10L bottle CTD-rosette epoxy-coated standard bridle frame. CTD - SBE 9+ (SN#3161-0936) Sensor Configuration	
1° Sensors: freshly calibrated	2° Sensors:
SBE 3plus temperature sensor (SN#2533); Conductivity SBE 4 Sensor (SN#3568) Oxygen SBE 43 Sensor (SN#3284) Pump	SBE 3plus temperature sensor (SN#5109); Conductivity SBE 4 Sensor (SN#3569) Oxygen SBE 43 Sensor (SN#0680) Pump
Other sensors (**unpumped**)	
Wetlabs ECO/FL Fluorometer SN#3122 Wetlabs C-Star Transmissometer SN#CST-811DR pH SBE 18 SN#0709 Remote PAR SN#70209	CCE-LTER MBARI-ISUS v3 SN#111 Altimeter SN#46604 Carousel SBE 32 3217964-0225 Reference PAR SN#20514, newly calibrated & repaired

Logistics & General System/Sampling Notes:

Cast Notes (transcribed from console ops, clipboard notes, & data processing):
Cast 001 sta 90.0 28.0: 69m bottom, 8 bottle cast to 65m; ISUS not working but not noticed
Cast 002 sta 90.0 30.0: 607m bottom, 21 bottle cast to 515, extra 10m LTER bottle; ISUS not working but not noticed
Cast 003 sta 90.0 35.0: 305m bottom, 18 bottle cast to 300m; ISUS not working, noticed & battery changed post-cast and reading > 0V
Cast 004 sta 90.0 37.0: 22 bottle cast to 515m; 2-68m 'flat' chl profile - mixed with no distinct max, 67m mixed layer; extra 10 & 62m NCOG bottles; ISUS working. Remote depth readout serial connection online. CTD pressure sensor offset by -0.1db precast since deck pressure is consistently >0.175.
Cast 005 sta 90.0 45.0: 21 bottle cast to 515m; 2-58m 'flat' chl profile, slight max at 58, 53m mixed layer; CTD pressure sensor offset again by -0.1db precast since deck pressure is consistently >0.150.
Cast 006 sta 90.0 53.0: 22 bottle cast to 515m, 2 extra NCOG bottles, 10m & 30m; chl max @35m, 10m mixed layer; deck pr looks good
Cast 007 sta 90.0 60.0: 20 bottle cast to 515m
Cast 008 sta 90.0 70.0: 22 bottle to 515m, with NCOG @ 10m & 62m, chl max ~64m, mixed layer ~62m

Cast 009 sta 90.0 80.0: 20 bottle cast to 515m; O2 feature (dip) at ~140m on both sensors, down & upcast but likely missed by 140m bottle

Cast 010 sta 90.0 90.0: 22 bottle cast to 515m; 78m chl max, 75m mixed layer; 2 NCOG bottles at 10m & 87m

Cast 011 sta 90.0 100.0: 20 bottle cast to 515m; double tripped 75m bottle #14 & #15, skipped on CESL

Cast 012 sta 80.0 100.0: 22 bottle cast to 515m; 2 NCOG bottles 10m & 30m; chl max ~30m, chl 0-30m mixed; 45m mixed layer

Cast 013 sta 80.0 90.0: 20 bottle cast to 515m; chl max 48m, mixed layer 25m; ISUS trace looks funky @ surface ie high >>10uM/L

Cast 014 sta 80.0 80.0: 22 bottle cast to 515m; 'flat' chl profile from 0-80m, slight max at ~70m; 10m & 62m NCOG bottles

Cast 015 sta 80.0 70.0: 22 bottle cast to 515m; 30m chl mx, 56m mixed layer; CTD held at surface ~8mins while the ship repositioned into the swell, some rolls. Bottle #4 mistripped, no sample - trigger replaced post-cast

Cast 016 sta 80.0 60.0: 21 bottle cast to 515m; rolling a bit, hard to hit target depths exactly; 10m chl max (0-30m), 36m mixed layer

Cast 017 sta 80.0 55.0: 23 bottle cast to 515m; 2 extra NCOG bottles at 10m & 20m, plus 10m LTER; seas kind of rocky, surface bottle at 3m to keep it submerged

Cast 018 sta 80.0 51.0: 8 bottle cast to 60m, 67m bottom; 0-20m chl max; CTD yo-yo'd had to go down to 10m for extra LTER bottle

Cast 019 sta 81.8 46.9: Santa Barbara Basin 24 bottle cast to 564m; overshot 560m, had to come back down to 545m (yo-yo'd); 12 oxygen bottles samples drawn instead of the usual 24.

Cast 020 sta 83.3 40.6: 6 bottle cast to 28m although EK60 showed bottom at 27m, altimeter was ~6m off bottom (no mud in samples & transmissometer didn't drop); pH sensor noisy; all profiles flat - no changed, very mixed here; no ISUS data since battery was not plugged in, replaced with new battery because of connector erosion

Cast 021 sta 83.3 42.0: 12 bottle cast to 115m, again EK60 bottom was much shallower than indicated by altimeter EK60 119m, Alt 123m. With CTD at 115m, altimeter was reading 9.0m from bottom. Interesting pH trace at 30m; chl max 0-40m, 40m mixed layer

Cast 022 sta 83.3 51.0: 11 bottle cast to 95m; 15-20m chl max; 30m mixed layer; 100m bottom

Cast 023 sta 83.3 55.0: 24 bottle cast to 515m, 55m chl max, 62m mixed layer; two NCOG bottle tripped at 55m chl max & 10m, plus 10m LTER bottle; extra bottle fired at 25m by mistake, skipped; bottle #10 draw temp was high so probable mistrip

Cast 024 sta 86.7 55.0: 21 bottle cast to 515m; no ISUS signal even though battery was plugged in, swapped post-cast

Cast 025 sta 86.7 50.0: San Nicolas Is sta, 9 bottle cast to 65m (alt 14m off bottom); ISUS working

Cast 026 sta 86.7 45.0: 22 bottle cast to 515m, one extra LTER bottle at 10m & one extra at 120m insurance since trigger #10 is problematice; 34m chl max, 43m mixed layer; "classic" profiles; ISUS working but spiked to 0 at 515m and stayed there for the upcast. Bottle #10 O2 temp was slightly higher than bottle #11 so may have mistripped, skipped except for salts (post-cruise review shows salts from #10 & #11 agree, so no mistrip).

Cast 027 sta 86.7 40.0: Santa Monica Basin, 24 bottle cast to 715m, 25-30m chl max, 45m mixed layer. Bottle #10 didn't close, no insurance bottle available. EK60 was reading 695m upon arrival so the ship moved us gradually into deeper water, bottom was 706m & dropping at start of cast. Oddly the EK60 was over estimating bottom here (on shallow stations it has been under estimating by several meters). Panicked a bit when approaching bottom at 700m heading to 725m, the altimeter said bottom was at 723m. Winch stopped (fortunately) 8m off bottom so terminal depth was 715m, bottom was 723m, EK60 read 735m(!). Almost bounced it...

Cast 028 sta 86.7 35.0: 24 bottle cast to 515m; 10m & 30m NCOG, 10m LTER, plus insurance bottle at 120m since #10 trigger still problematic - O2 draw temp on bottles #10 & #11 matched so no mistrip indicated. 30m chl max, 57m mixed layer

Cast 029 sta 86.7 33.0: 8 bottle cast to 44m, 51m bottom; 10m chl max

JRW 21 Feb 2019