OC471 Cruise Report
Draft May 19, 2011

Contents

1. Introduction

The diazotroph *Trichodesmium* spp. constitutes a major pathway of nitrogen flow into marine planktonic ecosystems, but estimates of its impact on global nitrogen budgets vary widely. Sampling is made difficult by the fragility of the organism with the consequence that *Trichodesmium* spp. are difficult to manipulate in both field and laboratory experiments. Optical methods that sample the organism nondestructively are thus appealing. A recent transatlantic survey using the Video Plankton Recorder (VPR) revealed unexpectedly high abundance of *Trichodesmium* spp. at depth, suggesting the vertical distribution of the organism within the euphotic zone may be more uniform than previously thought (Davis and Mcgillicuddy 2006). Application of a simple bio-optical model of productivity to the observed profile of abundance suggests the depth-integrated nitrogen fixation rate could be three to five times higher than that based on the canonical profile of exponential decrease in abundance with depth.

The unexpected vertical distribution of *Trichodesmium* spp. reported in Davis and McGillicuddy (2006) came from an area in which its overall abundance is relatively low, near the northern periphery of its geographic range. If this same vertical distribution is also present in the high-abundance regions further to the south, and the deep populations of *Trichodesmium* spp. are actively fixing nitrogen, the implications for the nitrogen budget would be substantial. This leads us to the following key questions motivating this study:

> (1) Is the vertical distribution of *Trichodesmium* spp. in the high abundance region of the tropical Atlantic similar to that reported in Davis and McGillicuddy (2006) for the northern Sargasso Sea?
>
> (2) How does the distribution of *Trichodesmium* spp. vary over a continuum of scales spanning 1-1000km in the tropical and subtropical Atlantic?
>
> (3) Is the reported association of local *Trichodesmium* spp. maxima with anticyclones robust? Does this association provide clues to the physical, chemical, and biological factors regulating abundance of the organism?

(4) Are the deep populations of *Trichodesmium* spp. actively fixing nitrogen?

(5) What is the impact of *Trichodesmium* spp. populations on net biogeochemical fluxes?

2. Cruise Synopsis

R/V *Oceanus* Voyage #471 was the second of two cruises designed to answer these questions. The survey track (Figure 1) began with a meridional section from Bermuda to Puerto Rico that transects the gradient in *Trichodesmium* spp. separating the relatively low-abundance region in the central Sargasso Sea from the high-abundance region in the southern limb of the subtropical gyre. This particular section has the added benefit of ancillary data from the BATS validation cruises that have occupied this section numerous times in the past, as well as an occupation that is nearly concurrent with our first cruise OC469 (October 18-28, 2010). The second segment of the survey ran southeast through the high-abundance region that has been sampled in prior studies. Several eddy features were studied along the way before the ship made port in Barbados on May 13.

A variety of data streams facilitated adaptive sampling during the cruise. Near-real-time altimetric data (Leben et al. 2002) allowed us to target several eddy features along our survey track. Altimetric information was supplemented with shipboard VPR, ADCP, and XBT observations to determine the precise location of eddy features. Our adaptive sampling strategy was further augmented with a satellite ocean color proxy for the probability of *Trichodesmium* spp. blooms (Westberry and Siegel 2006; Westberry et al. 2005), kindly provided by Toby Westberry. An 8-day composite of the latter from the early part of this cruise reveals a strong meridional gradient in *Trichodesmium*, with very low abundance north of 25N (Figure 2).

Daily station work typically consisted of four standard casts: (1) a 150m CTD cast to characterize the stratification and light environment, (2) MOCNESS tows to collect organisms for nitrogen fixation incubations and gene expression assays, (3) Niskin bottle profiles of the upper 80m, with samples gravity filtered for microscopic cell counts and qPCR, and (4) hydrographic profiles of the upper 700m to measure nutrients, chlorophyll, and alkaline phosphotase activity. A color digital VPR and holocam were affixed to the CTD rosette to provide profiles of plankton images on each cast. A typical station schedule is provided in Appendix B. A table of station identifiers is included as Appendix C. See Appendix D for salinity calibrations, Appendix E for MOCNESS tow information, Appendix F for a log of VPR deployments, and Appendix F for plots of all CTD casts.

3. Sampling overview

A total of 16 hydrographic stations were occupied, each consisting of one or more CTD casts (Figure 1). Our roughly-meridional transect began with station #1 at BATS, which at the time was near the center of cyclonic eddy C1 (Figure 3a). We then proceeded south with a VPR/XBT section through anticyclonic eddy AC1 to an interacting pair of cyclones C2/C3, at which point station 2 was occupied. Large amplitude variations in the thermocline are evident in the alongtrack XBT section, with doming isotherms in cyclones C1-C3 and depressed isotherms in AC1 (Figure 4) confirm this feature as a regular anticyclone (rather than a mode-water eddy). VPR Survey 1 (Figure 5) reveals high fluorescence in the subsurface chlorophyll maximum in cyclone C1, with lower values in AC1 and C2/C3. Station 2 was occupied at the rather poorly defined interface between C2 and C3.

VPR Survey 2 commenced at station 2, proceeding south to anticyclone AC2 (Figure 3a). The alongtrack XBT section (Figure 6) reveals the thermocline perturbation associated with AC2 is mostly confined to the upper 300m, with little disturbance of the main thermocline. However, this section may not have reached eddy center as evidenced by the ADCP velocity (Figure 3a) and the subsequent XBT section (see below). The associated VPR survey (Figure 7) shows the warm waters of the seasonal thermocline in AC2 are relatively fresh, and fluorescence values in the subsurface chlorophyll maximum very low. Station 3 was occupied in the center of AC2.

From AC2 we proceeded southeast to AC3 (Figure 3a). Depression of the main thermocline in AC2 is more evident in the alongtrack XBT section. AC3's relatively weak expression in SLA is apparently the result of a density anomaly confined to the upper ocean (Figure 8). VPR data reveal elevated fluorescence at the interface between the two features (Figure 9). MOCNESS tows yielded the highest biomass of the trip thus far at station 4 in AC3. A replicate tow and had the highest deep biomass thus far, despite an abbreviated towing period (only 15 min). Incubations were performed at 2 light levels: 620 W m^{-2} (shallow) and 200 W m^{-2} (deep). Shallow / deep per-colony N_2-fxation rates were in approximate proportion to light intensity. Additional biomass facilitated a light-switching experiment, such that deep colonies were incubated at surface light intensity and vice-versa. Again, per-colony N_2-fxation rates were in approximate proportion to light intensity.

VPR/XBT survey operations resumed with a transect toward cyclone C4. Station 5 was occupied at the periphery of the feature (Figure 3b). Shallow *Trichodesmium* biomass was high, deep biomass not as much. VPR data indicated a low-salinity surface expression, and rafts appear to be more abundant in the interior (Figure 10), so we decided to undertake a survey of the feature before proceeding further. Cyclonic circulation was clearly documented by the ADCP data (Figure 11), and doming of the main thermocline was evident in the XBT survey (Figure 12). Interestingly, a local salinity maximum at the surface occurs at eddy center (Figure 10). This is potentially an indirect result of downwelling induced by eddy-wind interaction, putting the mixed layer in contact with saltier water at depth. Final approach to station 6 was guided by the VPR to the highest abundance region on the southeast flank of the eddy (Figure 10).

After completing our survey of C4 we turned southward to AC4 and along the way encountered a low-salinity tongue with a huge amount of biomass including *Trichodesmium* (Figure 13). Station 7 was occupied along that track, and afterward we continued south to eddy center (Figure 3b; see Figure 14 for a zoom view). From there we turned east to survey cyclone C5. Along the way we encountered even fresher water at the surface. *Trichodesmium* seemed to be becoming less abundant on the fresh side of the front, so we turned around and sampled station 8 in saltier water mid-front. A bow-tie survey of C5 revealed enhanced *Trichodesmium* biomass along the periphery of the eddy, similar in pattern to what was observed in C4. Highest biomass was present along the southwestern flank of the eddy, and station 9 was situated there accordingly. XBT collected along this survey track are presented in Figure 15.

From C5 we surveyed south into the interior AC5 (Station 10) and back out again north-northeast toward C6 (Figure 16). VPR data indicate a very fresh surface layer in the interior of AC5, and both rafts and puffs were confined to that surface layer. Water at station 10 was visibly green with plentiful Sargassum weed. Perhaps the lack of *Trichodesmium* at depth was associated with reduced light penetration in the turbid water; if so, then bio-optical feedbacks in an ecosystem model will be necessary to accurately simulate the vertical distribution of *Trichodesmium* in this environment. This low-salinity water is presumably of Amazon origin,

and the HYCOM operational model suggests northward transport of the plume by AC5 (Figure 17). Outside of the freshwater plume, *Trichodesmium* is more uniformly spread throughout the upper 100m (Figure 16). As we transited out of AC5 toward C6, *Trichodesmium* abundance decreased. A local enhancement was present at the edge of a salinity front toward the end of the transect, so we turned 180° back up the trackline and occupied station 11 at the edge of the front (Figure 18). MOCNESS tows contained ample *Trichodesmium.* XBT collected along this survey track are presented in Figure 19.

Cyclone C6 was surveyed for three days, May 8-10 (Figures 20, 21). The survey began with a SSW-NNE section, toward the end of which *Trichodesmium* abundance began to decline. We turned 180° and occupied station 12 in what was thought to be modest biomass, but the MOCNESS tows yielded high biomass in the surface sample and ample biomass in the deep sample. A mini-survey of C6 was then carried out, revealing high biomass in the center of the eddy. This facilitated adaptive sampling of the patch (Figures 22, 23), yielding some of the highest biomass of the trip at station 13. Retermination of the VPR on May 9 reduced the extent of the subsequent mini-survey (Figure 24), and eddy center was sampled again on May 10 (Station 14). Biomass in the net tows was again quite high, especially at depth.

During the VPR retermination, a slow-speed (4 knots) underway survey of triple-oxygen isotopes was carried out by Zoe Sandwith. The track started at eddy center, proceeded south for ca. 4 hours, then back north to eddy center for four hours.

From Station 14 we proceeded northwest to an area in which Toby Westberry's satellite analysis predicted the presence of *Trichodesmium* (Figure 25). An east-west transect across cyclone C7 was conducted (Figure 23). VPR data reveal doming of the seasonal thermocline and uplift of the subsurface fluorescence maximum (Figure 26). *Trichodesmium* rafts were enhanced along the eastern periphery of the eddy, whereas puffs were more uniformly distributed. Station 15 was occupied on the western flank of the eddy, at which a low-salinity lens was present in the near-surface layer. John Waterbury noted the presence of *Rhizosolenia*, and took an extra surface net tow for culture collection.

Transiting southwest toward Barbados, the final VPR/XBT survey documented multiple salinity fronts with which *Trichodesmium* populations covaried (Figure 27, 28). The final station (16) was occupied near the terminus, although we backtracked ca. 1 hr along the trackline to sample a local maximum in *Trichodesmium*. MOC tows yielded ample *Trichodesmium*, along with a large amount of other biomass.

4. Initial Findings

Our preliminary conclusions are:

(1) Deep *Trichodesmium* populations are actively fixing nitrogen

(2) *Trichodesmium* populations covary with salinity on multiple scales

(3) *Trichodesmium* is more abundant in cyclones (e.g. C4-C7), especially along the periphery of the eddies (cf. Davis and McGillicuddy, 2006)

(4) *Trichodesmium* co-occurs with dense blooms of the phytoplankton community in association with low-salinity plumes of riverine origin (cf. Subramaniam et al. (2008)).

(5) *T. erethreum* was the dominant species to the north and west; *T. thebautii* was dominant to the south and east.

5. Daily Narrative

April 23 – Departure from Woods Hole, transit

April 24 – Abby's birthday, transit continues

April 25 – transit continues

April 26 – arrival at BATS/C1 circa 1300 local. Too late for an incubation, so a MOC tow was conducted to assess overall levels of biomass. Towed for 10 minutes at 60m, then 5 minutes at 5m. Tricho were present, but in very low abundance. Occupied a 700m hydrocast, deployed the VPR and headed for AC1.

April 27 – towing through AC1, Tricho abundance was still quite low. Decided forego station work in favor of getting farther south for the next day. Continued towing VPR through C2 and toward C3.

April 28 – Station work in between C2 and C3; MOCNESS tow yields high biomass at surface, almost none at depth.

April 29 – Station 3 inside AC2. Ample Tricho in surface and deep MOC tows, but some colony damage. Swell was causing net to jerk, as evidenced by rapidly changing net angles. Towed a little faster to stabilize the net, so volume filtered was up too.

April 30 – Station 4 inside AC3. Highest biomass of the trip so far. Net was fishing much better, angles well behaved mostly below 10 degrees. Did a replicate tow and had the highest deep biomass thus far, despite an abbreviated towing period (only 15 min). Incubations were performed at 2 light levels: 620 (shallow) and 200 (deep). Shallow / deep per-colony N_2-fxation rates were in approximate proportion to light intensity. Additional biomass facilitated a light-switching experiment, such that deep colonies were incubated at surface light intensity and vice-versa. Again, per-colony N_2-fxation rates were in approximate proportion to light intensity.

May 1 – Towing through C4. Stopped for station 5 at the periphery of C4. Shallow biomass high, deep biomass not as much. C4 has a low-salinity surface expression and rafts appear to be more abundant in the interior, so we decided to undertake a survey of C4 before proceeding further.

May 2 – Survey of C4, adaptive sampling, located station 6 accordingly. On to AC4.

May 3 – Freshwater plume in between C4 and AC4; lots of diatoms, Tricho.

May 4 – Surveying east from AC4, encountered even fresher water at the surface. Tricho seemed to be becoming less abundant on the fresh side of the front, turned around and sampled in saltier water mid-front. VPR retermination.

May 5 – Survey of C5, station 9 in SW quadrant of high abundance.

May 6 – Toward center of AC5, station 10 in the interior. Tufts and puffs confined to upper 20m. Leo catches a nice mahi.

May 7 – Exiting AC5 toward C6.

May 8 – C6 survey; biomass tapered toward the N, swung around and sampled in what was thought to be modest biomass; surface sample had very high biomass, deep was ample as well.

May 9 – C6 survey, found good patch at eddy center, a single MOC tow was all that was needed to gather enough biomass. VPR flipped on deployment. Retermination required, postponed operations until after mindnight. Took the opportunity for Rachel/Zoe's 8 hour steam at 4 knots, first south then north, 1400-2230.

May 10 – Station 14 at C6 eddy center, high biomass again. Westberry's latest satellite image shows hits to the NW, VPR survey in that direction.

May 11 – VPR survey through C7, near where Toby's imagery suggest Tricho presence. Biomass enhancement along the periphery. Station 15 on the western end had good biomass shallow, moderate (but enough) down deep.

May 12 – VPR survey to frontal region on the transit back to Barbados. Low salinity surface layer, green water, lots of material in the MOC tows. Small boat operations, transit to Barbados.

May 13 – Arrival.

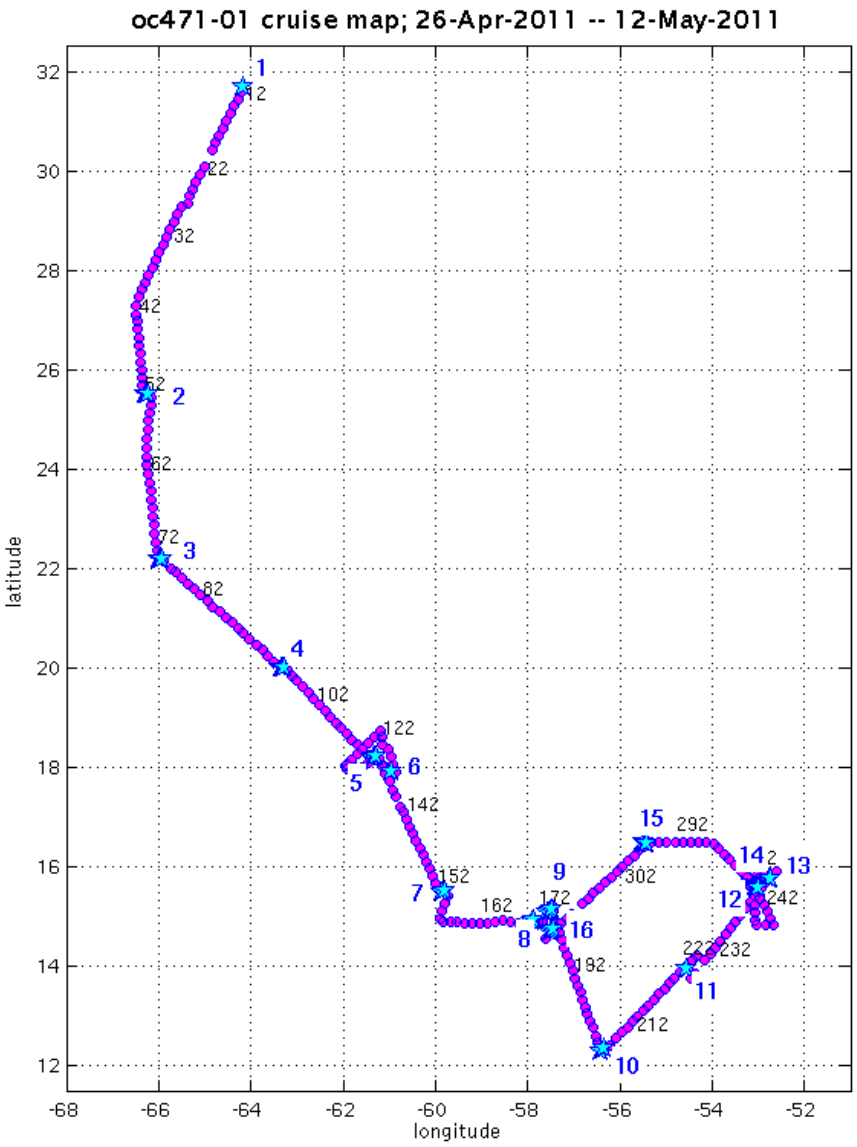


Figure 1a: OC471 sampling. Hydrographic stations indicated by stars, each consisting of one or more CTD casts. XBTs along VPR transects are shown as magenta dots with sequential drop numbers indicated.

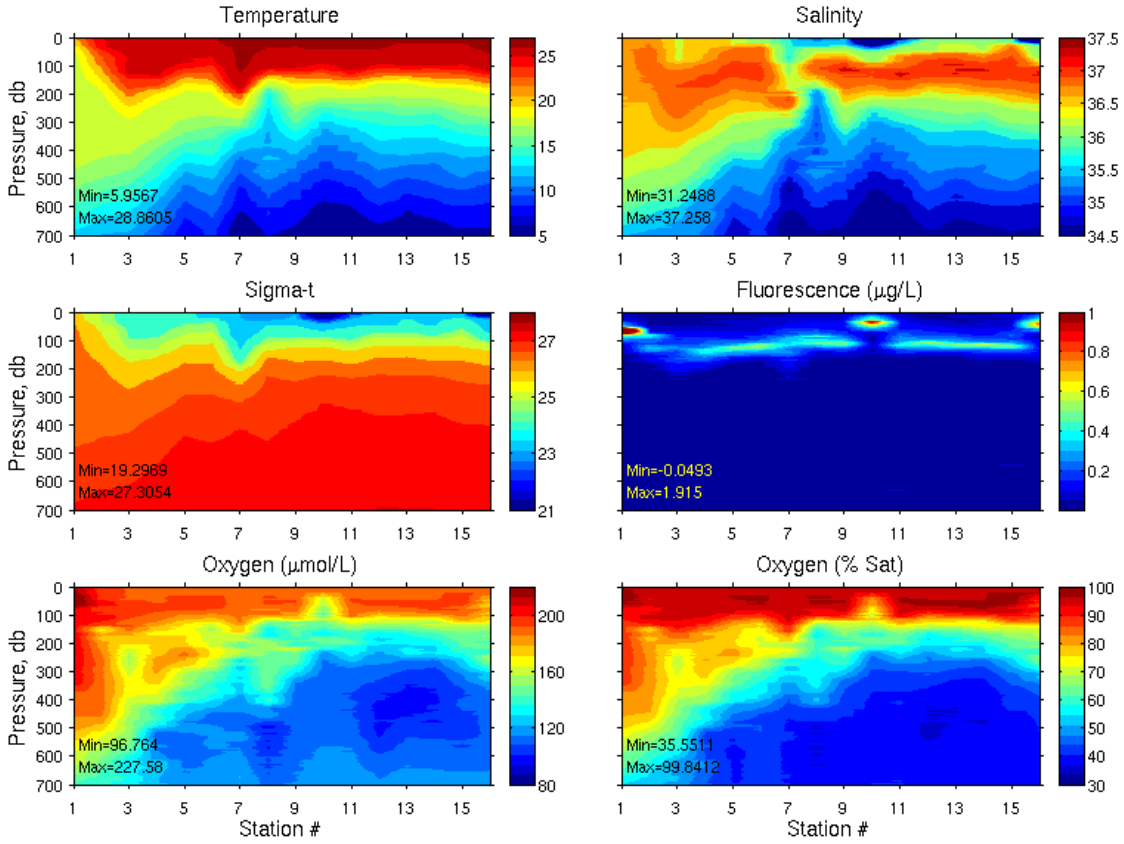


Figure 1b. CTD sections (0-700m) for hydrographic stations 1-16.

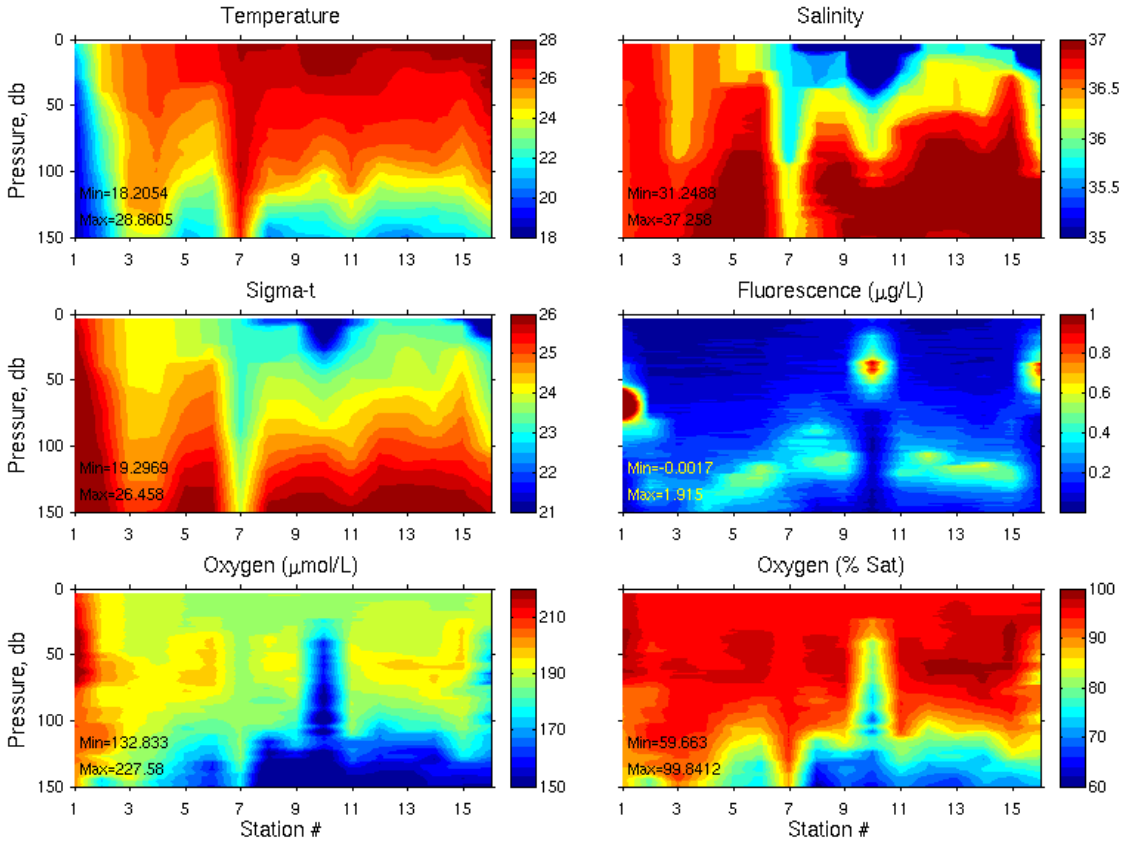
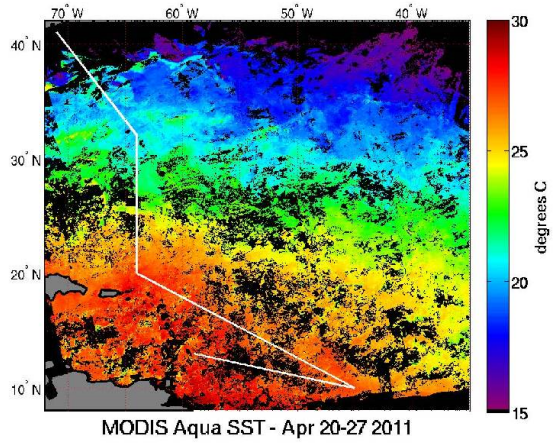
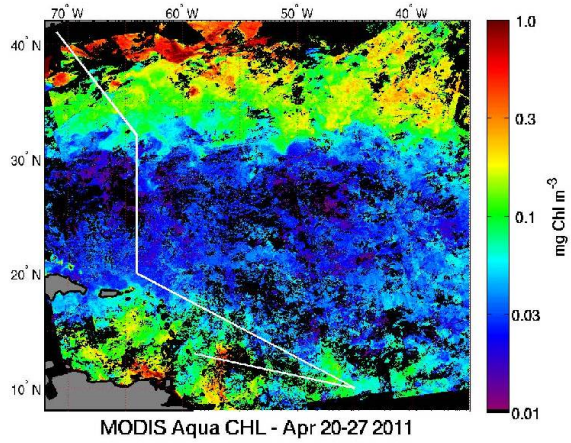


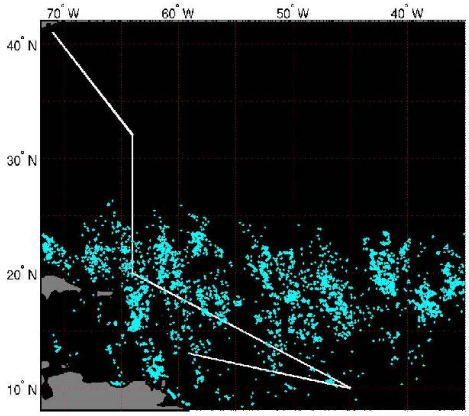
Figure 1c. CTD sections (0-150m) for hydrographic stations 1-16.



MODIS Aqua SST - Apr 20-27 2011



MODIS Aqua CHL - Apr 20-27 2011



MODIS Aqua Tricho - Apr 20-27 2011

Figure 2. April 20-27 composite MODIS Aqua temperature, chlorophyll, and *Trichodesmium*, kindly provided by Toby Westberry, OSU.

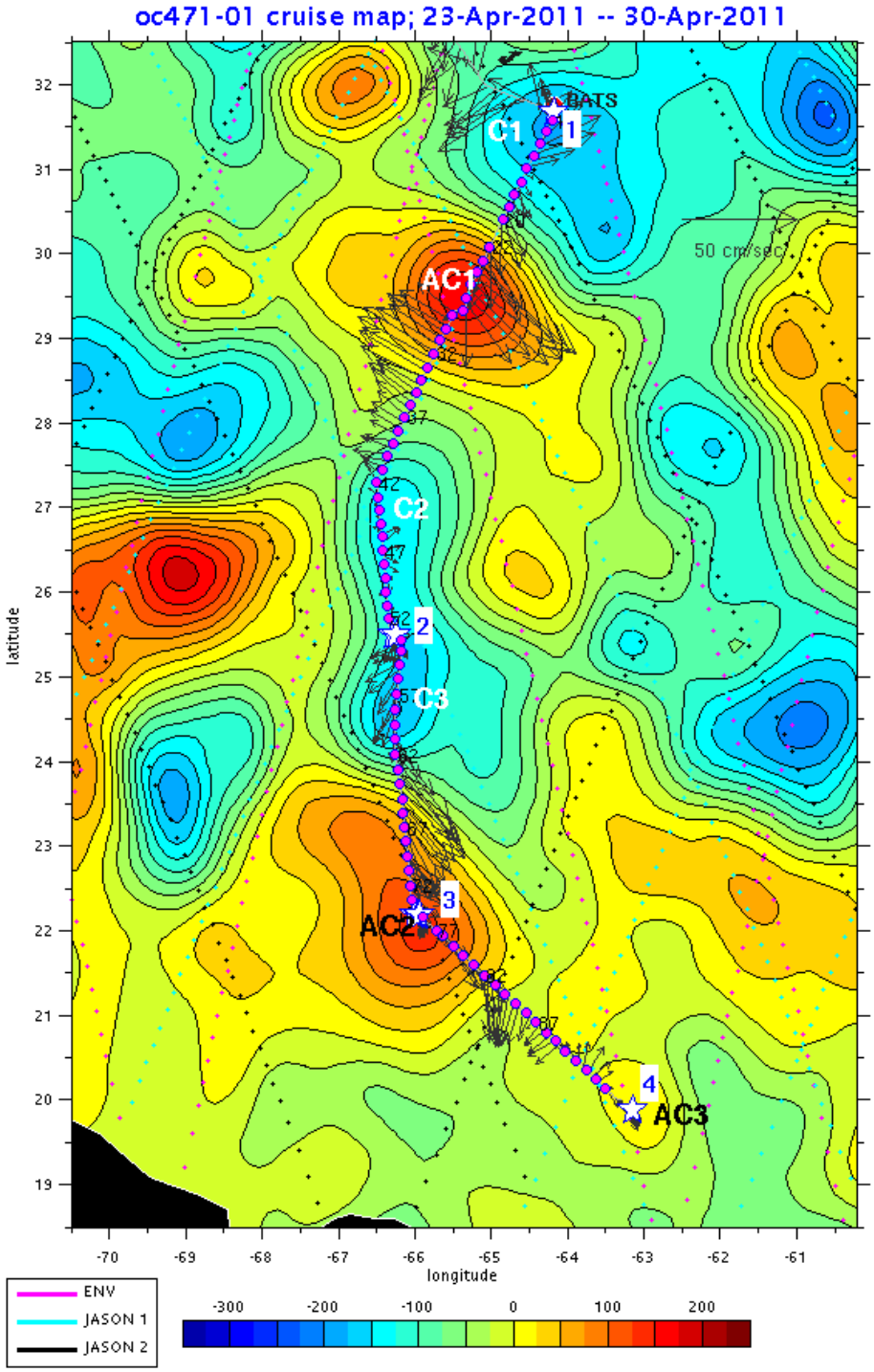


Figure 3a: OC471 sampling for stations 1-4 overlayed on a satellite altimetric map for the central time for this subset of observations. Hydrographic stations indicated by stars, each consisting of one or more CTD casts. XBTs along VPR transects are shown as magenta dots (see Figure 4). Velocity vectors derived from a vertical average (0-240m) of shipboard ADCP measurements.

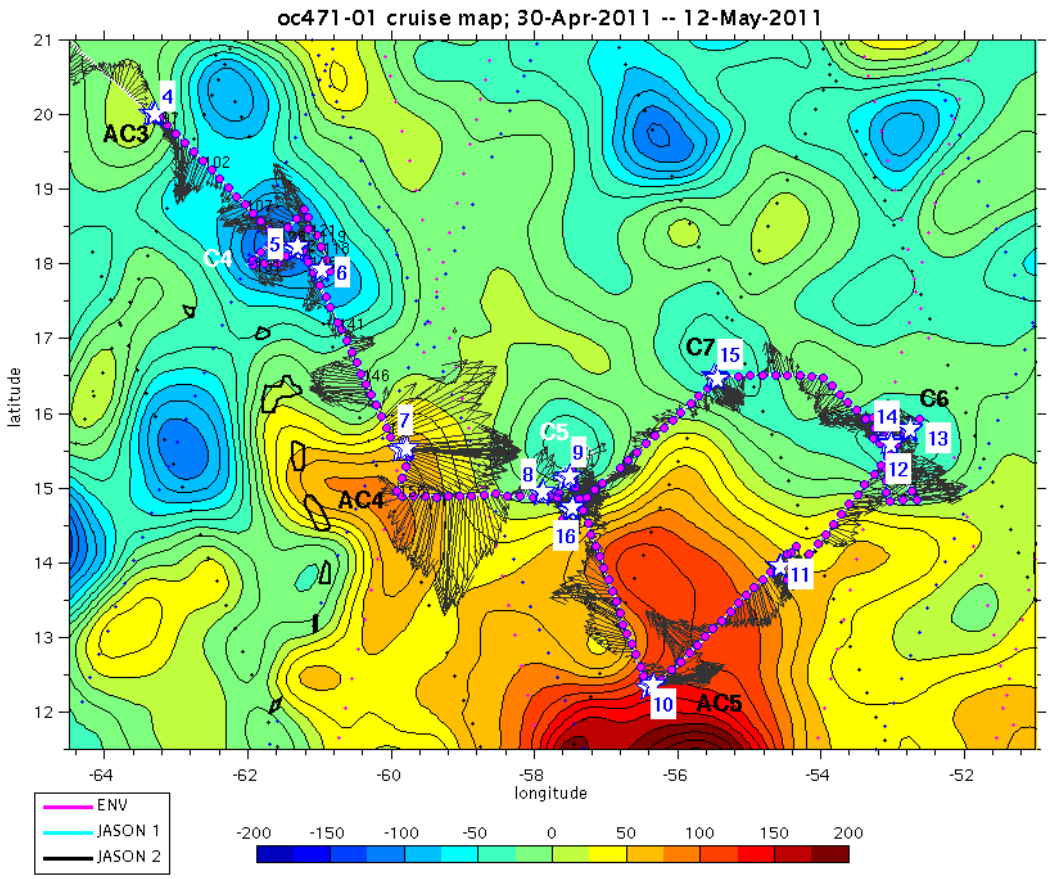


Figure 3b: OC471 sampling for stations 4-16 overlayed on a satellite altimetric map for the central time for this subset of observations. Hydrographic stations indicated by stars, each consisting of one or more CTD casts. XBTs along VPR transects are shown as magenta dots (see Figure 4). Velocity vectors derived from a vertical average (0-240m) of shipboard ADCP measurements.

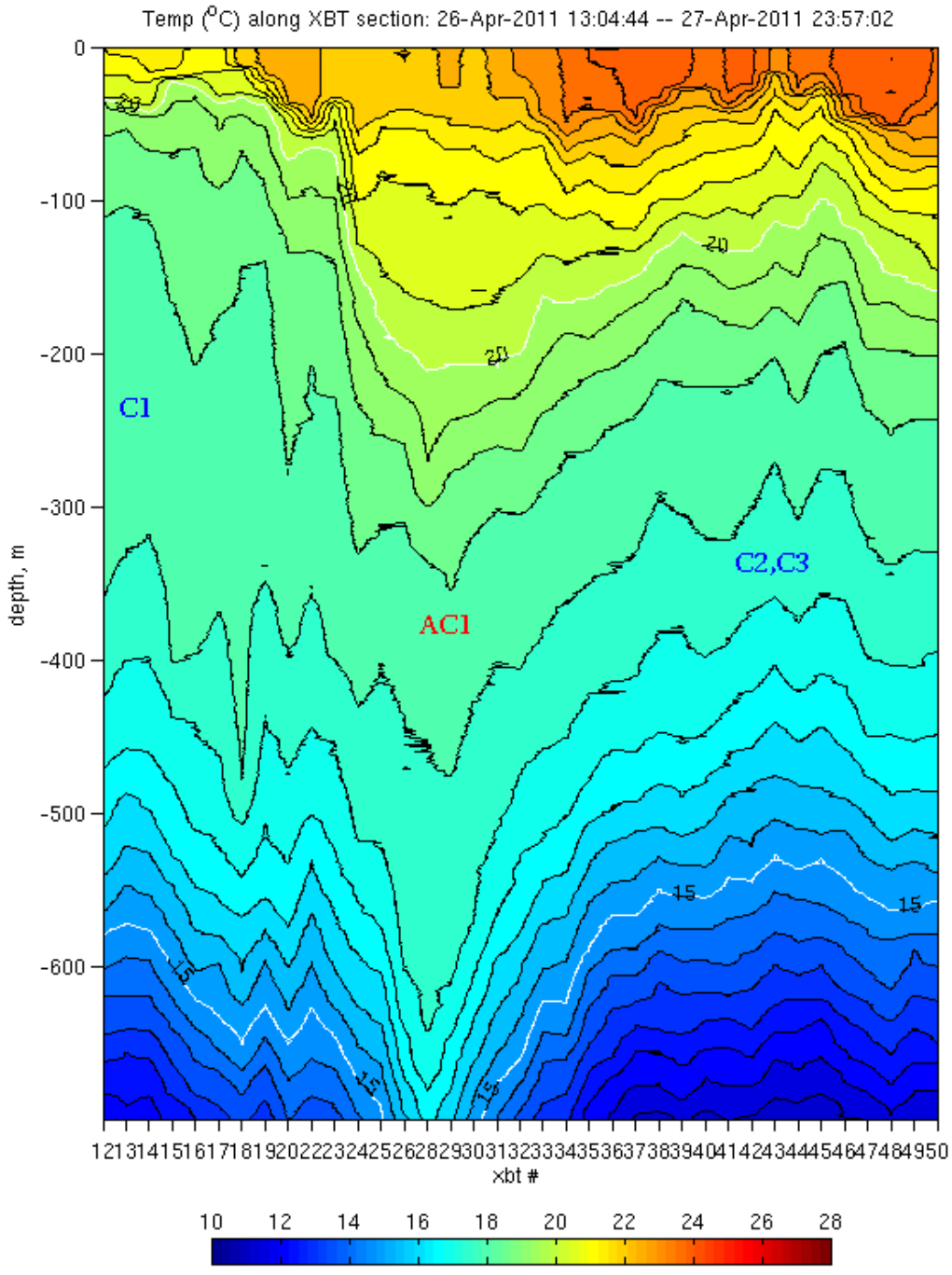
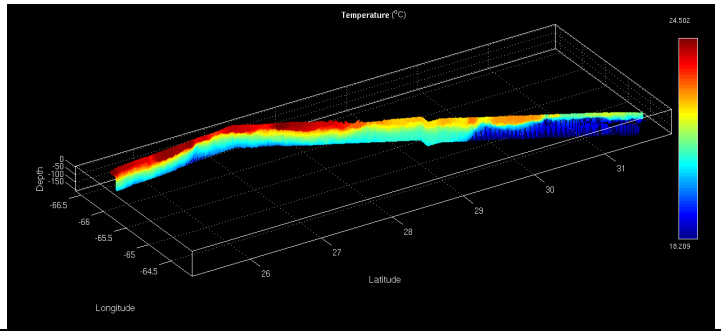


Figure 4. Alongtrack XBT section for VPR/XBT survey 1. See Figure 3a for trackline. Locations of cyclones C1-C3 and anticyclone AC1 are indicated.

(a)



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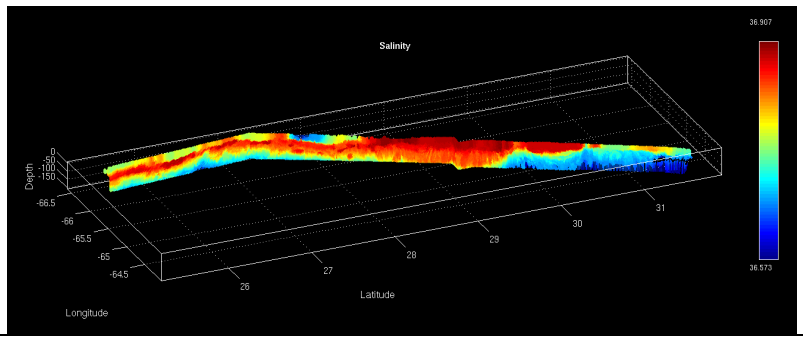

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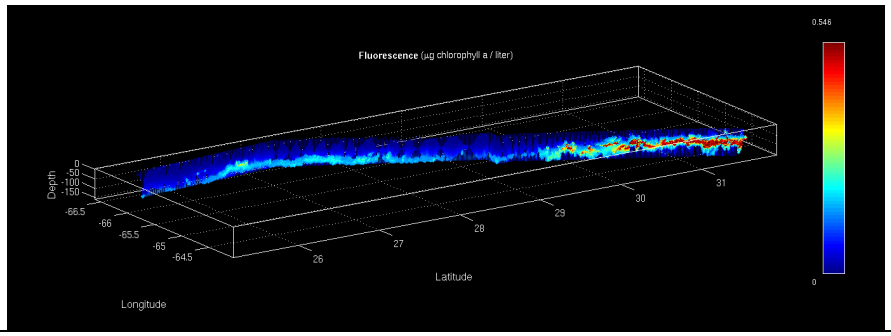

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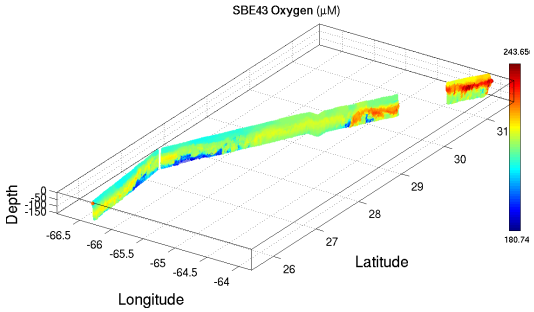


Figure 5. (a) Temperature, (b) salinity, (c) fluorescence, and (d) oxygen from VPR Survey 1.

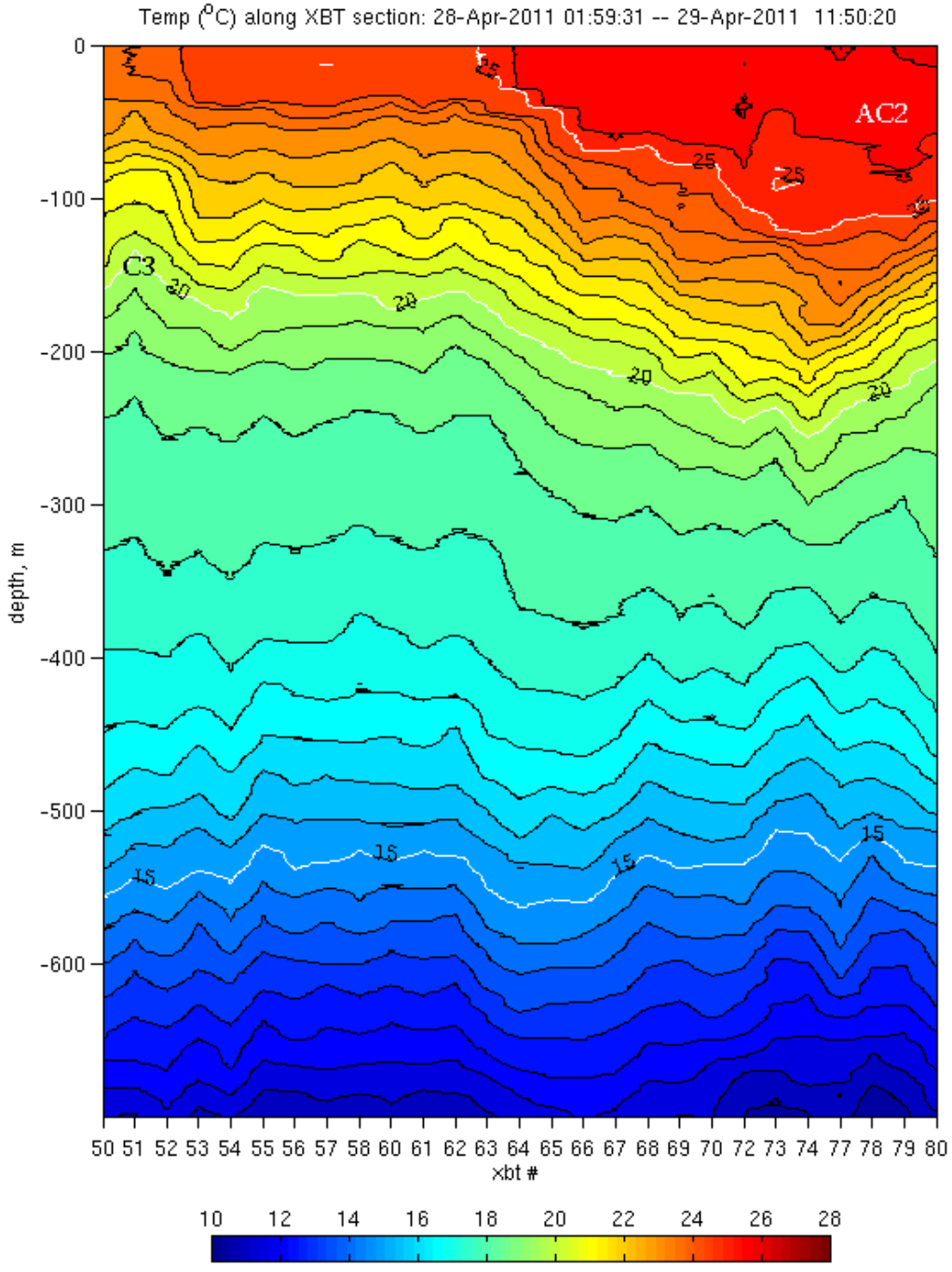
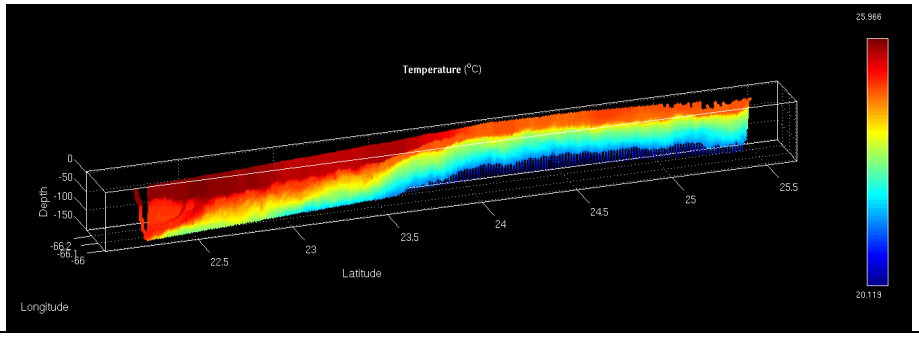


Figure 6. Alongtrack XBT section for VPR/XBT survey 2. See Figure 3a for trackline. Locations of cyclone C3 and anticyclone AC1 are indicated.

(a)



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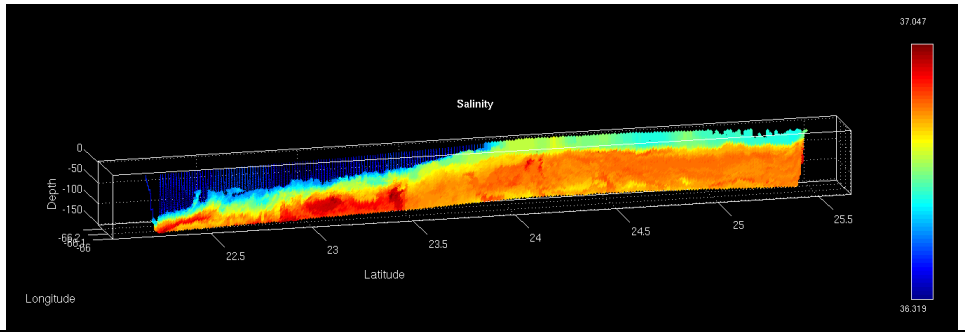

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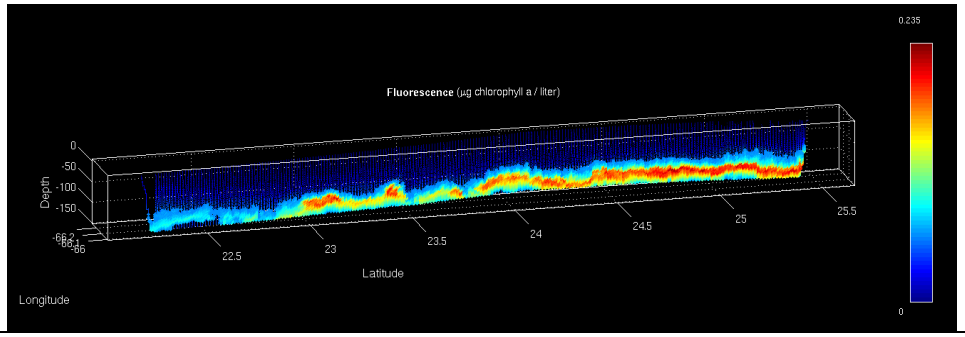

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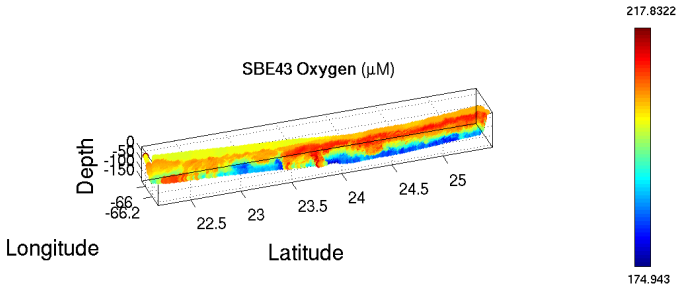


Figure 7. (a) Temperature, (b) salinity, (c) fluorescence, and (d) oxygen from VPR Survey 2.

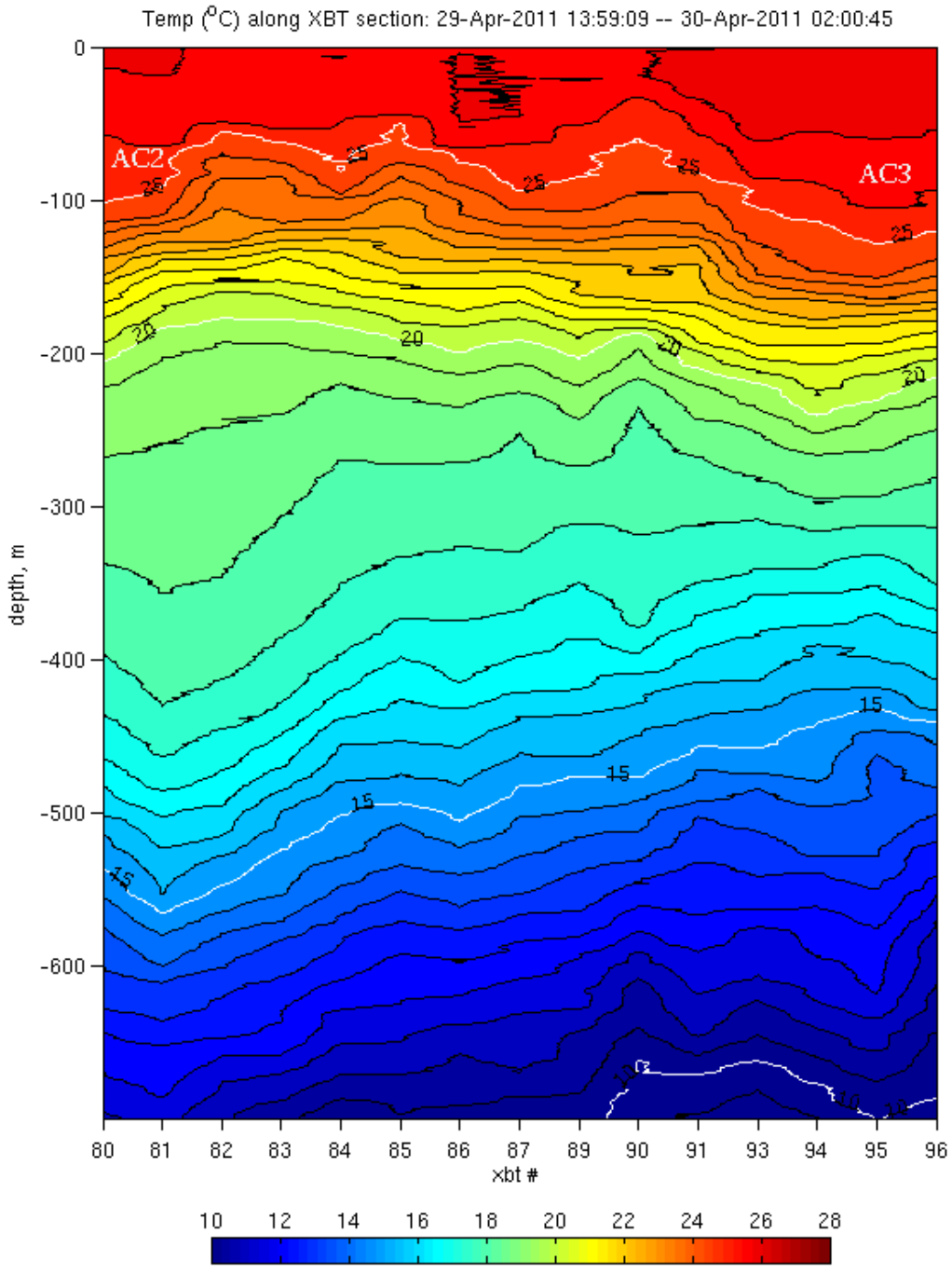
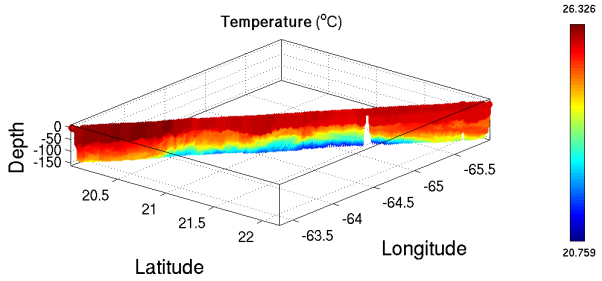


Figure 8. Alongtrack XBT section for VPR/XBT survey 3. See Figure 3a for trackline. Locations of anticyclones AC2 and AC3 are indicated.

(a)



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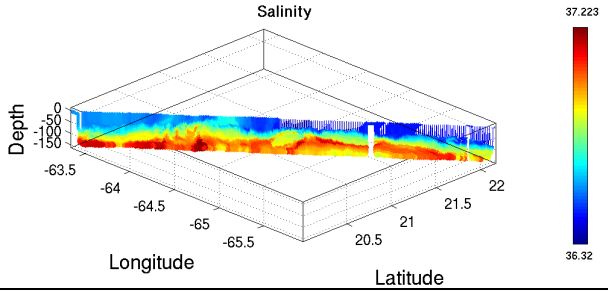

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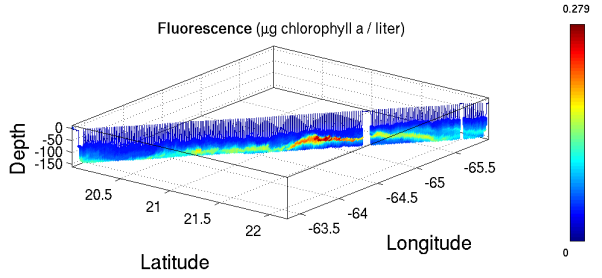

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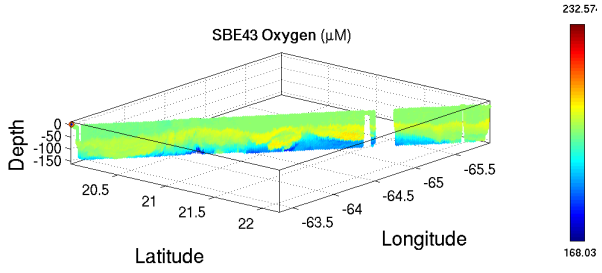
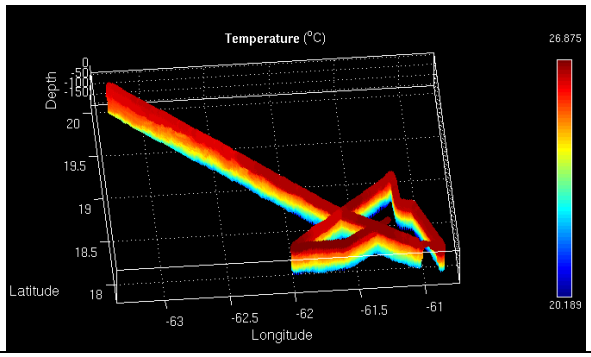


Figure 9. (a) Temperature, (b) salinity, (c) fluorescence, and (d) oxygen from VPR Survey 3.

(a)



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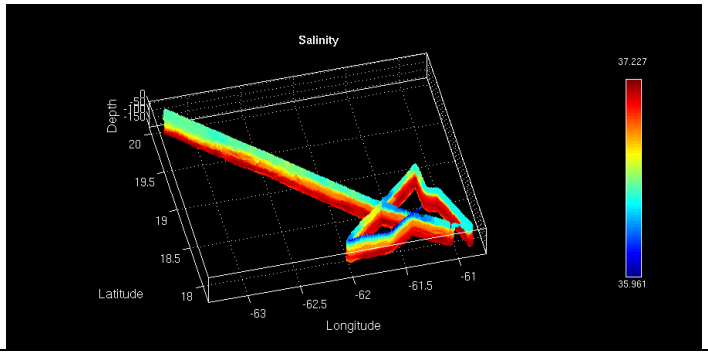

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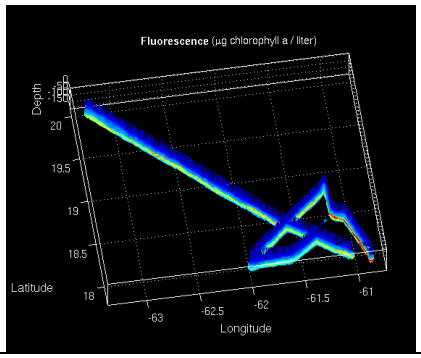

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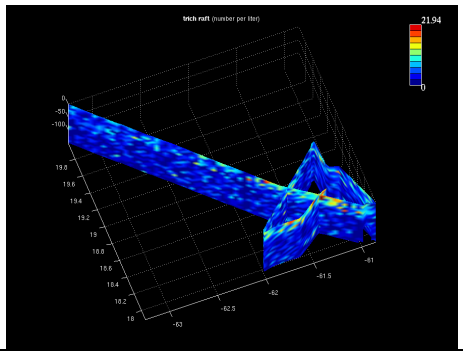


Figure 10. (a) Temperature, (b) salinity, (c) fluorescence, and (d) *Trichodesmium* rafts from VPR Survey 4/5.

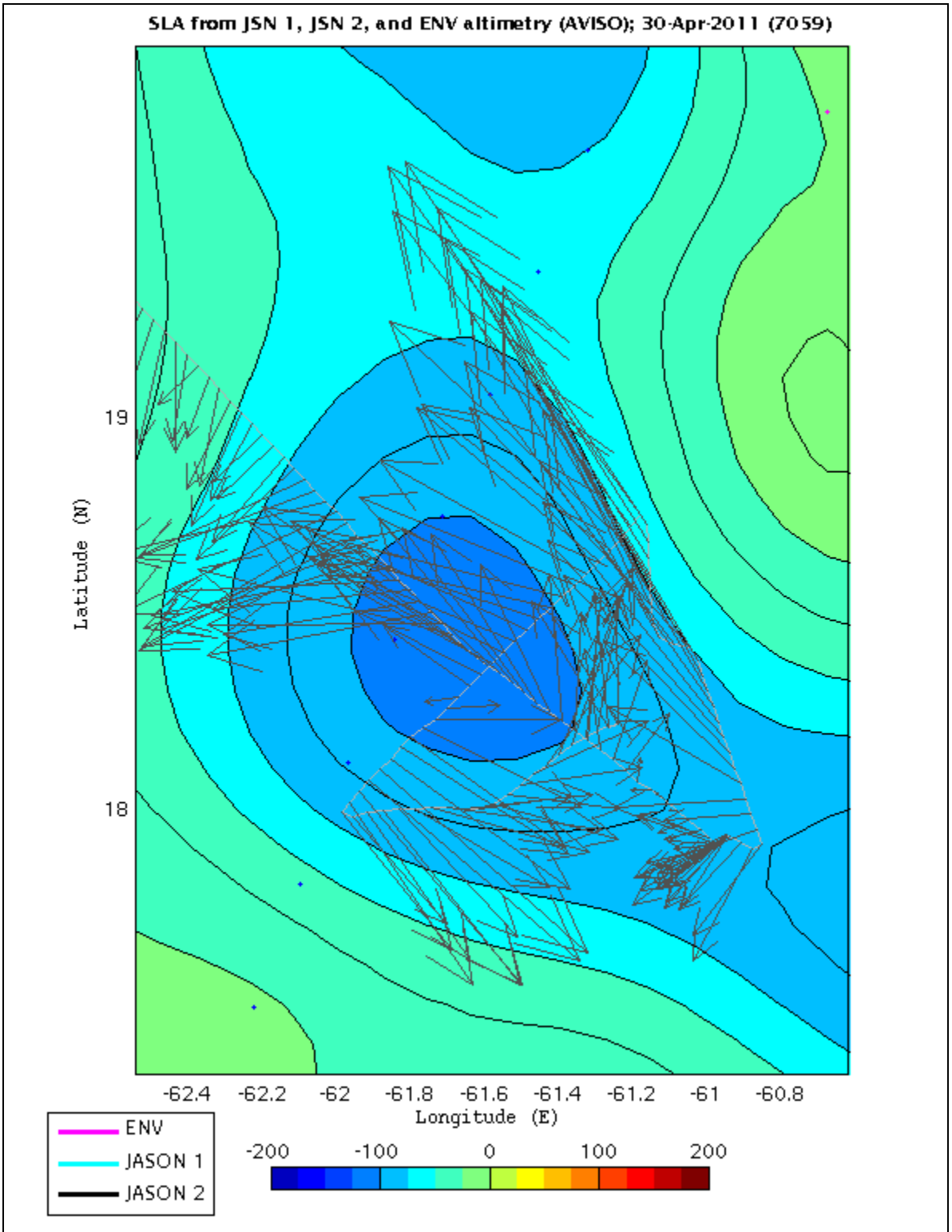


Figure 11: ADCP velocity vectors (averaged over the upper 240m) overlayed on sea level anomaly for April 30, 2011, illustrating the survey of cyclone C4.

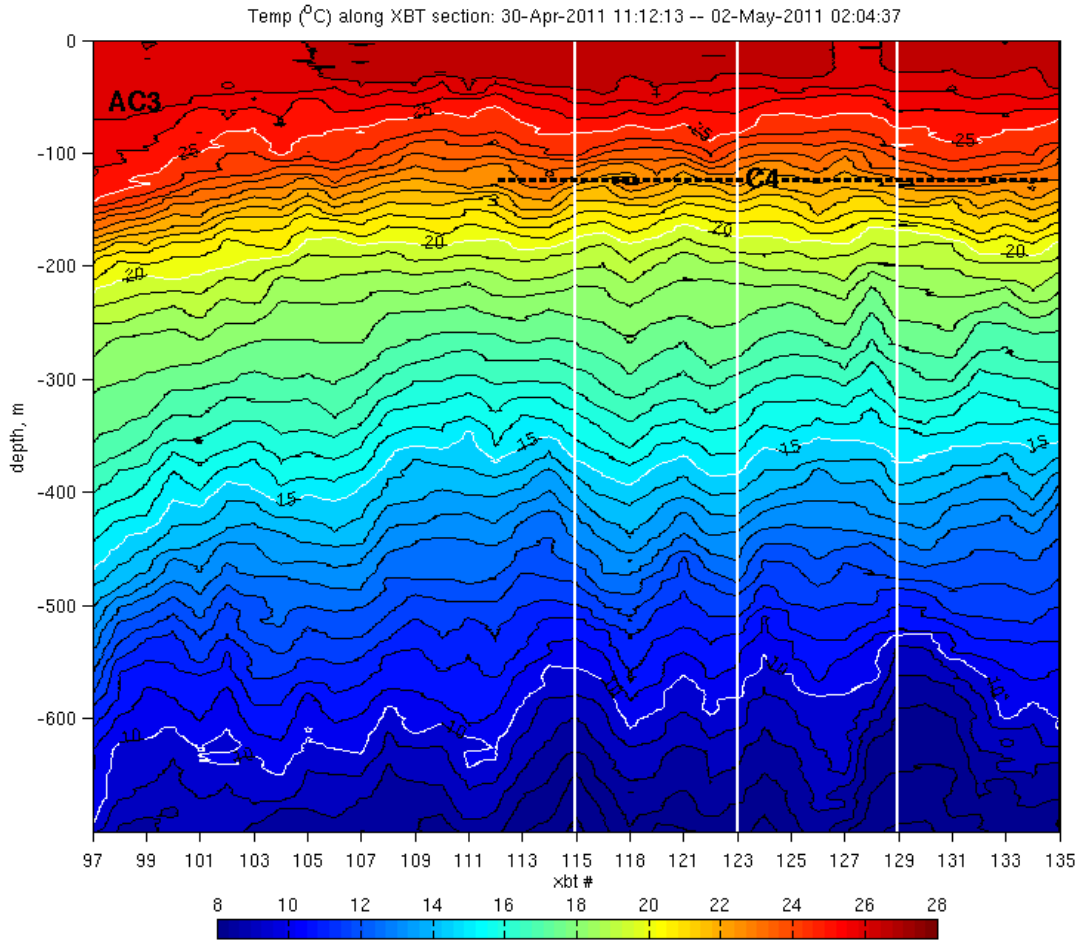
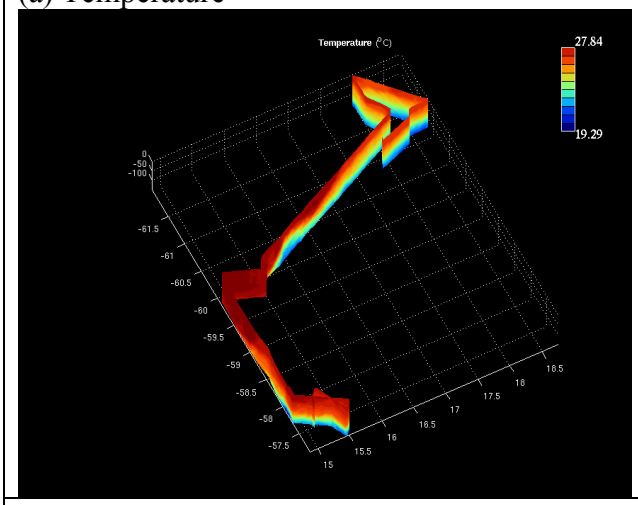
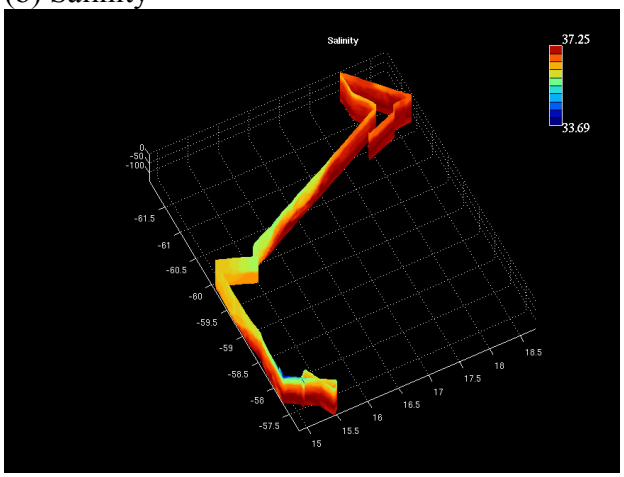


Figure 12. Alongtrack XBT section for VPR/XBT survey 4/5. See Figure 3b for trackline. Locations of features AC3 and C4 are indicated.

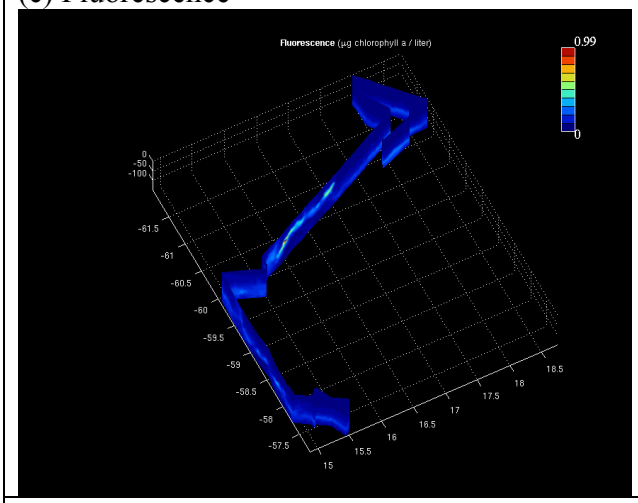
(a) Temperature



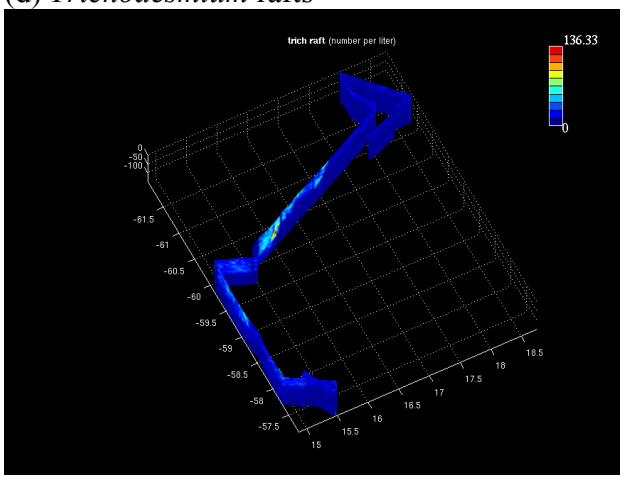
(b) Salinity



(c) Fluorescence



(d) *Trichodesmium* rafts



(e) *Trichodesmium* puffs

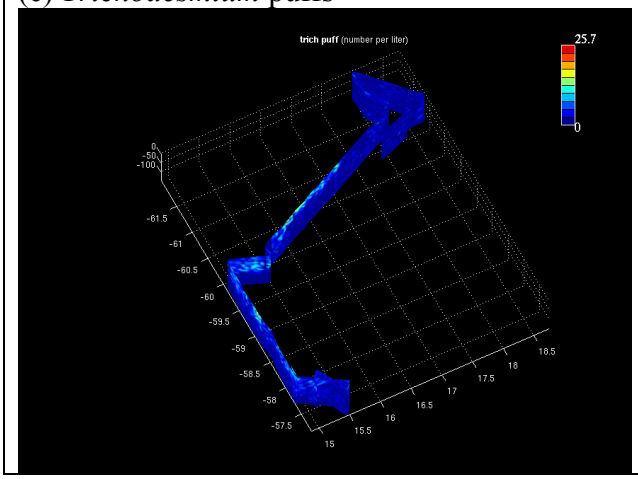


Figure 13. (a) Temperature, (b) salinity, (c) fluorescence, (d) *Trichodesmium* rafts, and (d) *Trichodesmium* puffs from VPR Surveys 5/6/7 sampling features C4, AC4, and C5. Note partial overlap with C4 survey presented in Figure 10.

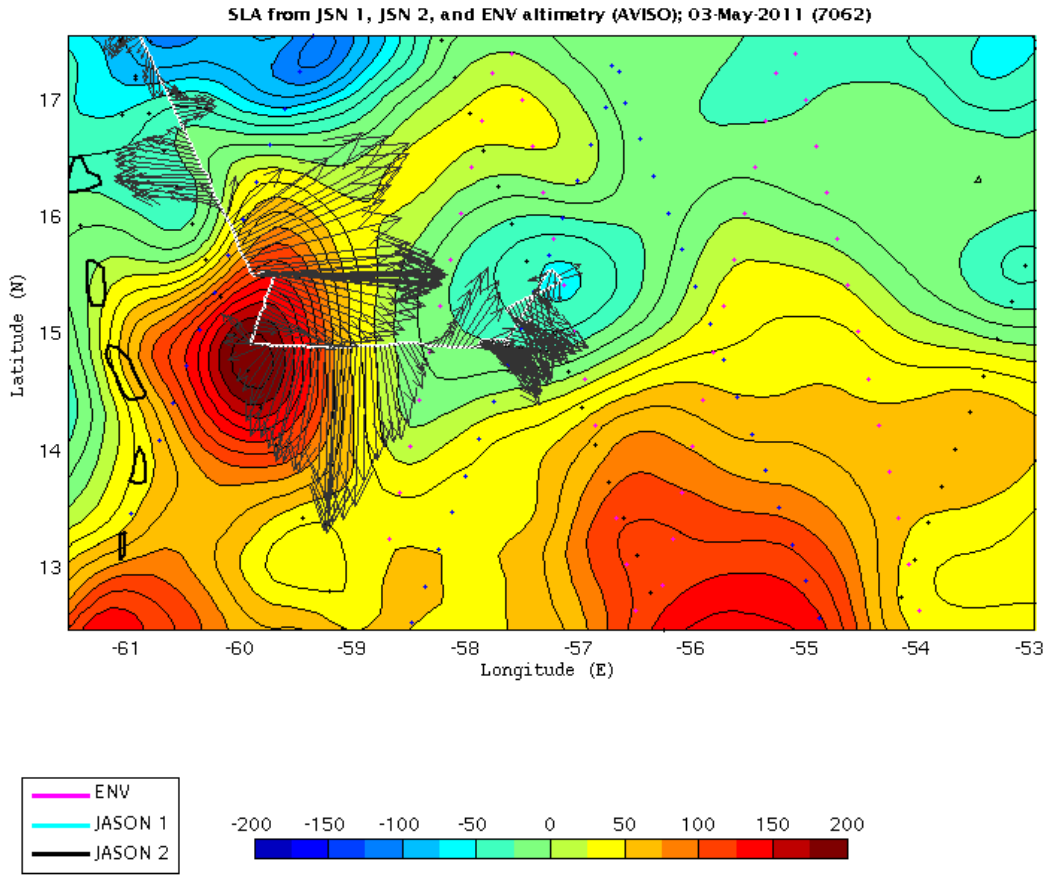


Figure 14. Zoom in of ADCP vectors overlayed on sea level anomaly for survey of AC4 and C5.

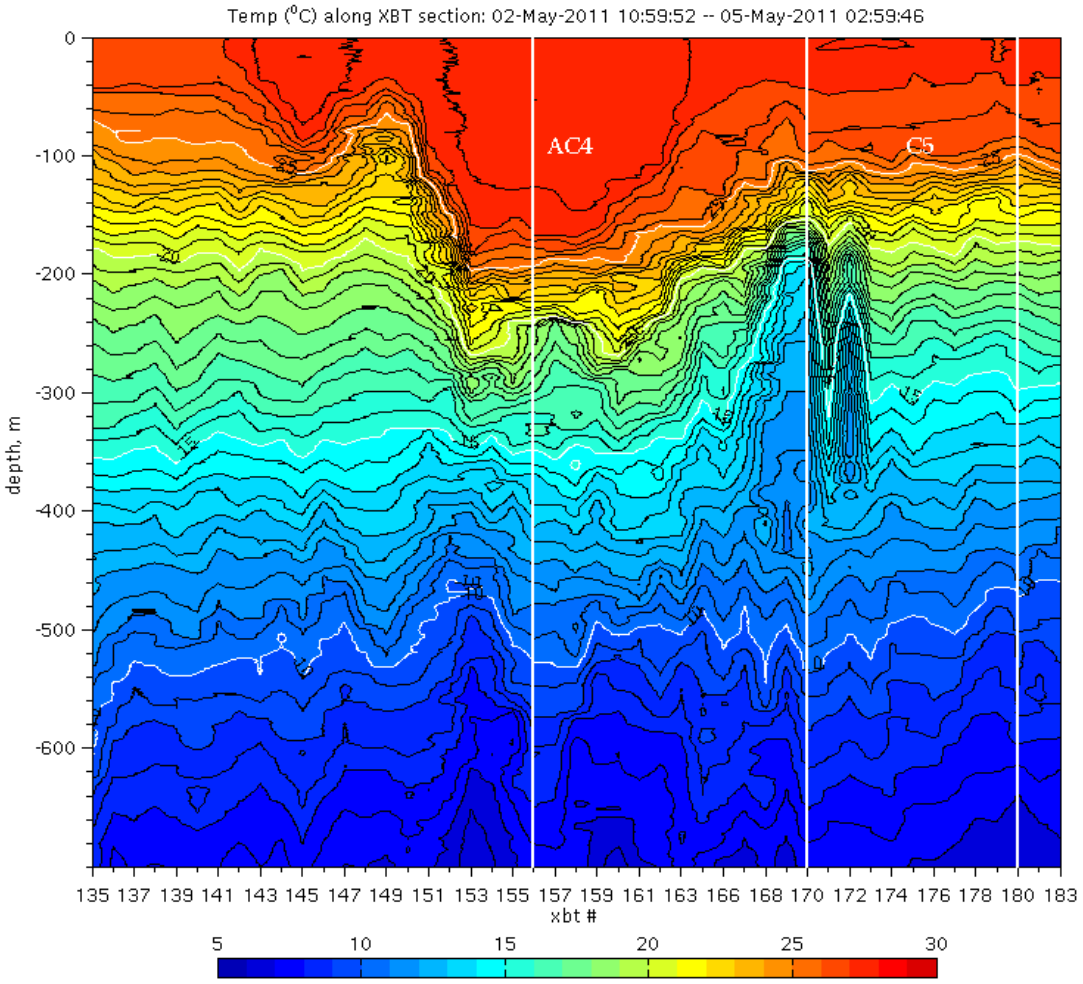
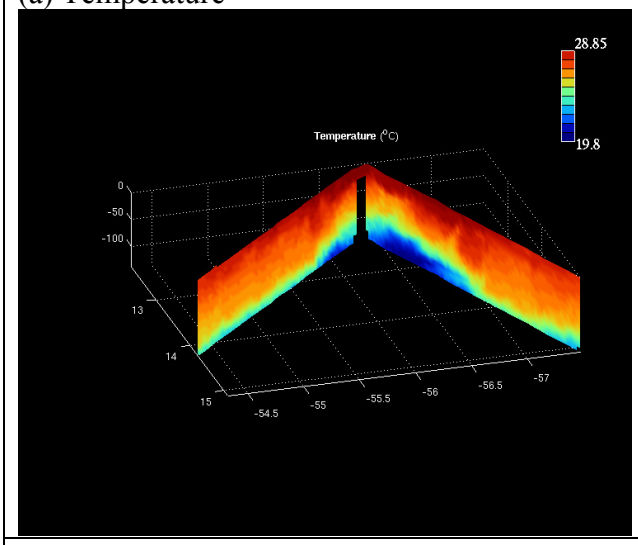
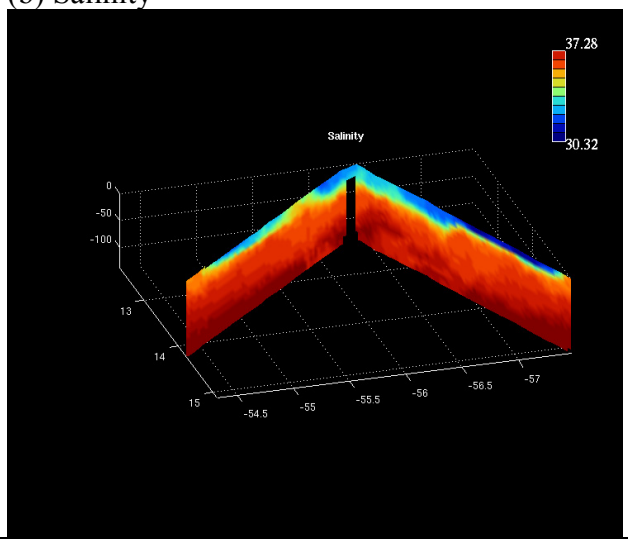


Figure 15. Alongtrack XBT section for VPR/XBT survey of C4, AC4, and C5. See Figure 3b for trackline. Locations of AC4 and C5 are indicated; C4 is at the far left (unlabeled).

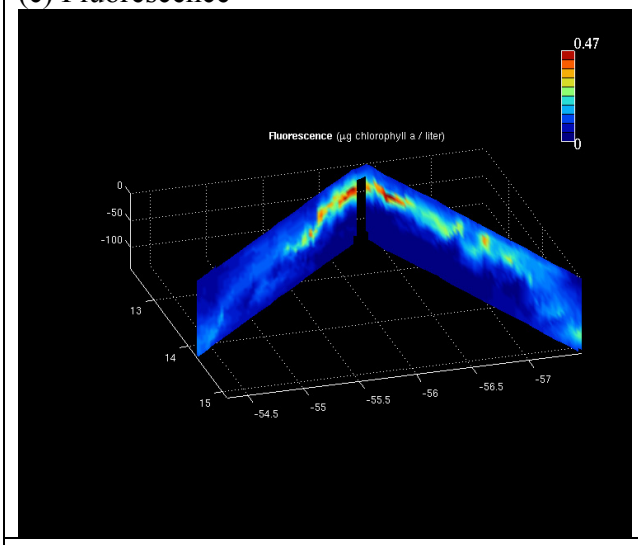
(a) Temperature



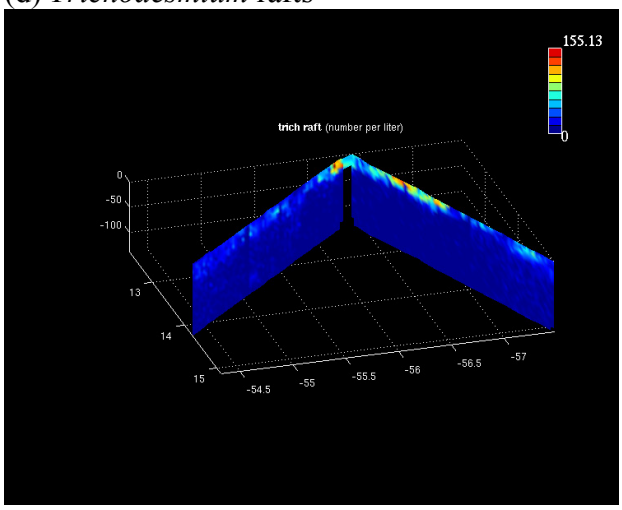
(b) Salinity



(c) Fluorescence



(d) *Trichodesmium* rafts



(e) *Trichodesmium* puffs

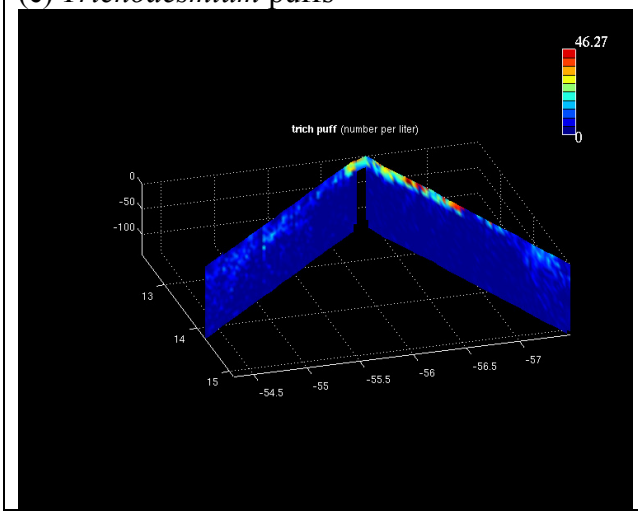


Figure 16. (a) Temperature, (b) salinity, (c) fluorescence, (d) *Trichodesmium* rafts, and (d) *Trichodesmium* puffs from VPR Surveys 9/10 sampling from C5 into the interior of AC5 and back out toward C6.

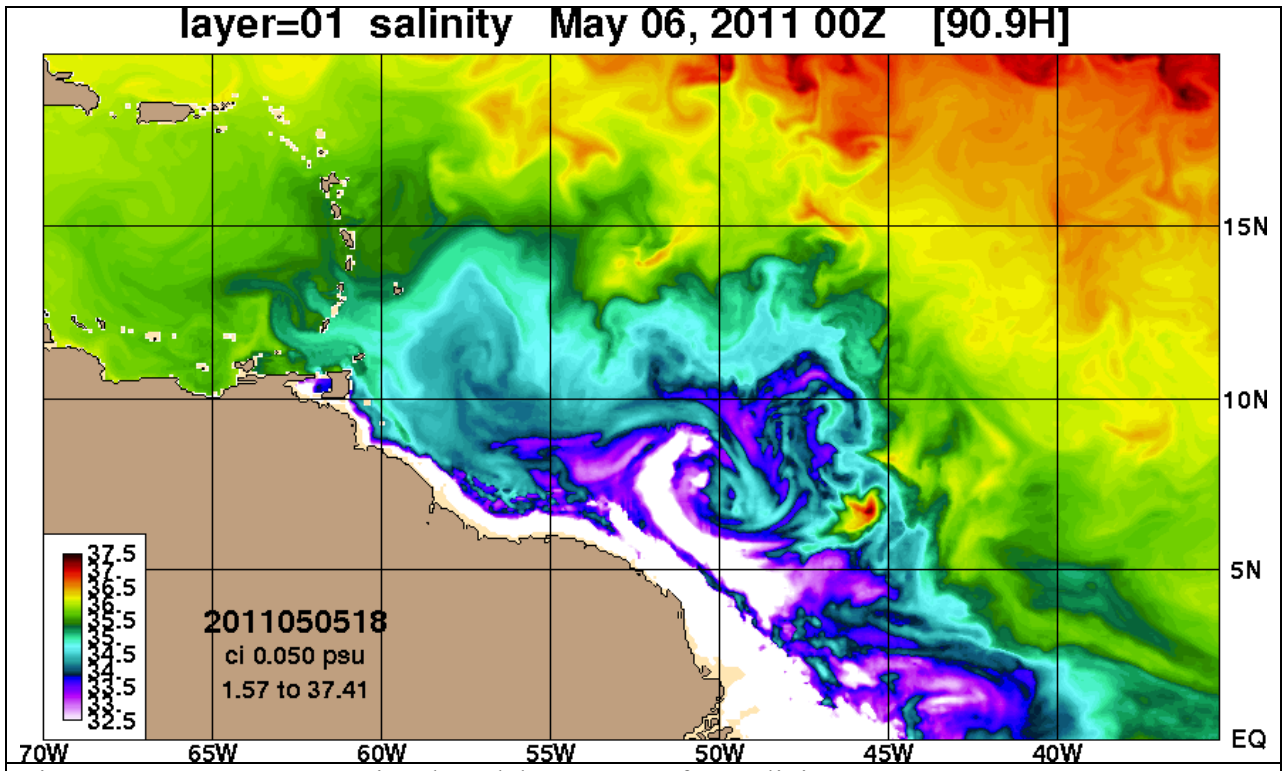
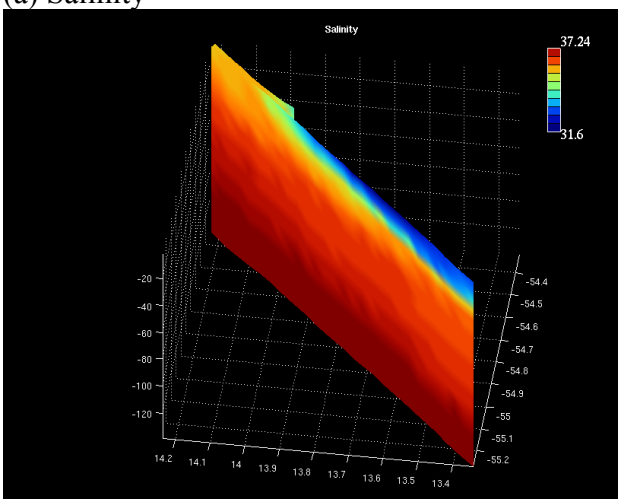
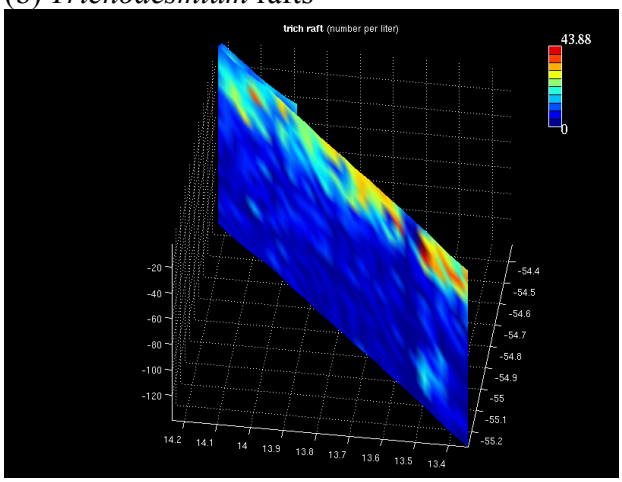


Figure 17. HYCOM operational model output: Surface salinity on May 6.

(a) Salinity



(b) *Trichodesmium* rafts



(e) *Trichodesmium* puffs

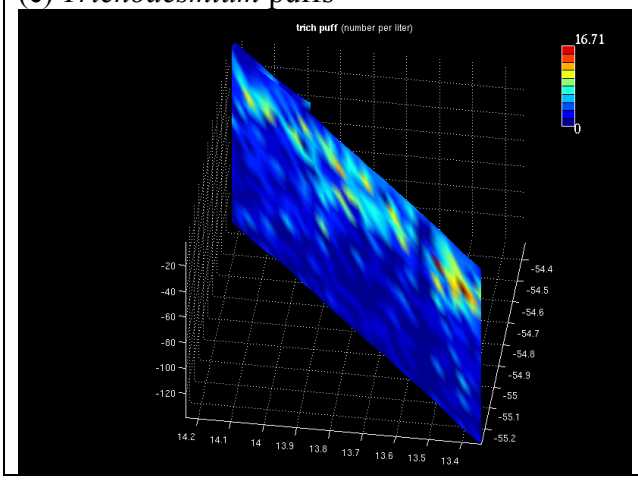


Figure 18. (a) Salinity, (b) *Trichodesmium* rafts, and (c) *Trichodesmium* puffs at the end of VPR Survey 10 exiting AC5 toward C6. Note the 180° at the northernmost point in the transect to facilitate sampling at the edge of the salinity front.

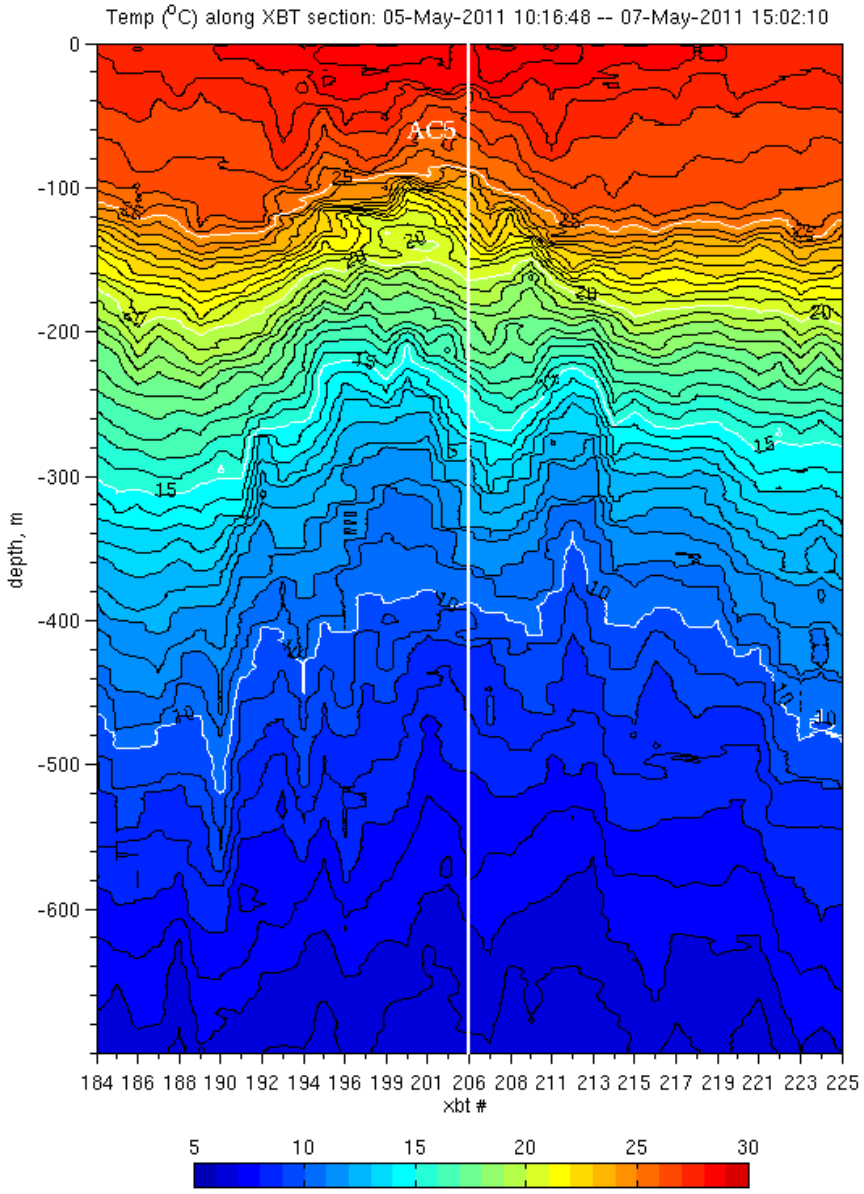
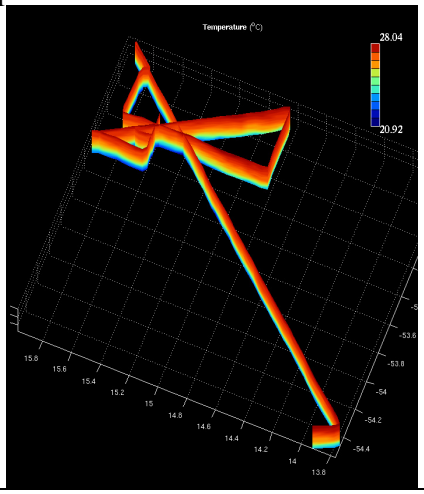
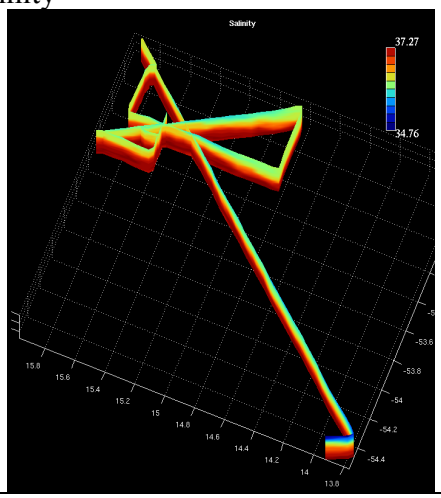


Figure 19. Alongtrack XBT section for VPR/XBT survey from C5 into AC5 and back out toward C6. See Figure 3b for trackline.

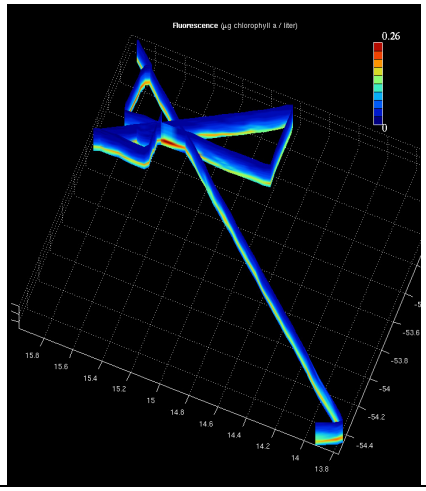
(a) Temperature



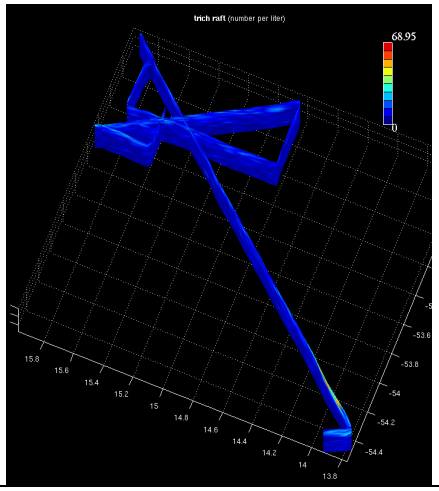
(b) Salinity



(c) Fluorescence



(d) *Trichodesmium* rafts



(e) *Trichodesmium* puffs

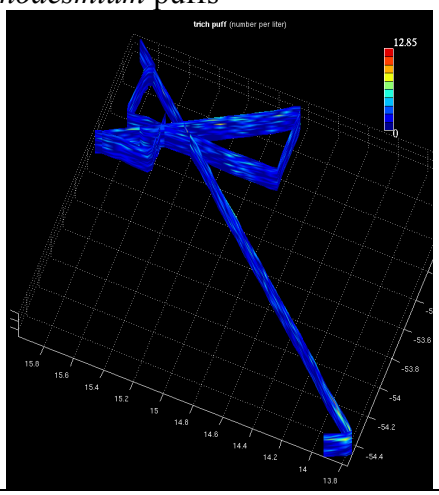


Figure 20. (a) Temperature, (b) salinity, (c) fluorescence, (d) *Trichodesmium* rafts, and (d) *Trichodesmium* puffs from VPR Surveys 11,12,13 (May 8-10) sampling cyclone C6.

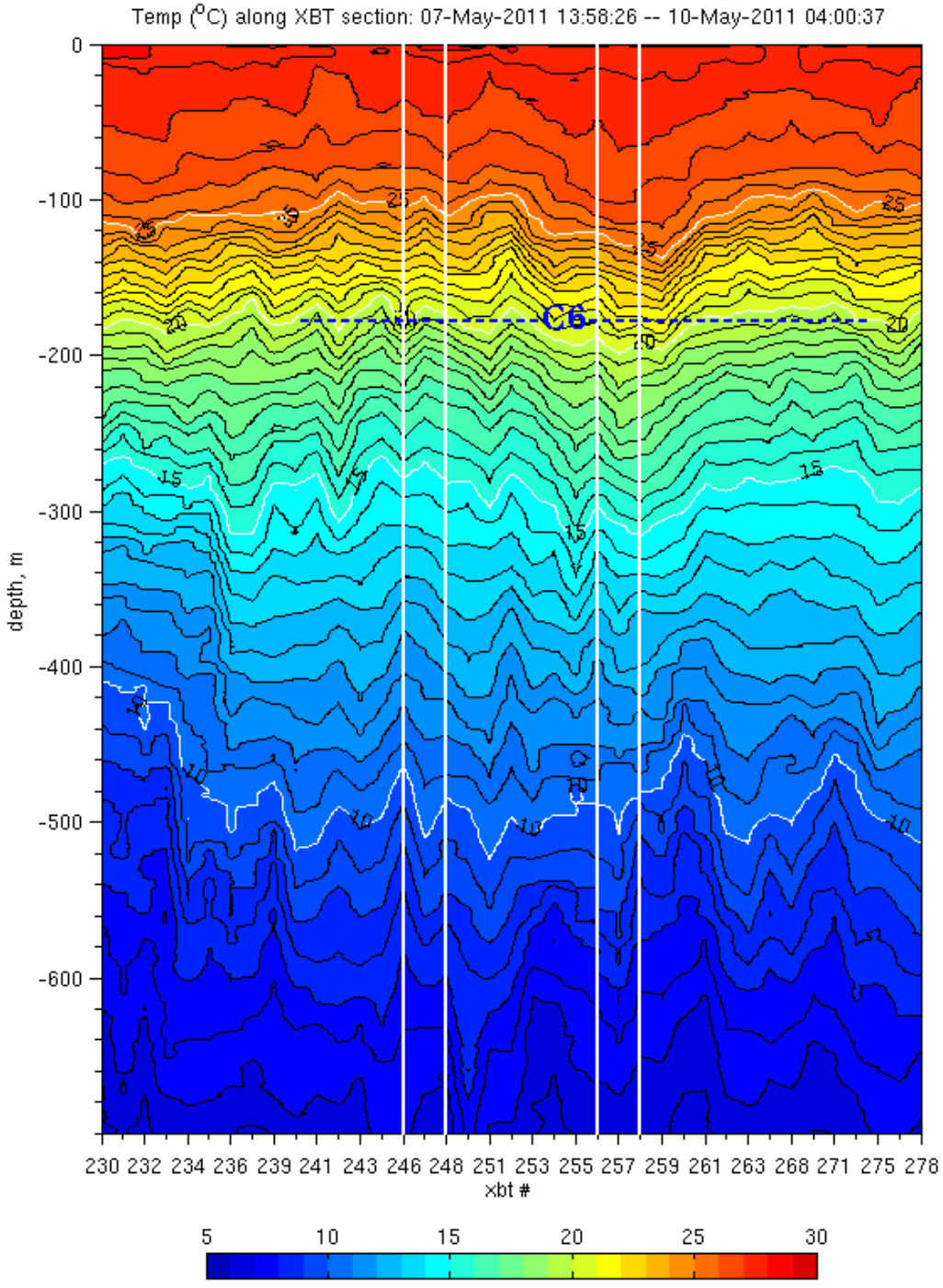
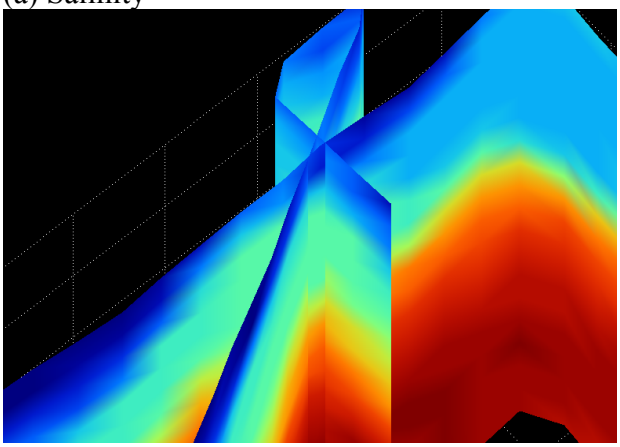
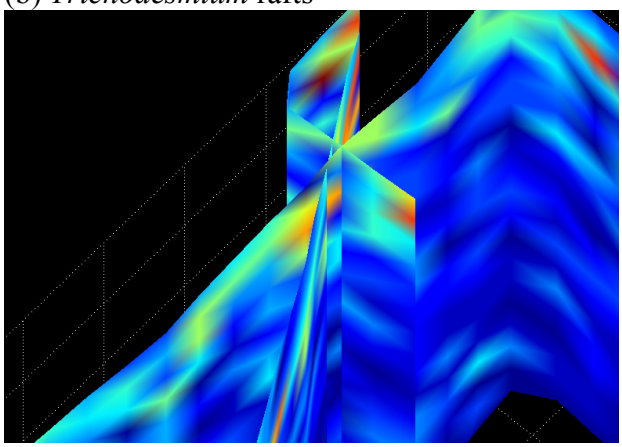


Figure 21. Alongtrack XBT section for VPR/XBT survey of cyclone C6. See Figure 3b for trackline.

(a) Salinity



(b) *Trichodesmium* rafts



(c) Surface MOCNESS sample from station 13.

Figure 22. (a) Salinity, and (b) *Trichodesmium* rafts at the end of VPR Survey 12 in cyclone C6. The near-surface sample from the MOCNESS tow at station 13 is shown in panel (c).

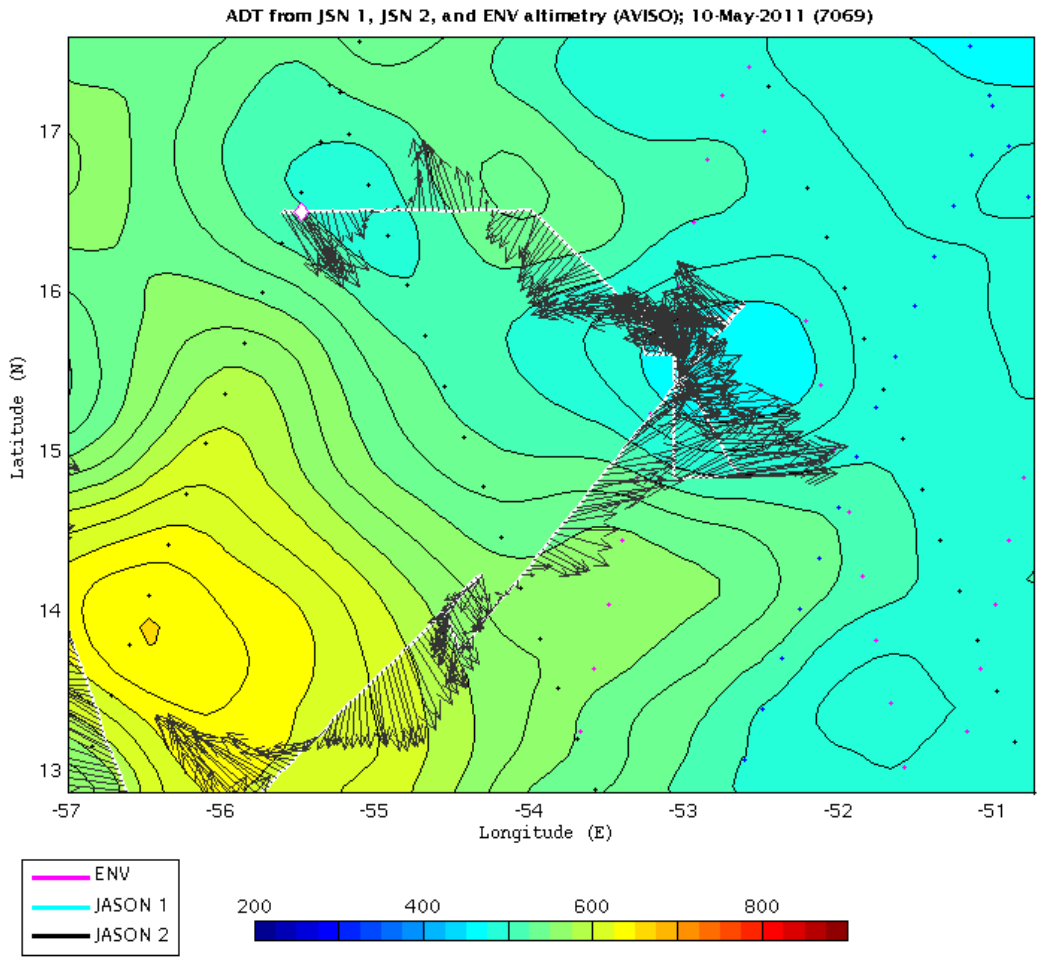
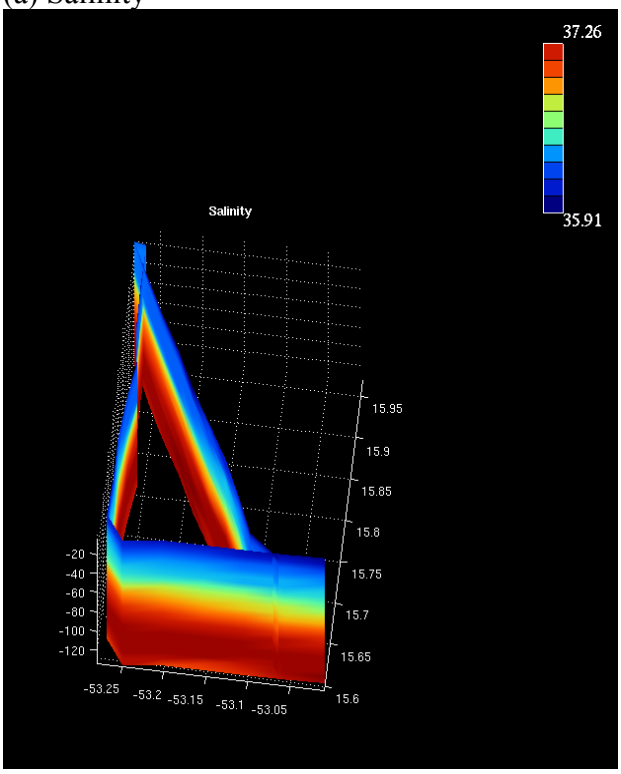
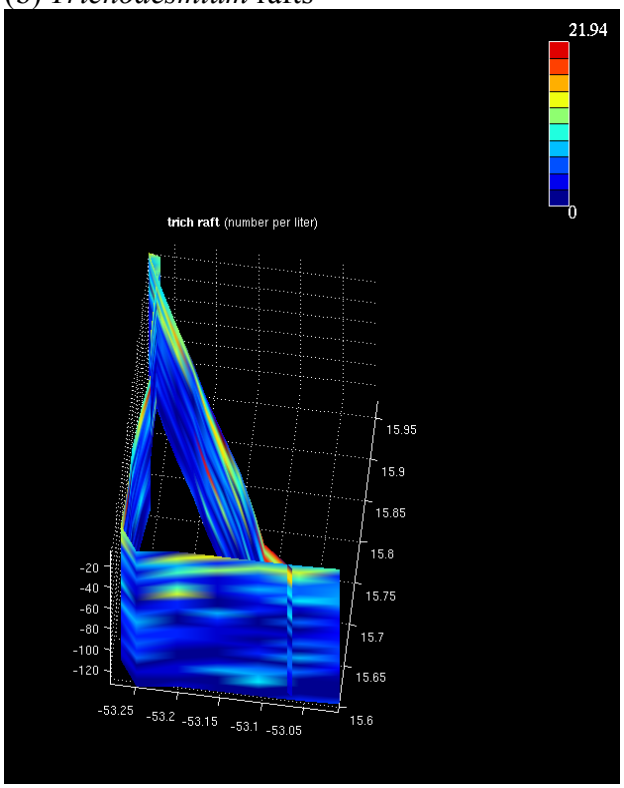


Figure 23. Zoom in of ADCP vectors overlayed on sea level anomaly for surveys of AC5, C6, and C7.

(a) Salinity



(b) *Trichodesmium* rafts



(c) *Trichodesmium* puffs

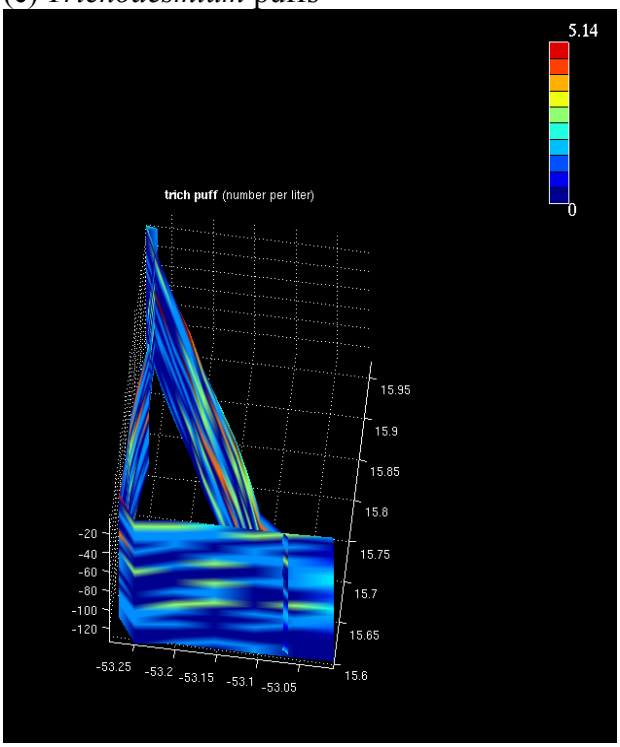
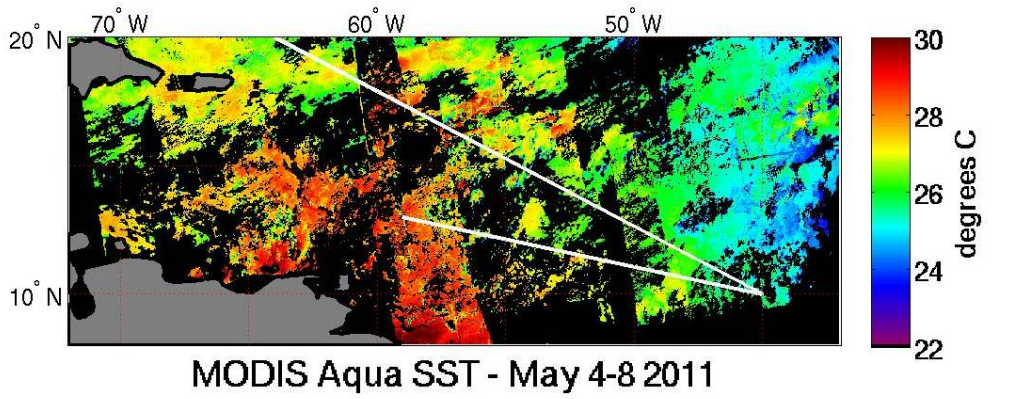
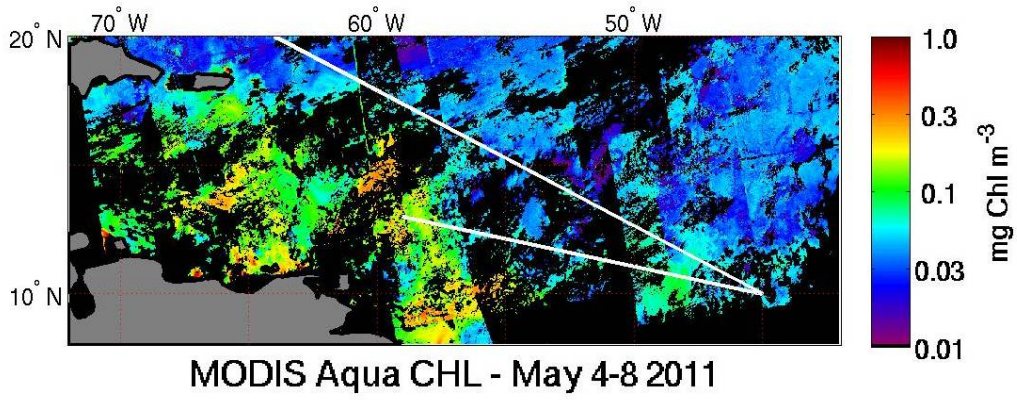


Figure 24. (a) Salinity, (b) *Trichodesmium* rafts, and (c) *Trichodesmium* puffs observed during VPR Survey 13 (May 10) in cyclone C6.





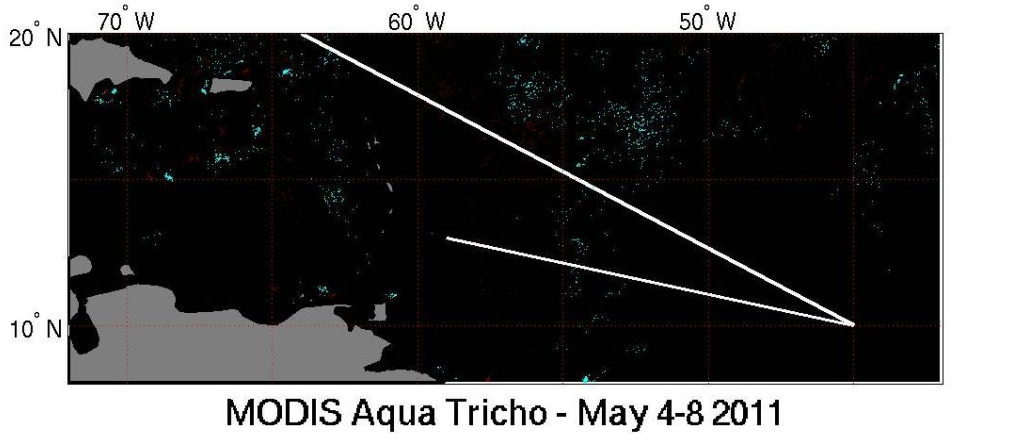
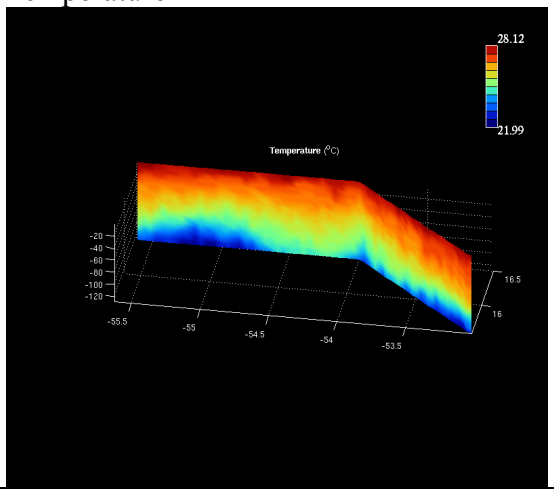
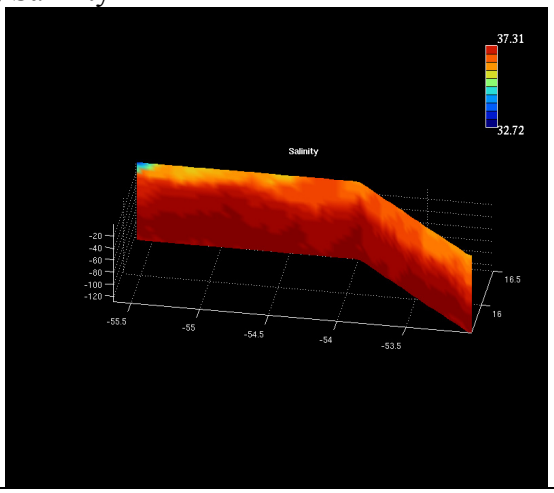


Figure 25. May 4-8 composite MODIS Aqua temperature, chlorophyll, and *Trichodesmium*, kindly provided by Toby Westberry, OSU.

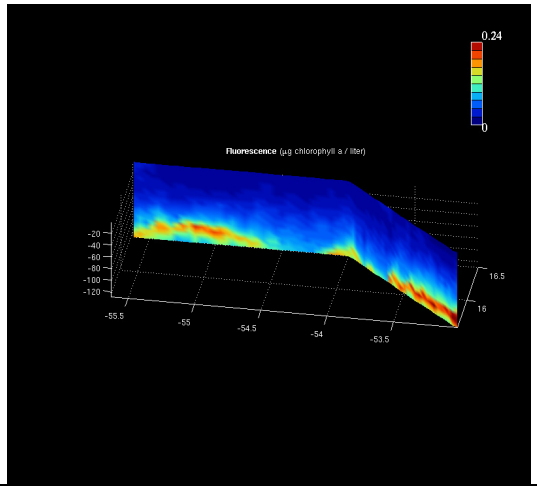
(a) Temperature



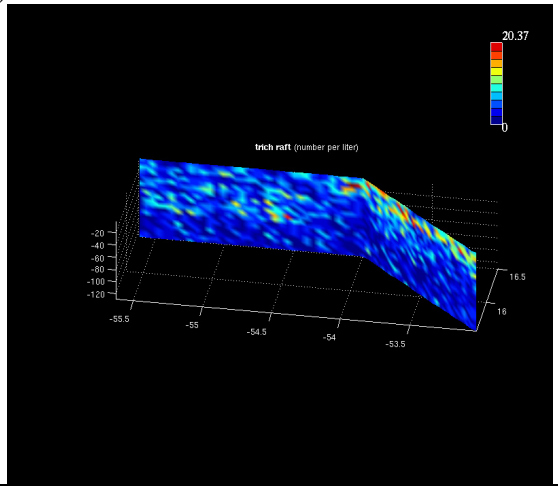
(b) Salinity



(c) Fluorescence



(d) *Trichodesmium* rafts



(e) *Trichodesmium* puffs

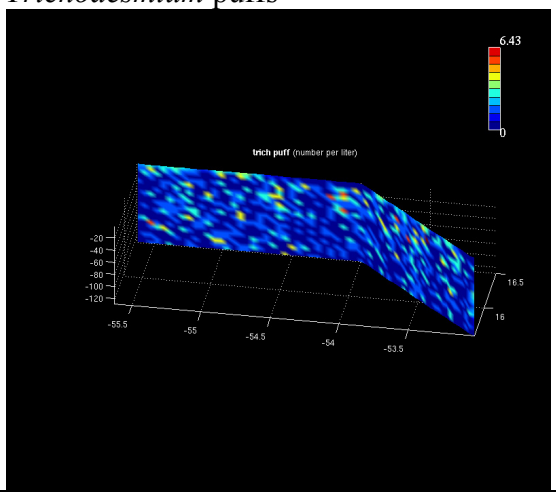


Figure 26. (a) Temperature, (b) salinity, (c) fluorescence, (d) *Trichodesmium* rafts, and (d) *Trichodesmium* puffs from VPR Surveys 14 and 15 (May 10-12) departing cyclone C6, sampling cyclone C7 and finishing at its western periphery.

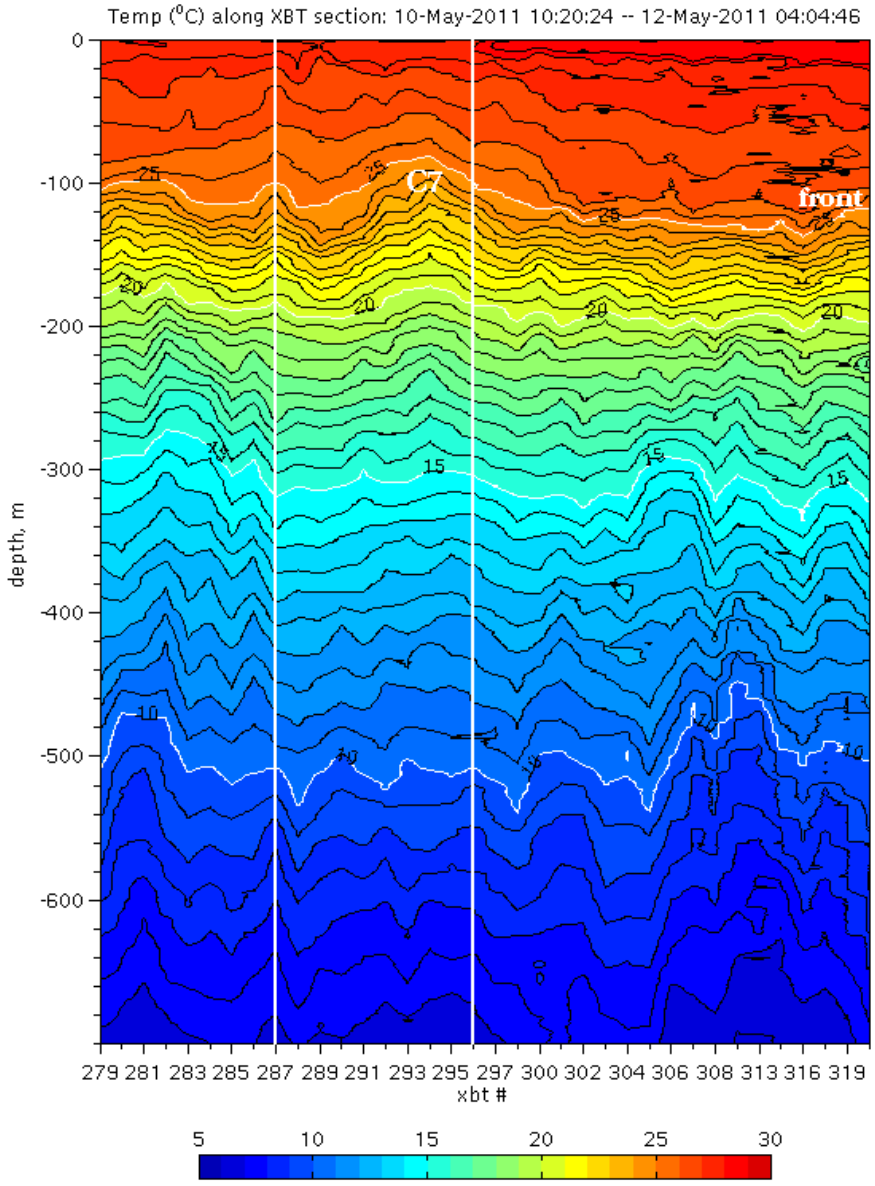
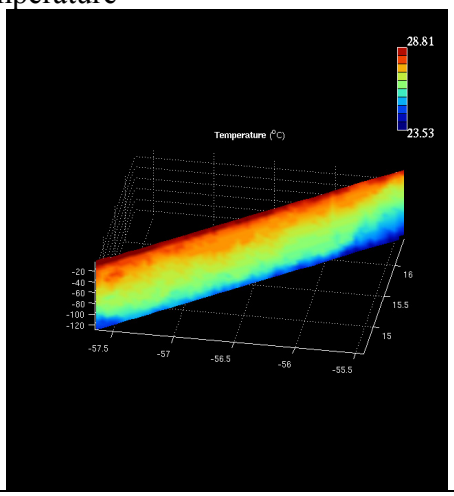
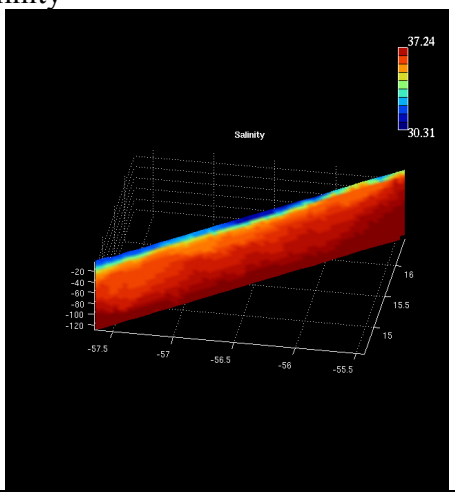


Figure 27. Alongtrack XBT section for VPR/XBT survey of cyclone C7 and the SW through a frontal region of low salinity water. Vertical white lines indicate turning points in the ship track. See Figure 3b for trackline.

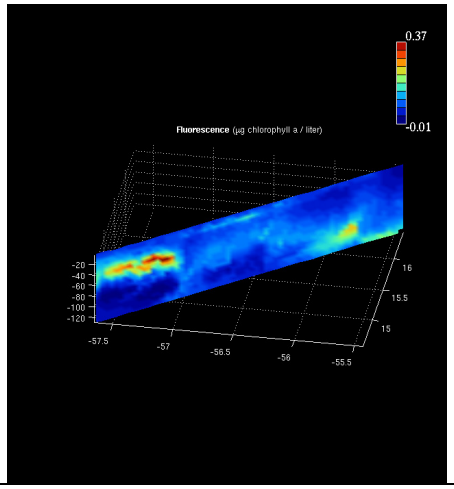
(a) Temperature



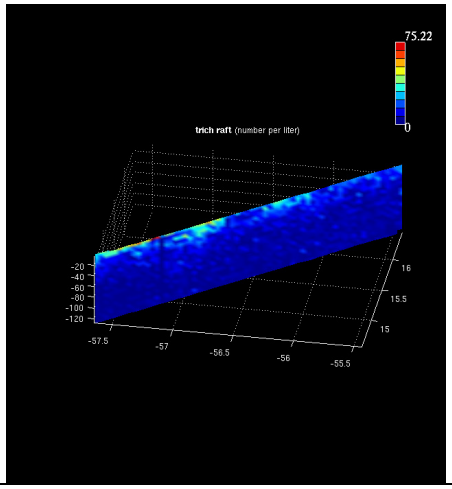
(b) Salinity



(c) Fluorescence



(d) *Trichodesmium* rafts



(e) *Trichodesmium* puffs

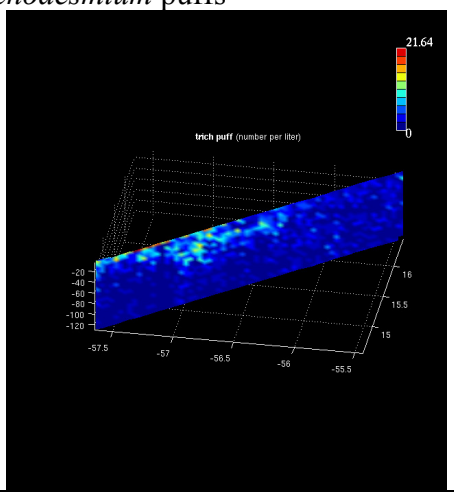


Figure 28. (a) Temperature, (b) salinity, (c) fluorescence, (d) *Trichodesmium* rafts, and (d) *Trichodesmium* puffs from VPR Survey 16 (May 11-12) departing cyclone C7 and finishing in a frontal region.

Appendix A. Cruise participants

1. Dennis McGillicuddy
2. Elise Olson
3. Larry Anderson
4. Valery Kosnyrev
5. Keston Smith
6. Sonya Dhyrman
7. John Waterbury
8. Abby Heithoff
9. Cabell Davis
10. Jamie Haley
11. Fred Marin
12. Josh Eaton
13. Zoe Sandwith
14. Meri Ratzel
15. Dan Brinkhuis

Appendix B. Typical station schedule

CTD operator: Larry
CTD launch/recovery: Dennis, Keston; Valery to tend cable
MOCNESS: Dennis console; John, Keston, Jaime on deck

0700 VPR Haulback begins

0845 CTD Cast 1
0-150 to assess ML depth, light environment; no bottles tripped

0930-1015 MOCNESS (two tows if necessary)

Target depths:
High light – 390, 210 μE
Low light - 15 μE or the depth of the subsurface Tricho max
Typical I_0 - 1200 μE

Deep sample: standard depth closest to low light target
organisms for incubation and nifH sample

Shallow sample: – standard depth closest to high light target
organisms for incubation and nifH sample

Sonya, Abby, Meri, Elise pick colonies

Second tow to be carried out if conditions warrant

1030 CTD Cast 2

Descend to 150m to rinse bottles
Upcast: trip bottles at standard depths 80m and above
water for microscopy and PCR
John to process Niskins; ca. 30 min required for gravity filtration

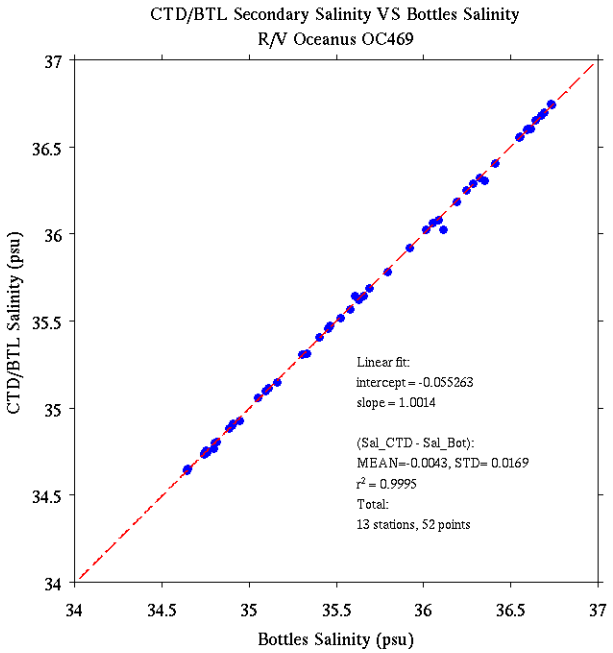
Turnaround of holocam/VPR: Cabell/Fred

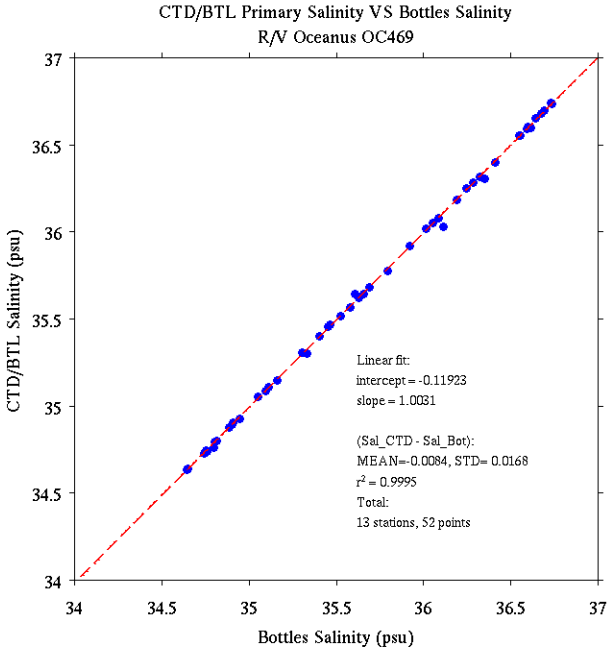
1130 CTD Cast 3
700m hydrocast; oxygen triple isotope, nutrients, chl, alk phosphatase, etc.
Zoe samples first, then Elise + Meri: Chl alk phosphatase

Appendix C. Table of station numbers and CTD casts

Date	Station Number	Feature	CTD casts
4/26/11	1	BATS; C1	1
4/28/11	2	C2/C3	2,3,4
4/29/11	3	AC2	5,6,7
4/30/11	4	AC3	8,9,10
5/1/11	5	C4	11,12,13
5/2/11	6	C4	14,15,16
5/3/11	7	AC4; plume	17,18,19
5/4/11	8	Salinity front	20,21,22
5/5/11	9	C5	23,24,25
5/6/11	10	AC5	26,27,28
5/7/11	11	front	29,30,31
5/8/11	12	C6	32,33,34
5/9/11	13	C6	35,36,37
5/10/11	14	C6	38,39,40
5/11/11	15	C7 periphery	41,42,43
5/12/11	16	front	44,45,46

Appendix D. Salinity calibrations and CTD profiles. Note these are placeholders from OC469, will be replaced with OC471 salts are run.





Appendix E. MOCNESS tow log

Date	Tow	Bat V	Net 0	Net 1	Net 2	Net 3	Info
4/26/11	001	20.7 – 20.6	0-60m	60m, 5min 186m^{-3}	60-5m	5m, 5 min 238m^{-3}	BATS; low biomass shallow and deep
4/28/11	002	20.6 – 20.5	0-60m	60m, 20min 860m^{-3}	60-15m	15m, 10 min 485 m^{-3}	Between C2 and C3; high biomass shallow, low biomass deep
4/29/11	003	20.6 – 20.5	0-70m	70m, 20min 973 m^{-3}	70-10m	10m, 10 min 587m^{-3}	Inside AC2; Ample Tricho shallow and deep, but some colony damage
4/30/11	004	20.5 – 20.4	0-50m	50m, 20 min 584 m^{-3}	50-10m	10m, 10min 349 m^{-3}	Inside AC3; lots of biomass; good enough to try a replicate MOC tow
4/30/11	005	20.4 – 20.3	0-50m	50m, 15 min 487 m^{-3}	50-10m	10m, 5min 98 m^{-3}	Biggest deep biomass thus far
5/1/11	006	20.4 – 20.3	0-50m	50m, 20 min 766 m^{-3}	50-10m	10m, 10 min 279 m^{-3}	C4 periphery; lots of biomass shallow, not as much deep
5/1/11	007	20.3 – 20.2	0-50m	50m, 15 min 597 m^{-3}	50-10m	10m, 5 min 132 m^{-3}	same
5/2/11	008	20.4 – 20.3	0-40m	40m, 20 min 579 m^{-3}	40 – 5m	5m, 10 min 262 m^{-3}	C4 adaptive
5/2/11	009	20.3 – 20.2	0-40m	40m, 15 min 443 m^{-3}	40 – 5m	5m, 5 min 169 m^{-3}	C4 adaptive
5/3/11	010	20.4 – 20.3	0-40m	40m, 10 min 208 m^{-3}	40 – 5m	5m, 5 min 106 m^{-3}	AC4 periphery; plume; small colonies
5/3/11	011	20.3 – 20.2	0-40m	40m, 10 min 228 m^{-3}	40 – 5m	5m, 5 min 145 m^{-3}	AC4 periphery; plume; small colonies
5/4/11	012	20.4 – 20.3	0-40m	40m, 20 min 350 m^{-3}	40 – 5m	5 m, 10 min 222 m^{-3}	Salinity front E of AC4; small colonies, lots of copepods
5/4/11	013	20.2 – 20.2	0-40m	40m, 15 min 432 m^{-3}	40 – 5m	5m, 5 min 112 m^{-3}	same
5/5/11	014	20.3 – 20.2	0-35m	28m, 20min ----	28 – 5m	5m, 10min ----	C5 patch; very high biomass, second tow not necessary; flow meter stopped spinning, replaced with spare
5/6/11	015	20.0 – 20.2	0-40 (5min)-20	20m, 20min 365 m^{-3}	20 – 5m	5m, 10min 352 m^{-3}	AC5
5/7/11	016	20.3 – 20.2	0-40	40m, 20min 580 m^{-3}	40 – 5m	5m, 10min 299 m^{-3}	Frontal region on periphery of AC5
5/8/11	017	20.2-20.1	0-40	40m, 20min 582 m^{-3}	40 – 5m	5m, 10min 291 m^{-3}	N side of C6
5/8/11	018	20.1 – 20.1	0-40	40m, 10min 343 m^{-3}	40 – 5m	5m, 5min 161 m^{-3}	same
5/9/11	019	20.2 – 20.1	0-40-37	37m, 20min 633 m^{-3}	37 – 5m	5m, 10min 333 m^{-3}	Center of C6
5/10/11	020	20.2 – 20.0	0-40	40, 20min N/A Best est avg of 17,19	40 -5m	5m, 10 min N/A Best est avg 17,19	Center of C6; initial deployment recovered (missing shackle pin), log file lost
5/11/11	021	20.1 – 20.0	0-40	40, 20 min 663 m^{-3}	40 – 5m	5m, 10min 356 m^{-3}	W edge of C7
5/12/11	022	20.1 –	0-25	25, 20 min	25-5m	5m, 10min	Front in green water

		20.0		663 m^{-3}		446 m^{-3}	
5/12/11	023	20.0 – 19.9	0-25	25, 15min 295 m^{-3}	25-5m	5m, 5min 167 m^{-3}	same

Tow: OC471001 OC471
Date: 26 April 2011
Temperature Probe # 535 Conductivity Probe # 120 Pressure Probe # 124
Flow Meter Calibration 6.41 (m/count)
MOCNESS STATISTICAL SUMMARY

net#	pmin	pmax	pavg	tmin	tmax	tavg	thmin	thmax	thavg	smin	smax	savg
0	-005.2	-002.7	-003.9	22.7	24.6	23.7	22.7	24.6	23.7	00.01	00.02	00.02
1	-002.6	060.1	018.4	18.6	26.8	21.7	18.6	26.8	21.7	00.01	37.08	24.44
2	058.2	060.1	059.1	18.6	18.7	18.7	18.6	18.7	18.7	36.58	36.60	36.59
3	005.1	059.0	032.2	18.7	21.0	19.6	18.7	21.0	19.6	36.56	36.67	36.61
4	001.2	005.8	004.9	20.8	21.2	21.1	20.8	21.2	21.1	36.61	36.82	36.68

net#	simin	simax	siavg	cmin	cmax	cavg	fmin	fmax	favg	oxmin	oxmax	oxavg
0	-02.85	-02.39	-02.61	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
1	-03.42	26.35	16.36	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
2	26.32	26.34	26.33	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
3	25.71	26.33	26.10	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
4	25.69	25.92	25.75	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0

net#	amin	amax	aavg	spmin	spmax	spavg	armin	armax	aravg	#obs	vol
0	00.0	00.0	00.0	00.0	00.4	00.2	-03.3	09.8	03.0	00016	00012
1	00.0	20.0	02.5	00.0	03.1	00.3	-13.0	00.6	-06.4	00146	00192
2	00.0	05.0	01.1	00.0	00.8	00.3	-02.7	01.9	00.0	00152	00186
3	00.0	10.0	04.0	00.4	01.2	00.8	-01.0	13.4	09.2	00086	00250
4	00.0	12.0	05.6	00.4	01.2	00.8	-01.8	07.4	00.7	00079	00238

net#	Yearday/Time (NetOpenTime)	hh:mm:ss	pmin	pmax	pavg	#obs	vol
0	116.560417	13:26:59	-005.2	-002.7	-003.9	00016	00012
1	116.561227	13:28:9	-002.6	060.1	018.4	00146	00192
2	116.568056	13:37:59	058.2	060.1	059.1	00152	00186
3	116.575162	13:48:14	005.1	059.0	032.2	00086	00250
4	116.579213	13:54:3	001.2	005.8	004.9	00079	00238
5	116.582928	13:59:25					

Tow: OC471002 OC471
Date: 28 April 2011
Temperature Probe # 535 Conductivity Probe # 120 Pressure Probe # 124
Flow Meter Calibration 6.41 (m/count)
MOCNESS STATISTICAL SUMMARY

net#	pmin	pmax	pavg	tmin	tmax	tavg	thmin	thmax	thavg	smin	smax	savg
0	-005.9	-002.6	-003.9	24.8	26.1	25.6	24.8	26.1	25.6	00.01	50.00	06.83
1	-002.4	060.8	017.3	22.8	25.6	24.4	22.8	25.6	24.4	00.01	50.00	24.91
2	058.1	063.2	061.0	22.7	22.8	22.7	22.7	22.8	22.7	36.83	36.85	36.84
3	014.3	062.5	034.8	22.7	24.5	23.9	22.7	24.5	23.9	36.65	36.84	36.76
4	001.9	016.0	013.8	24.5	24.5	24.5	24.5	24.5	24.5	36.72	36.73	36.72

net#	simin	simax	siavg	cmin	cmax	cavg	fmin	fmax	favg	oxmin	oxmax	oxavg
0	-03.23	34.56	02.02	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
1	-03.10	34.74	15.96	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
2	25.38	25.43	25.41	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
3	24.78	25.41	25.02	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
4	24.79	24.80	24.80	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0

net#	amin	amax	aavg	spmin	spmax	spavg	armin	armax	aravg	#obs	vol
0	00.0	00.0	00.0	00.0	00.4	00.1	-03.3	11.0	02.0	00022	00012
1	00.0	28.0	08.3	00.0	09.0	01.0	-22.9	00.4	-09.5	00099	00384
2	00.0	33.0	09.4	00.0	01.6	00.8	-04.7	05.8	-00.1	00302	00860
3	00.0	22.0	08.5	00.4	01.6	01.0	-01.6	15.5	08.0	00088	00302
4	00.0	24.0	08.2	00.4	01.2	00.9	-02.5	11.4	01.2	00160	00485

net#	Yearday/Time (NetOpenTime)	hh:mm:ss	pmin	pmax	pavg	#obs	vol
0	118.394699	9:28:21	-005.9	-002.6	-003.9	00022	00012
1	118.395822	9:29:59	-002.4	060.8	017.3	00099	00384
2	118.400475	9:36:41	058.1	063.2	061.0	00302	00860
3	118.414549	9:56:56	014.3	062.5	034.8	00088	00302
4	118.418681	10:2:53	001.9	016.0	013.8	00160	00485
5	118.426169	10:13:41					

Tow: OC471003 OC471
Date: 29 April 2011
Temperature Probe # 535 Conductivity Probe # 120 Pressure Probe # 124
Flow Meter Calibration 6.41 (m/count)
MOCNESS STATISTICAL SUMMARY

net#	pmin	pmax	pavg	tmin	tmax	tavg	thmin	thmax	thavg	smin	smax	savg
0	-005.6	-001.9	-003.2	26.9	28.0	27.6	26.9	28.0	27.6	00.01	50.00	01.12
1	-002.2	070.5	020.8	25.1	27.9	26.1	25.0	27.9	26.1	00.01	36.46	25.47
2	066.0	074.2	069.1	25.0	25.1	25.0	25.0	25.1	25.0	36.37	36.39	36.37
3	009.9	070.2	040.2	25.0	25.8	25.5	25.0	25.8	25.5	36.28	36.39	36.38
4	003.2	011.6	009.9	25.8	25.8	25.8	25.8	25.8	25.8	36.38	36.39	36.39

net#	simin	simax	siavg	cmin	cmax	cavg	fmin	fmax	favg	oxmin	oxmax	oxavg
0	-03.74	33.78	-02.81	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
1	-03.71	24.39	15.88	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
2	24.36	24.39	24.38	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
3	24.09	24.38	24.22	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
4	24.15	24.16	24.15	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0

net#	amin	amax	aavg	spmin	spmax	spavg	armin	armax	aravg	#obs	vol
0	00.0	00.0	00.0	00.0	00.8	00.1	-03.1	10.6	00.7	00045	00026
1	00.0	51.0	09.8	00.0	07.4	01.0	-23.1	01.6	-09.6	00112	00448
2	00.0	76.0	12.4	00.4	01.9	01.0	-06.6	08.1	00.0	00302	00973
3	00.0	84.0	09.2	00.8	01.9	01.1	-03.1	17.6	09.6	00091	00321
4	01.0	42.0	14.9	00.4	01.6	01.1	-03.9	09.3	00.6	00168	00587

net#	Yearday/Time (NetOpenTime)	hh:mm:ss	pmin	pmax	pavg	#obs	vol
0	119.388322	9:19:10	-005.6	-001.9	-003.2	00045	00026
1	119.390903	9:22:54	-002.2	070.5	020.8	00112	00448
2	119.396157	9:30:28	066.0	074.2	069.1	00302	00973
3	119.410231	9:50:43	009.9	070.2	040.2	00091	00321
4	119.414502	9:56:52	003.2	011.6	009.9	00168	00587
5	119.422361	10:8:11					

Tow: OC471004 OC471
Date: 30 April 2011
Temperature Probe # 535 Conductivity Probe # 120 Pressure Probe # 124
Flow Meter Calibration 6.41 (m/count)
MOCNESS STATISTICAL SUMMARY

net#	pmin	pmax	pavg	tmin	tmax	tavg	thmin	thmax	thavg	smin	smax	savg
0	-005.7	-002.1	-003.4	26.2	27.3	26.7	26.2	27.3	26.7	00.01	00.02	00.01
1	-002.2	051.9	014.3	25.9	27.8	26.6	25.9	27.9	26.6	00.01	50.00	22.91
2	049.6	052.3	051.0	26.1	26.1	26.1	26.1	26.1	26.1	36.53	36.53	36.53
3	009.8	051.0	028.8	26.1	26.1	26.1	26.1	26.1	26.1	36.52	36.53	36.53
4	002.8	011.2	009.9	26.1	26.1	26.1	26.1	26.1	26.1	36.52	36.53	36.53

net#	simin	simax	siavg	cmin	cmax	cavg	fmin	fmax	favg	oxmin	oxmax	oxavg
0	-03.55	-03.25	-03.39	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
1	-03.71	33.91	13.80	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
2	24.17	24.17	24.17	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
3	24.16	24.17	24.17	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
4	24.15	24.17	24.16	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0

net#	amin	amax	aavg	spmin	spmax	spavg	armin	armax	aravg	#obs	vol
0	00.0	00.0	00.0	00.0	01.2	00.3	-02.9	10.7	00.9	00039	00051
1	00.0	24.0	07.2	00.0	05.5	00.7	-21.9	00.2	-09.2	00086	00250
2	00.0	17.0	04.8	00.0	01.2	00.5	-06.8	03.1	00.0	00302	00584
3	01.0	16.0	08.5	00.0	01.6	01.0	-01.0	15.1	08.7	00070	00223

```
 4      00.0  15.0   05.4   00.0   01.2   00.6   -01.6 09.9    00.6      00168     00349

net#   Yearday/Time  hh:mm:ss  pmin      pmax     pavg     #obs     vol
                  (NetOpenTime)
 0       120.388588  9:19:33   -005.7   -002.1   -003.4   00039    00051
 1       120.390625  9:22:30   -002.2   051.9    014.3    00086    00250
 2       120.394664  9:28:19   049.6    052.3    051.0    00302    00584
 3       120.408750  9:48:36   009.8    051.0    028.8    00070    00223
 4       120.412049  9:53:21   002.8    011.2    009.9    00168    00349
 5       120.419907  10:4:40

Tow: OC471005   OC471
 Date: 30 April 2011
 Temperature Probe #  535    Conductivity Probe #  120   Pressure Probe #  124
 Flow Meter Calibration  6.41 (m/count)
                         MOCNESS STATISTICAL SUMMARY

net#   pmin   pmax   pavg   tmin   tmax   tavg   thmin  thmax  thavg  smin   smax   savg
 0     -005.3 -003.4 -004.3 27.8   28.2   28.1   27.8   28.2   28.1   00.01  00.02  00.01
 1     -003.1 054.8  015.2  23.6   28.7   26.6   23.6   28.7   26.6   00.01  36.60  24.26
 2     049.4  052.2  050.7  26.1   26.1   26.1   26.1   26.1   26.1   36.53  36.54  36.53
 3     009.6  051.4  030.4  26.1   26.1   26.1   26.1   26.1   26.1   36.52  36.54  36.53
 4     003.4  010.7  009.3  26.1   26.1   26.1   26.1   26.1   26.1   36.52  36.53  36.52

net#   simin  simax  siavg  cmin   cmax   cavg   fmin   fmax   favg   oxmin  oxmax  oxavg
 0     -03.81 -03.70 -03.77 00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 1     -03.95 24.24  14.81  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 2     24.17  24.18  24.17  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 3     24.14  24.17  24.16  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 4     24.14  24.16  24.15  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0

net#   amin   amax   aavg   spmin  spmax  spavg  armin  armax  aravg      #obs      vol
 0      00.0  00.0   00.0   00.0   01.6   00.8   -03.1 09.9    04.0       00014     00049
 1      00.0  23.0   06.5   00.0   06.2   01.0   -23.5 14.4    -07.3      00113     00447
 2      00.0  11.0   04.2   00.0   01.2   00.6   -02.5 03.3    00.0       00227     00487
 3      00.0  12.0   06.4   00.4   01.2   00.9   -01.7 14.0    09.0       00067     00192
 4      01.0  14.0   06.3   00.0   01.6   00.3   -01.7 13.2    01.0       00088     00098

net#   Yearday/Time  hh:mm:ss  pmin      pmax     pavg     #obs     vol
                  (NetOpenTime)
 0       120.432512  10:22:48  -005.3   -003.4   -004.3   00014    00049
 1       120.433252  10:23:53  -003.1   054.8    015.2    00113    00447
 2       120.438553  10:31:31  049.4    052.2    050.7    00227    00487
 3       120.449144  10:46:46  009.6    051.4    030.4    00067    00192
 4       120.452303  10:51:19  003.4    010.7    009.3    00088    00098
 5       120.456447  10:57:17

Tow: OC471006   OC471
 Date: 1 May 2011
 Temperature Probe #  535    Conductivity Probe #  120   Pressure Probe #  124
 Flow Meter Calibration  6.41 (m/count)
                         MOCNESS STATISTICAL SUMMARY

net#   pmin   pmax   pavg   tmin   tmax   tavg   thmin  thmax  thavg  smin   smax   savg
 0     -006.3 -002.2 -003.3 27.4   28.3   27.7   27.4   28.3   27.7   00.01  00.02  00.02
 1     -002.3 051.1  013.4  25.2   28.0   26.7   25.1   28.0   26.7   00.01  50.00  23.71
 2     047.1  051.8  049.8  25.2   25.3   25.2   25.1   25.3   25.2   36.73  36.86  36.80
 3     010.3  050.8  030.5  25.2   26.6   26.0   25.2   26.6   26.0   36.38  36.86  36.59
 4     002.1  010.9  009.1  26.6   26.6   26.6   26.6   26.6   26.6   36.40  36.40  36.40

net#   simin  simax  siavg  cmin   cmax   cavg   fmin   fmax   favg   oxmin  oxmax  oxavg
 0     -03.83 -03.58 -03.67 00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 1     -03.76 33.98  14.37  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 2     24.59  24.67  24.64  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 3     23.89  24.67  24.25  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 4     23.90  23.91  23.90  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0

net#   amin   amax   aavg   spmin  spmax  spavg  armin  armax  aravg      #obs      vol
 0      00.0  00.0   00.0   00.0   00.4   00.1   -03.7 11.8    00.7       00049     00026
 1      00.0  14.0   02.2   00.0   07.8   01.0   -22.3 00.8    -09.3      00083     00357
 2      00.0  40.0   07.7   00.0   01.6   00.7   -03.9 03.5    00.0       00301     00766
```

3	00.0	13.0	06.5	00.4	01.6	01.0	-01.0	11.4	07.5	00079	00250
4	00.0	10.0	04.3	00.0	01.2	00.4	-03.1	12.8	00.7	00164	00279

net#	Yearday/Time (NetOpenTime)	hh:mm:ss	pmin	pmax	pavg	#obs	vol
0	121.388241	9:19:3	-006.3	-002.2	-003.3	00049	00026
1	121.390613	9:22:29	-002.3	051.1	013.4	00083	00357
2	121.394514	9:28:5	047.1	051.8	049.8	00301	00766
3	121.408553	9:48:19	010.3	050.8	030.5	00079	00250
4	121.412269	9:53:40	002.1	010.9	009.1	00164	00279
5	121.419942	10:4:43					

Tow: OC471007 OC471
Date: 1 May 2011
Temperature Probe # 535 Conductivity Probe # 120 Pressure Probe # 124
Flow Meter Calibration 6.41 (m/count)

MOCNESS STATISTICAL SUMMARY

net#	pmin	pmax	pavg	tmin	tmax	tavg	thmin	thmax	thavg	smin	smax	savg
0	-005.6	-003.0	-004.1	27.9	28.5	28.3	27.9	28.5	28.3	00.01	00.02	00.01
1	-002.9	051.7	016.2	25.2	28.3	26.7	25.2	28.3	26.6	00.01	36.85	25.10
2	045.8	052.7	050.0	25.2	25.4	25.2	25.2	25.4	25.2	36.76	36.88	36.80
3	009.8	051.3	029.9	25.2	26.6	26.0	25.2	26.6	26.0	36.29	36.84	36.57
4	002.7	010.7	009.6	26.6	26.6	26.6	26.6	26.6	26.6	36.39	36.41	36.40

net#	simin	simax	siavg	cmin	cmax	cavg	fmin	fmax	favg	oxmin	oxmax	oxavg
0	-03.91	-03.72	-03.84	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
1	-03.84	24.66	15.43	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
2	24.57	24.70	24.63	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
3	23.84	24.67	24.22	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
4	23.89	23.91	23.90	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0

net#	amin	amax	aavg	spmin	spmax	spavg	armin	armax	aravg	#obs	vol
0	00.0	00.0	00.0	00.0	01.6	00.9	-04.1	10.6	03.6	00014	00049
1	00.0	24.0	06.4	00.0	12.8	02.2	-22.9	-00.2	-11.6	00069	00617
2	00.0	26.0	08.1	00.0	01.9	00.8	-06.2	05.0	00.0	00227	00597
3	00.0	03.0	00.2	00.0	00.4	00.2	-00.6	13.2	08.9	00068	00058
4	00.0	11.0	03.1	00.0	01.2	00.4	-01.5	13.6	01.1	00088	00132

net#	Yearday/Time (NetOpenTime)	hh:mm:ss	pmin	pmax	pavg	#obs	vol
0	121.429745	10:18:49	-005.6	-003.0	-004.1	00014	00049
1	121.430637	10:20:6	-002.9	051.7	016.2	00069	00617
2	121.433889	10:24:47	045.8	052.7	050.0	00227	00597
3	121.444479	10:40:2	009.8	051.3	029.9	00068	00058
4	121.447685	10:44:40	002.7	010.7	009.6	00088	00132
5	121.419942	10:4:43					

Tow: OC471008 OC471
Date: 2 May 2011
Temperature Probe # 535 Conductivity Probe # 120 Pressure Probe # 124
Flow Meter Calibration 6.41 (m/count)

MOCNESS STATISTICAL SUMMARY

net#	pmin	pmax	pavg	tmin	tmax	tavg	thmin	thmax	thavg	smin	smax	savg
0	-004.7	-003.5	-004.0	27.4	28.3	27.6	27.4	28.3	27.6	50.00	50.00	50.00
1	-003.3	041.9	011.4	26.3	28.5	27.1	26.3	28.5	27.1	03.15	50.00	40.60
2	041.0	043.2	042.1	25.8	26.3	26.1	25.8	26.3	26.1	36.56	36.72	36.62
3	005.3	042.0	023.7	25.9	26.8	26.6	25.9	26.8	26.6	36.08	36.70	36.29
4	002.1	006.5	005.8	26.7	26.8	26.8	26.7	26.8	26.8	36.08	36.09	36.08

net#	simin	simax	siavg	cmin	cmax	cavg	fmin	fmax	favg	oxmin	oxmax	oxavg
0	33.62	33.95	33.86	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
1	-01.20	33.95	26.92	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
2	24.12	24.41	24.24	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
3	23.61	24.37	23.83	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
4	23.60	23.62	23.61	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0

net#	amin	amax	aavg	spmin	spmax	spavg	armin	armax	aravg	#obs	vol
0	00.0	00.0	00.0	00.0	00.8	00.5	-01.9	08.8	04.7	00012	00025
1	00.0	18.0	05.5	00.0	00.8	00.2	-23.7	-00.6	-10.2	00065	00047

```
 2      00.0  13.0   03.1   00.0   01.2   00.5   -05.4 02.5    00.0      00302     00579
 3      00.0  12.0   04.0   00.0   01.2   00.6   00.0  11.4    08.4      00064     00143
 4      00.0  14.0   05.5   00.0   01.2   00.4   -01.9 07.0    00.3      00161     00262

net#   Yearday/Time  hh:mm:ss  pmin      pmax     pavg     #obs     vol
                   (NetOpenTime)
 0       122.389132  9:20:20   -004.7   -003.5   -004.0   00012    00025
 1       122.389792  9:21:17   -003.3   041.9    011.4    00065    00047
 2       122.392859  9:25:42   041.0    043.2    042.1    00302    00579
 3       122.406933  9:45:59   005.3    042.0    023.7    00064    00143
 4       122.409954  9:50:20   002.1    006.5    005.8    00161    00262
 5       122.417477  10:1:10

Tow: OC471009   OC471
 Date: 2 May 2011
 Temperature Probe #  535    Conductivity Probe #  120   Pressure Probe #  124
 Flow Meter Calibration  6.41 (m/count)
                         MOCNESS STATISTICAL SUMMARY

net#   pmin   pmax   pavg   tmin   tmax   tavg   thmin  thmax  thavg  smin   smax   savg
 0     -006.1 -003.1 -004.4 27.2   27.7   27.4   27.2   27.7   27.4   00.02  00.02  00.02
 1     -003.2 041.8  012.2  25.7   27.7   26.9   25.7   27.7   26.9   00.02  36.73  23.27
 2     040.0  042.0  041.1  25.7   25.8   25.7   25.7   25.8   25.7   36.63  36.72  36.68
 3     005.1  041.6  023.1  25.7   26.8   26.5   25.7   26.8   26.5   36.08  36.71  36.32
 4     002.1  006.3  005.5  26.8   26.8   26.8   26.8   26.8   26.8   36.08  36.09  36.08

net#   simin  simax  siavg  cmin   cmax   cavg   fmin   fmax   favg   oxmin  oxmax  oxavg
 0     -03.67 -03.53 -03.58 00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 1     -03.67 24.43  13.98  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 2     24.32  24.42  24.39  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 3     23.59  24.42  23.87  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 4     23.59  23.61  23.60  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0

net#   amin   amax   aavg   spmin  spmax  spavg  armin  armax  aravg      #obs      vol
 0      00.0  00.0   00.0   00.0   00.8   00.4   -04.1 11.4    03.5       00015     00024
 1      00.0  25.0   04.3   00.0   01.9   00.3   -21.5 -00.6   -10.3      00064     00086
 2      00.0  09.0   03.3   00.0   01.6   00.5   -04.1 02.7    00.0       00227     00443
 3      00.0  07.0   02.9   00.4   00.8   00.7   -00.8 12.8    08.7       00060     00159
 4      00.0  20.0   05.7   00.0   00.8   00.5   -02.1 06.8    00.6       00087     00169

net#   Yearday/Time  hh:mm:ss  pmin      pmax     pavg     #obs     vol
                   (NetOpenTime)
 0       122.425764  10:13:5   -006.1   -003.1   -004.4   00015    00024
 1       122.426655  10:14:23  -003.2   041.8    012.2    00064    00086
 2       122.429676  10:18:44  040.0    042.0    041.1    00227    00443
 3       122.440266  10:33:59  005.1    041.6    023.1    00060    00159
 4       122.443102  10:38:3   002.1    006.3    005.5    00087    00169
 5       122.447188  10:43:57

Tow: OC471010   OC471
 Date: 3 May 2011
 Temperature Probe #  535    Conductivity Probe #  120   Pressure Probe #  124
 Flow Meter Calibration  6.41 (m/count)
                         MOCNESS STATISTICAL SUMMARY

net#   pmin   pmax   pavg   tmin   tmax   tavg   thmin  thmax  thavg  smin   smax   savg
 0     -006.0 -003.3 -004.4 29.3   29.6   29.5   29.3   29.6   29.5   50.00  50.00  50.00
 1     -003.1 040.8  009.6  27.4   29.5   28.0   27.4   29.5   28.0   05.05  50.00  39.96
 2     039.4  041.4  040.5  27.4   27.4   27.4   27.4   27.4   27.4   35.66  35.67  35.66
 3     004.9  041.1  022.7  27.4   27.4   27.4   27.4   27.4   27.4   35.66  35.66  35.66
 4     002.1  005.8  005.0  27.4   27.5   27.4   27.4   27.5   27.4   35.65  35.67  35.66

net#   simin  simax  siavg  cmin   cmax   cavg   fmin   fmax   favg   oxmin  oxmax  oxavg
 0     33.16  33.29  33.22  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 1     00.03  33.65  26.12  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 2     23.09  23.09  23.09  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 3     23.07  23.09  23.09  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 4     23.06  23.08  23.08  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0

net#   amin   amax   aavg   spmin  spmax  spavg  armin  armax  aravg      #obs      vol
 0      00.0  00.0   00.0   00.0   00.8   00.3   -02.9 11.3    02.7       00020     00026
```

1	00.0	27.0	06.1	00.0	07.0	01.1	-21.1	01.9	-08.3	00078	00350
2	00.0	09.0	02.1	00.0	00.8	00.4	-03.1	02.5	-00.1	00152	00208
3	00.0	06.0	01.6	00.0	00.8	00.5	-01.2	11.6	08.7	00060	00114
4	00.0	13.0	02.8	00.0	00.8	00.3	-01.4	05.4	00.4	00084	00106

net#	Yearday/Time (NetOpenTime)	hh:mm:ss	pmin	pmax	pavg	#obs	vol
0	123.395567	9:29:37	-006.0	-003.3	-004.4	00020	00026
1	123.396539	9:31:1	-003.1	040.8	009.6	00078	00350
2	123.400208	9:36:17	039.4	041.4	040.5	00152	00208
3	123.407315	9:46:32	004.9	041.1	022.7	00060	00114
4	123.410150	9:50:36	002.1	005.8	005.0	00084	00106
5	123.414144	9:56:22					

Tow: OC471011 OC471
Date: 3 May 2011
Temperature Probe # 535 Conductivity Probe # 120 Pressure Probe # 124
Flow Meter Calibration 6.41 (m/count)
MOCNESS STATISTICAL SUMMARY

net#	pmin	pmax	pavg	tmin	tmax	tavg	thmin	thmax	thavg	smin	smax	savg
0	-005.7	-002.7	-003.8	28.5	28.7	28.6	28.5	28.7	28.6	00.02	00.02	00.02
1	-002.4	039.8	008.5	27.4	28.8	28.0	27.4	28.8	28.0	00.02	35.67	17.20
2	039.0	041.0	039.8	27.4	27.4	27.4	27.4	27.4	27.4	35.66	35.67	35.67
3	005.0	040.3	022.2	27.4	27.5	27.4	27.4	27.5	27.4	35.66	35.67	35.66
4	002.5	005.9	005.1	27.5	27.5	27.5	27.5	27.5	27.5	35.66	35.67	35.66

net#	simin	simax	siavg	cmin	cmax	cavg	fmin	fmax	favg	oxmin	oxmax	oxavg
0	-03.95	-03.88	-03.91	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
1	-03.98	23.09	09.11	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
2	23.09	23.09	23.09	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
3	23.06	23.09	23.08	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
4	23.06	23.08	23.06	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0

net#	amin	amax	aavg	spmin	spmax	spavg	armin	armax	aravg	#obs	vol
0	00.0	00.0	00.0	00.0	00.4	00.1	-03.5	10.8	01.9	00023	00013
1	00.0	30.0	03.7	00.0	05.5	00.9	-21.7	00.2	-07.9	00079	00289
2	00.0	09.0	02.1	00.0	01.2	00.4	-04.5	03.5	-00.1	00152	00228
3	00.0	07.0	02.2	00.4	01.2	00.7	-01.0	11.4	08.6	00059	00137
4	00.0	09.0	02.8	00.0	00.8	00.4	-02.1	05.8	00.4	00084	00145

net#	Yearday/Time (NetOpenTime)	hh:mm:ss	pmin	pmax	pavg	#obs	vol
0	123.430324	10:19:40	-005.7	-002.7	-003.8	00023	00013
1	123.431447	10:21:16	-002.4	039.8	008.5	00079	00289
2	123.435162	10:26:37	039.0	041.0	039.8	00152	00228
3	123.442280	10:36:53	005.0	040.3	022.2	00059	00137
4	123.445069	10:40:53	002.5	005.9	005.1	00084	00145
5	123.449016	10:46:35					

Tow: OC471012 OC471
Date: 3 May 2011
Temperature Probe # 535 Conductivity Probe # 120 Pressure Probe # 124
Flow Meter Calibration 6.41 (m/count)
MOCNESS STATISTICAL SUMMARY

net#	pmin	pmax	pavg	tmin	tmax	tavg	thmin	thmax	thavg	smin	smax	savg
0	-006.3	-002.7	-004.1	28.4	29.1	28.8	28.4	29.1	28.8	50.00	50.00	50.00
1	-002.7	040.2	011.4	26.8	30.2	28.0	26.8	30.2	28.0	04.64	50.00	40.19
2	038.9	041.3	040.0	26.7	26.8	26.8	26.7	26.8	26.8	36.33	36.36	36.35
3	004.7	040.7	022.7	26.7	27.4	27.1	26.7	27.4	27.1	34.05	36.36	35.63
4	001.3	006.1	005.1	27.4	27.4	27.4	27.4	27.4	27.4	33.95	34.69	34.23

net#	simin	simax	siavg	cmin	cmax	cavg	fmin	fmax	favg	oxmin	oxmax	oxavg
0	33.34	33.59	33.46	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
1	-00.22	33.75	26.30	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
2	23.79	23.84	23.82	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
3	21.88	23.83	23.15	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
4	21.80	22.37	22.02	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0

net#	amin	amax	aavg	spmin	spmax	spavg	armin	armax	aravg	#obs	vol

0	00.0	00.0	00.0	00.0	00.8	00.2	-03.3	11.8	01.7	00027	00026
1	00.0	12.0	04.1	00.0	03.9	00.6	-21.7	00.0	-10.0	00063	00152
2	00.0	12.0	05.0	00.0	01.2	00.3	-03.9	03.9	00.0	00301	00350
3	00.0	11.0	03.2	00.4	01.2	00.7	-02.3	12.8	08.7	00060	00145
4	00.0	19.0	04.3	00.0	00.8	00.4	-01.9	07.0	00.3	00162	00222

net#	Yearday/Time	hh:mm:ss (NetOpenTime)	pmin	pmax	pavg	#obs	vol
0	124.388102	9:18:52	-006.3	-002.7	-004.1	00027	00026
1	124.389444	9:20:47	-002.7	040.2	011.4	00063	00152
2	124.392407	9:25:4	038.9	041.3	040.0	00301	00350
3	124.406458	9:45:18	004.7	040.7	022.7	00060	00145
4	124.409294	9:49:22	001.3	006.1	005.1	00162	00222
5	124.416863	10:0:17					

Tow: OC471013 OC471
Date: 3 May 2011
Temperature Probe # 535 Conductivity Probe # 120 Pressure Probe # 124
Flow Meter Calibration 6.41 (m/count)
MOCNESS STATISTICAL SUMMARY

net#	pmin	pmax	pavg	tmin	tmax	tavg	thmin	thmax	thavg	smin	smax	savg
0	-006.2	-003.8	-004.7	28.8	29.4	29.1	28.8	29.4	29.1	00.02	00.03	00.03
1	-003.5	039.9	011.6	26.8	29.0	27.6	26.8	29.0	27.6	00.03	36.33	24.07
2	036.4	041.9	040.5	26.8	27.0	26.8	26.8	26.9	26.8	36.20	36.32	36.30
3	005.1	041.4	023.4	26.8	27.4	27.2	26.8	27.4	27.2	34.25	36.32	35.56
4	002.0	006.2	005.1	27.4	27.4	27.4	27.4	27.4	27.4	33.98	34.81	34.29

net#	simin	simax	siavg	cmin	cmax	cavg	fmin	fmax	favg	oxmin	oxmax	oxavg
0	-04.14	-03.97	-04.06	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
1	-04.04	23.78	14.35	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
2	23.64	23.78	23.75	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
3	22.04	23.78	23.08	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
4	21.81	22.46	22.06	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0

net#	amin	amax	aavg	spmin	spmax	spavg	armin	armax	aravg	#obs	vol
0	00.0	00.0	00.0	00.0	01.2	00.8	-03.7	11.5	05.4	00012	00036
1	00.0	31.0	06.7	00.0	02.7	00.8	-21.9	-01.2	-10.5	00061	00200
2	00.0	21.0	04.7	00.0	01.6	00.5	-04.3	05.0	-00.1	00227	00432
3	00.0	09.0	04.2	00.4	01.2	00.8	-01.4	12.0	08.4	00062	00167
4	00.0	12.0	05.6	00.0	01.2	00.4	-01.9	05.2	00.5	00086	00112

net#	Yearday/Time	hh:mm:ss (NetOpenTime)	pmin	pmax	pavg	#obs	vol
0	124.429387	10:18:19	-006.2	-003.8	-004.7	00012	00036
1	124.430035	10:19:14	-003.5	039.9	011.6	00061	00200
2	124.432917	10:23:24	036.4	041.9	040.5	00227	00432
3	124.443519	10:38:40	005.1	041.4	023.4	00062	00167
4	124.446435	10:42:51	002.0	006.2	005.1	00086	00112
5	124.450486	10:48:41					

Tow: OC471014 OC471
Date: 5 May 2011
Temperature Probe # 535 Conductivity Probe # 120 Pressure Probe # 124
Flow Meter Calibration 6.41 (m/count)
MOCNESS STATISTICAL SUMMARY

net#	pmin	pmax	pavg	tmin	tmax	tavg	thmin	thmax	thavg	smin	smax	savg
0	-006.6	-003.3	-004.5	30.6	31.2	30.9	30.6	31.2	30.9	50.00	50.00	50.00
1	-003.3	036.3	014.7	27.0	31.0	28.2	27.0	31.0	28.2	03.95	50.00	39.37
2	026.3	028.2	027.3	27.2	27.2	27.2	27.2	27.2	27.2	35.65	35.68	35.66
3	005.0	027.5	016.0	27.2	27.4	27.3	27.2	27.4	27.3	34.80	35.65	35.52
4	001.7	006.0	005.0	27.3	27.4	27.4	27.3	27.4	27.4	33.75	35.25	34.77

net#	simin	simax	siavg	cmin	cmax	cavg	fmin	fmax	favg	oxmin	oxmax	oxavg
0	32.61	32.80	32.70	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
1	-00.87	33.51	25.63	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
2	23.14	23.17	23.15	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
3	22.45	23.14	23.02	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
4	21.66	22.78	22.42	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0

net#	amin	amax	aavg	spmin	spmax	spavg	armin	armax	aravg	#obs	vol
0	00.0	00.0	00.0	00.0	00.4	00.1	-03.3	12.4	02.5	00021	00012
1	00.0	10.0	03.6	00.0	02.3	00.5	-21.3	14.5	-05.3	00088	00195
2	01.0	12.0	07.1	00.0	00.8	00.2	-02.1	02.5	00.0	00302	00199
3	03.0	12.0	07.6	00.0	00.0	00.0	-01.6	11.8	07.7	00042	00000
4	01.0	14.0	07.7	00.0	00.0	00.0	-01.7	05.8	00.3	00161	00000

net#	Yearday/Time (NetOpenTime)	hh:mm:ss	pmin	pmax	pavg	#obs	vol
0	125.388935	9:20:3	-006.6	-003.3	-004.5	00021	00012
1	125.390023	9:21:38	-003.3	036.3	014.7	00088	00195
2	125.394155	9:27:35	026.3	028.2	027.3	00302	00199
3	125.408229	9:47:50	005.0	027.5	016.0	00042	00000
4	125.410231	9:50:43	001.7	006.0	005.0	00161	00000
5	125.417801	10:1:38					

Tow: OC471015 OC471
Date: 6 May 2011
Temperature Probe # 535 Conductivity Probe # 120 Pressure Probe # 124
Flow Meter Calibration 6.41 (m/count)
MOCNESS STATISTICAL SUMMARY

net#	pmin	pmax	pavg	tmin	tmax	tavg	thmin	thmax	thavg	smin	smax	savg
0	-006.5	-003.6	-004.7	29.7	29.9	29.8	29.7	29.9	29.8	50.00	50.00	50.00
1	-003.3	041.7	028.0	27.2	29.9	27.9	27.2	29.9	27.9	12.57	50.00	36.13
2	019.4	022.0	020.7	28.3	28.4	28.4	28.3	28.4	28.4	33.17	33.28	33.23
3	004.6	021.2	012.6	28.4	28.6	28.6	28.4	28.6	28.5	32.21	33.18	32.54
4	001.9	006.1	005.0	28.6	28.6	28.6	28.6	28.6	28.6	32.20	32.24	32.22

net#	simin	simax	siavg	cmin	cmax	cavg	fmin	fmax	favg	oxmin	oxmax	oxavg
0	33.06	33.13	33.08	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
1	05.37	33.33	23.29	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
2	20.89	21.00	20.95	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
3	20.10	20.90	20.37	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
4	20.08	20.13	20.11	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0

net#	amin	amax	aavg	spmin	spmax	spavg	armin	armax	aravg	#obs	vol
0	00.0	00.0	00.0	00.0	00.8	00.4	-03.5	12.1	04.0	00015	00024
1	00.0	14.0	03.8	00.0	01.9	00.5	-22.5	13.0	-02.1	00179	00318
2	00.0	16.0	03.0	00.0	01.2	00.3	-03.3	03.9	00.0	00302	00365
3	00.0	08.0	02.5	00.0	00.8	00.5	-01.7	12.2	07.5	00030	00058
4	00.0	18.0	04.8	00.4	01.6	00.6	-02.7	07.4	00.2	00160	00352

net#	Yearday/Time (NetOpenTime)	hh:mm:ss	pmin	pmax	pavg	#obs	vol
0	126.389005	9:20:9	-006.5	-003.6	-004.7	00015	00024
1	126.389780	9:21:16	-003.3	041.7	028.0	00179	00318
2	126.398148	9:33:19	019.4	022.0	020.7	00302	00365
3	126.412222	9:53:36	004.6	021.2	012.6	00030	00058
4	126.413669	9:55:41	001.9	006.1	005.0	00160	00352
5	126.421146	10:6:27					

Tow: OC471016 OC471
Date: 7 May 2011
Temperature Probe # 535 Conductivity Probe # 120 Pressure Probe # 124
Flow Meter Calibration 6.41 (m/count)
MOCNESS STATISTICAL SUMMARY

net#	pmin	pmax	pavg	tmin	tmax	tavg	thmin	thmax	thavg	smin	smax	savg
0	-005.8	-002.4	-003.8	28.4	29.1	28.7	28.4	29.1	28.7	00.02	00.03	00.02
1	-002.7	050.5	013.5	26.8	29.1	27.9	26.8	29.1	27.9	00.02	50.00	38.85
2	048.4	051.0	049.6	26.8	26.9	26.8	26.7	26.9	26.8	36.21	36.30	36.25
3	005.0	050.5	028.1	26.8	27.7	27.3	26.8	27.7	27.3	34.10	36.27	35.47
4	002.5	006.1	004.8	27.6	27.6	27.6	27.6	27.6	27.6	34.03	34.18	34.05

net#	simin	simax	siavg	cmin	cmax	cavg	fmin	fmax	favg	oxmin	oxmax	oxavg
0	-04.05	-03.85	-03.95	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
1	-04.05	33.71	25.34	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
2	23.67	23.78	23.72	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0

3	21.86	23.75	22.97	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
4	21.80	21.92	21.82	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0

net#	amin	amax	aavg	spmin	spmax	spavg	armin	armax	aravg	#obs	vol
0	00.0	00.0	00.0	00.0	01.2	00.3	-02.9	10.9	01.3	00034	00039
1	00.0	24.0	04.3	00.0	04.3	00.7	-23.7	00.6	-10.0	00078	00222
2	00.0	10.0	04.5	00.0	01.2	00.5	-06.6	02.3	00.0	00301	00580
3	00.0	07.0	03.3	00.4	00.8	00.6	-01.4	12.4	08.5	00077	00181
4	01.0	12.0	05.9	00.4	00.8	00.5	-01.9	04.5	00.2	00160	00299

net#	Yearday/Time (NetOpenTime)	hh:mm:ss	pmin	pmax	pavg	#obs	vol
0	127.388924	9:20:2	-005.8	-002.4	-003.8	00034	00039
1	127.390556	9:22:23	-002.7	050.5	013.5	00078	00222
2	127.394225	9:27:40	048.4	051.0	049.6	00301	00580
3	127.408264	9:47:53	005.0	050.5	028.1	00077	00181
4	127.411887	9:53:6	002.5	006.1	004.8	00160	00299
5	127.419363	10:3:52					

Tow: OC471017 OC471
Date: 8 May 2011
Temperature Probe # 535 Conductivity Probe # 120 Pressure Probe # 124
Flow Meter Calibration 6.41 (m/count)
MOCNESS STATISTICAL SUMMARY

net#	pmin	pmax	pavg	tmin	tmax	tavg	thmin	thmax	thavg	smin	smax	savg
0	-006.4	-003.0	-004.3	25.7	26.5	26.1	25.7	26.5	26.1	00.01	50.00	48.00
1	-002.9	042.0	011.1	24.9	27.2	26.4	24.9	27.2	26.4	16.75	50.00	41.18
2	039.7	042.0	040.7	27.0	27.0	27.0	27.0	27.0	27.0	36.20	36.21	36.20
3	004.5	041.5	022.6	27.0	27.2	27.1	27.0	27.2	27.1	35.96	36.20	36.14
4	002.2	005.3	004.5	27.2	27.2	27.2	27.2	27.2	27.2	35.95	35.99	35.97

net#	simin	simax	siavg	cmin	cmax	cavg	fmin	fmax	favg	oxmin	oxmax	oxavg
0	-03.29	34.49	32.85	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
1	09.32	34.76	27.61	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
2	23.63	23.63	23.63	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
3	23.38	23.63	23.55	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0
4	23.36	23.41	23.38	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0

net#	amin	amax	aavg	spmin	spmax	spavg	armin	armax	aravg	#obs	vol
0	00.0	00.0	00.0	00.0	00.8	00.2	-03.3	12.1	02.0	00025	00026
1	00.0	15.0	03.7	00.0	00.8	00.2	-22.7	00.4	-09.4	00070	00051
2	00.0	11.0	04.2	00.4	01.2	00.5	-03.1	03.7	00.0	00302	00582
3	00.0	07.0	04.2	00.4	01.2	00.7	-01.9	13.4	09.1	00058	00153
4	00.0	10.0	05.2	00.4	00.8	00.5	-02.5	04.8	00.2	00158	00291

net#	Yearday/Time (NetOpenTime)	hh:mm:ss	pmin	pmax	pavg	#obs	vol
0	128.387951	9:18:38	-006.4	-003.0	-004.3	00025	00026
1	128.389190	9:20:25	-002.9	042.0	011.1	00070	00051
2	128.392488	9:25:11	039.7	042.0	040.7	00302	00582
3	128.406562	9:45:26	004.5	041.5	022.6	00058	00153
4	128.409306	9:49:24	002.2	005.3	004.5	00158	00291
5	128.416690	10:0:2					

Tow: OC471018 OC471
Date: 8 May 2011
Temperature Probe # 535 Conductivity Probe # 120 Pressure Probe # 124
Flow Meter Calibration 6.41 (m/count)
MOCNESS STATISTICAL SUMMARY

net#	pmin	pmax	pavg	tmin	tmax	tavg	thmin	thmax	thavg	smin	smax	savg
0	-006.1	-003.4	-004.6	27.6	29.1	28.5	27.6	29.1	28.5	00.03	00.03	00.03
1	-003.5	040.3	012.2	27.0	28.7	27.6	27.0	28.7	27.6	00.03	36.22	23.95
2	039.0	041.4	040.2	27.0	27.0	27.0	27.0	27.0	27.0	36.20	36.20	36.20
3	004.7	041.1	022.0	27.0	27.3	27.1	27.0	27.3	27.1	35.94	36.20	36.15
4	002.2	005.5	004.7	27.2	27.4	27.3	27.2	27.4	27.3	35.94	35.99	35.96

net#	simin	simax	siavg	cmin	cmax	cavg	fmin	fmax	favg	oxmin	oxmax	oxavg
0	-04.06	-03.63	-03.88	00.00	00.00	00.00	00.00	00.00	00.00	00.0	00.0	00.0

```
 1     -03.94 23.64  14.28  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 2     23.63  23.63  23.63  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 3     23.32  23.63  23.55  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 4     23.31  23.40  23.35  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0

net#   amin   amax   aavg   spmin  spmax  spavg  armin  armax  aravg      #obs      vol
 0      00.0  00.0   00.0   00.0   00.8   00.4   -03.1 11.5    03.7       00016     00024
 1      00.0  21.0   06.6   00.0   01.9   00.4   -22.3 -00.6   -10.9      00059     00111
 2      00.0  11.0   06.3   00.4   00.8   00.6   -04.5 02.3    -00.1      00152     00343
 3      00.0  10.0   05.0   00.4   01.2   00.7   -02.5 12.0    08.5       00061     00166
 4      00.0  13.0   04.6   00.4   00.8   00.5   -02.1 06.0    00.4       00083     00162

net#   Yearday/Time  hh:mm:ss  pmin      pmax     pavg     #obs     vol
                   (NetOpenTime)
 0       128.428495  10:17:1   -006.1   -003.4   -004.6   00016    00024
 1       128.429294  10:18:11  -003.5   040.3    012.2    00059    00111
 2       128.432083  10:22:11  039.0    041.4    040.2    00152    00343
 3       128.439190  10:32:26  004.7    041.1    022.0    00061    00166
 4       128.442072  10:36:34  002.2    005.5    004.7    00083    00162
 5       128.416690  10:0:2

Tow: OC471019   OC471
 Date: 9 May 2011
 Temperature Probe #  535    Conductivity Probe #  120   Pressure Probe #  124
 Flow Meter Calibration  6.41 (m/count)
                         MOCNESS STATISTICAL SUMMARY

net#   pmin   pmax   pavg   tmin   tmax   tavg   thmin  thmax  thavg  smin   smax   savg
 0     -005.4 -003.2 -004.1 28.3   29.0   28.7   28.3   29.0   28.7   00.01  50.00  07.15
 1     -003.2 041.3  018.1  26.7   28.8   27.4   26.7   28.8   27.4   25.42  50.00  39.47
 2     035.6  038.6  037.2  26.7   26.8   26.8   26.7   26.8   26.7   36.37  36.38  36.38
 3     004.8  037.3  020.5  26.8   27.6   27.1   26.8   27.6   27.1   35.84  36.38  36.13
 4     001.7  005.8  005.1  27.5   27.6   27.5   27.5   27.6   27.5   35.88  35.92  35.90

net#   simin  simax  siavg  cmin   cmax   cavg   fmin   fmax   favg   oxmin  oxmax  oxavg
 0     -04.04 33.44  01.39  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 1     15.28  33.72  25.97  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 2     23.83  23.84  23.84  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 3     23.20  23.84  23.54  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 4     23.20  23.25  23.23  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0

net#   amin   amax   aavg   spmin  spmax  spavg  armin  armax  aravg      #obs      vol
 0      00.0  00.0   00.0   00.0   00.4   00.1   -02.5 10.2    02.4       00021     00013
 1      00.0  35.0   07.4   00.0   03.9   00.7   -22.3 06.6    -07.5      00081     00228
 2      00.0  15.0   05.2   00.0   01.2   00.6   -02.3 02.9    00.0       00301     00633
 3      00.0  09.0   03.4   00.4   01.2   00.7   -00.8 13.2    08.8       00054     00137
 4      01.0  12.0   06.1   00.4   01.2   00.6   -01.6 06.8    00.3       00160     00333

net#   Yearday/Time  hh:mm:ss  pmin      pmax     pavg     #obs     vol
                   (NetOpenTime)
 0       129.388403  9:19:18   -005.4   -003.2   -004.1   00021    00013
 1       129.389479  9:20:50   -003.2   041.3    018.1    00081    00228
 2       129.393287  9:26:19   035.6    038.6    037.2    00301    00633
 3       129.407326  9:46:32   004.8    037.3    020.5    00054    00137
 4       129.409873  9:50:13   001.7    005.8    005.1    00160    00333
 5       129.417361  10:0:59
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[Tow 20 log file missing]

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Tow: OC471021   OC471
 Date: 11 May 2011
 Temperature Probe #  535    Conductivity Probe #  120   Pressure Probe #  124
 Flow Meter Calibration  6.41 (m/count)
                         MOCNESS STATISTICAL SUMMARY

net#   pmin   pmax   pavg   tmin   tmax   tavg   thmin  thmax  thavg  smin   smax   savg
 0     -006.7 -003.9 -005.0 27.9   28.8   28.5   27.9   28.8   28.5   50.00  50.00  50.00
 1     -003.7 040.3  009.5  26.4   28.7   27.6   26.4   28.7   27.6   03.58  50.00  41.70
 2     038.7  041.2  039.9  26.4   26.5   26.4   26.4   26.4   26.4   36.81  36.84  36.82
 3     004.7  040.3  021.8  26.4   27.8   27.0   26.3   27.8   27.0   34.71  36.83  36.26
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 4     001.1  005.5  004.7  27.5   28.0   27.6   27.5   28.0   27.6   33.34  35.91  35.48

net#   simin  simax  siavg  cmin   cmax   cavg   fmin   fmax   favg   oxmin  oxmax  oxavg
 0     33.46  33.75  33.54  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 1     -01.13 33.69  27.58  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 2     24.26  24.31  24.29  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 3     22.25  24.30  23.69  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 4     21.14  23.24  22.88  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0

net#   amin   amax   aavg   spmin  spmax  spavg  armin  armax  aravg      #obs       vol
 0      00.0  00.0   00.0   00.0   00.8   00.4   -03.7 12.5    04.3       00015      00024
 1      00.0  07.0   01.4   00.0   00.8   00.1   -21.7 -00.2   -08.7      00076      00041
 2      00.0  13.0   06.0   00.0   01.2   00.6   -02.5 02.3    00.0       00301      00663
 3      01.0  09.0   05.2   00.4   01.2   00.8   -01.4 12.0    08.8       00059      00164
 4      00.0  10.0   05.6   00.4   00.8   00.6   -01.6 07.4    00.3       00160      00356

net#   Yearday/Time  hh:mm:ss  pmin      pmax     pavg     #obs     vol
                  (NetOpenTime)
 0       131.388646  9:19:39   -006.7   -003.9   -005.0   00015    00024
 1       131.389410  9:20:45   -003.7   040.3    009.5    00076    00041
 2       131.392998  9:25:55   038.7    041.2    039.9    00301    00663
 3       131.407025  9:46:6    004.7    040.3    021.8    00059    00164
 4       131.409815  9:50:8    001.1    005.5    004.7    00160    00356
 5       131.417292  10:0:54

Tow: OC471022   OC471
 Date: 12 May 2011
 Temperature Probe #  535    Conductivity Probe #  120   Pressure Probe #  124
 Flow Meter Calibration  6.41 (m/count)
                         MOCNESS STATISTICAL SUMMARY

net#   pmin   pmax   pavg   tmin   tmax   tavg   thmin  thmax  thavg  smin   smax   savg
 0     -006.3 -003.4 -004.6 28.2   28.8   28.6   28.2   28.8   28.6   00.01  50.00  47.50
 1     -003.5 025.8  005.5  27.4   28.7   28.4   27.4   28.7   28.4   11.83  50.00  40.41
 2     022.7  026.5  024.8  27.5   27.7   27.6   27.5   27.7   27.6   35.18  35.41  35.27
 3     004.4  025.4  014.4  27.4   28.7   28.1   27.4   28.7   28.1   31.32  35.25  33.15
 4     001.8  005.8  005.0  28.7   28.7   28.7   28.7   28.7   28.7   31.32  31.36  31.33

net#   simin  simax  siavg  cmin   cmax   cavg   fmin   fmax   favg   oxmin  oxmax  oxavg
 0     -03.81 33.56  31.65  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 1     04.89  33.57  26.36  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 2     22.67  22.84  22.73  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 3     19.41  22.74  20.97  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 4     19.40  19.44  19.41  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0

net#   amin   amax   aavg   spmin  spmax  spavg  armin  armax  aravg      #obs       vol
 0      00.0  00.0   00.0   00.0   00.8   00.3   -03.1 11.9    02.8       00020      00026
 1      00.0  14.0   03.7   00.0   05.8   00.9   -22.1 00.2    -06.9      00063      00246
 2      00.0  18.0   06.4   00.0   01.2   00.6   -03.9 02.7    00.0       00302      00663
 3      00.0  10.0   03.3   00.0   01.2   00.7   -01.2 12.2    08.4       00035      00091
 4      00.0  13.0   06.4   00.4   01.2   00.8   -02.7 06.8    00.2       00160      00446

net#   Yearday/Time  hh:mm:ss  pmin      pmax     pavg     #obs     vol
                  (NetOpenTime)
 0       132.388044  9:18:47   -006.3   -003.4   -004.6   00020    00026
 1       132.389097  9:20:17   -003.5   025.8    005.5    00063    00246
 2       132.392072  9:24:35   022.7    026.5    024.8    00302    00663
 3       132.406146  9:44:51   004.4    025.4    014.4    00035    00091
 4       132.407824  9:47:16   001.8    005.8    005.0    00160    00446
 5       132.415312  9:58:2

Tow: OC471023   OC471
 Date: 12 May 2011
 Temperature Probe #  535    Conductivity Probe #  120   Pressure Probe #  124
 Flow Meter Calibration  6.41 (m/count)
                         MOCNESS STATISTICAL SUMMARY

net#   pmin   pmax   pavg   tmin   tmax   tavg   thmin  thmax  thavg  smin   smax   savg
 0     -006.4 -003.5 -005.0 30.1   30.6   30.5   30.1   30.6   30.5   00.04  00.04  00.04
 1     -003.6 025.4  005.5  27.5   30.6   29.0   27.5   30.6   29.0   00.04  35.41  18.62
 2     024.7  026.7  025.7  27.7   27.8   27.7   27.7   27.8   27.7   35.28  35.42  35.38
```
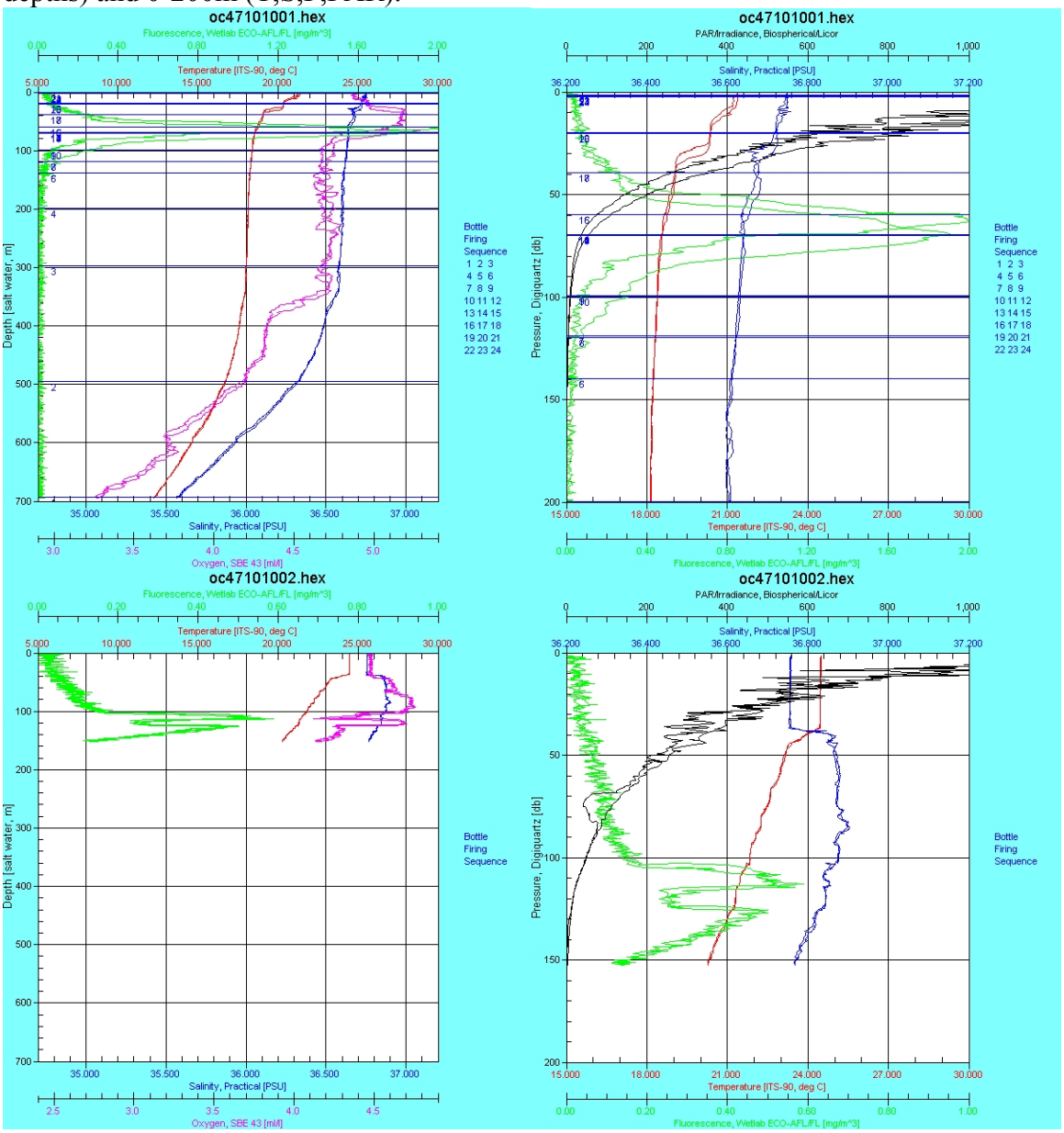
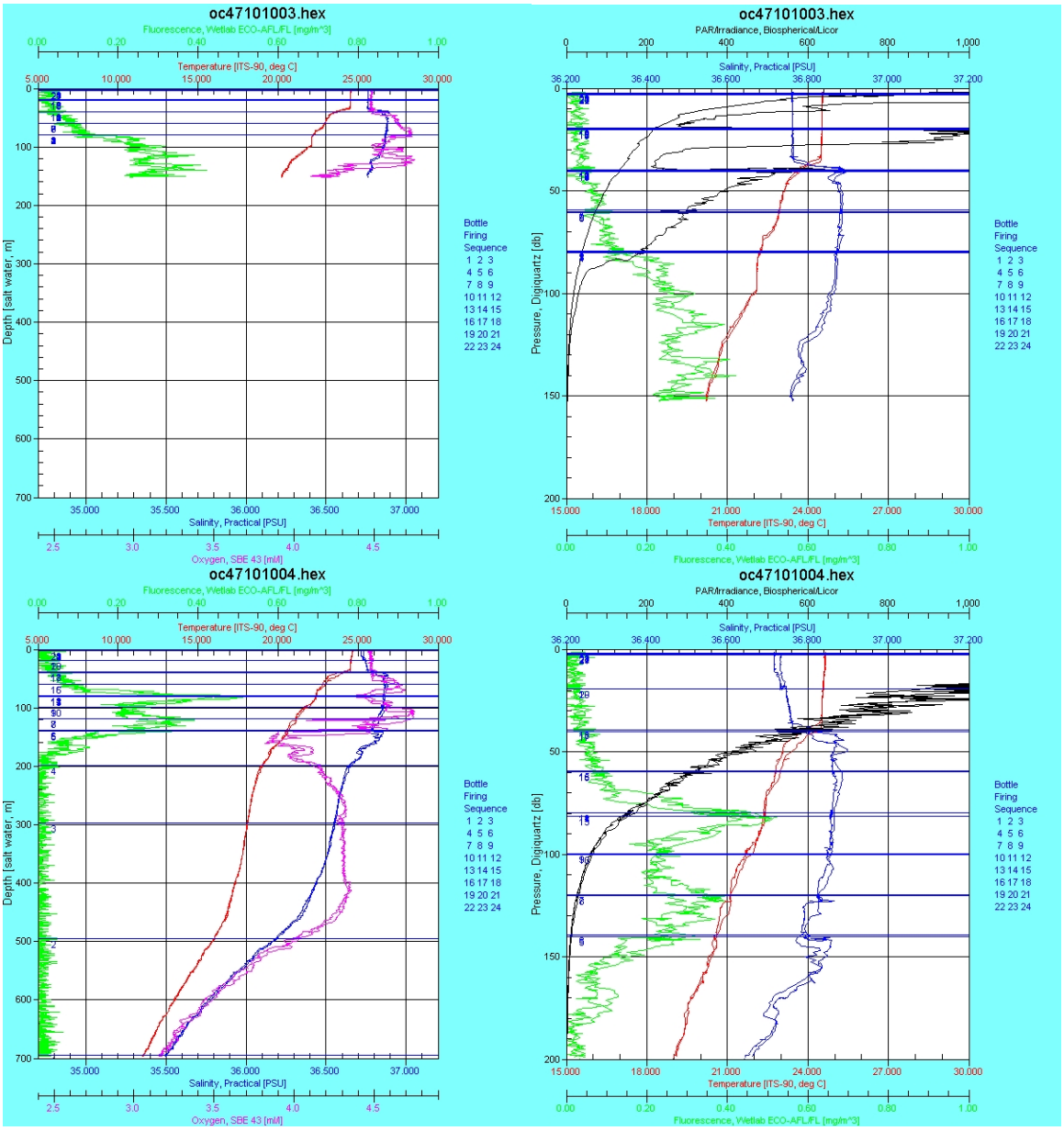

```
 3     004.5  025.9  014.5  27.5   28.7   28.2   27.5   28.7   28.2   31.30  35.29  33.11
 4     001.2  005.3  004.6  28.7   28.8   28.7   28.7   28.8   28.7   31.28  31.31  31.30

net#   simin  simax  siavg  cmin   cmax   cavg   fmin   fmax   favg   oxmin  oxmax  oxavg
 0     -04.51 -04.34 -04.46 00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 1     -04.51 22.79  09.84  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 2     22.71  22.81  22.77  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 3     19.37  22.72  20.92  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0
 4     19.36  19.39  19.37  00.00  00.00  00.00  00.00  00.00  00.00  00.0   00.0   00.0

net#   amin   amax   aavg   spmin  spmax  spavg  armin  armax  aravg      #obs      vol
 0      00.0  00.0   00.0   00.0   00.8   00.5   -04.1 12.0    05.6       00012     00024
 1      00.0  10.0   02.9   00.0   04.7   00.7   -21.1 00.2    -08.1      00053     00146
 2      00.0  07.0   01.6   00.0   01.2   00.3   -04.8 02.1    -00.1      00227     00295
 3      00.0  10.0   03.8   00.0   01.2   00.6   00.0  12.0    07.9       00039     00088
 4      00.0  10.0   03.3   00.4   00.8   00.5   -01.5 06.8    00.5       00085     00167

net#   Yearday/Time  hh:mm:ss  pmin      pmax     pavg     #obs     vol
                  (NetOpenTime)
 0       132.429456  10:18:25  -006.4   -003.5   -005.0   00012    00024
 1       132.430208  10:19:29  -003.6   025.4    005.5    00053    00146
 2       132.432720  10:23:6   024.7    026.7    025.7    00227    00295
 3       132.443333  10:38:24  004.5    025.9    014.5    00039    00088
 4       132.445185  10:41:3   001.2    005.3    004.6    00085    00167
 5       132.449178  10:46:49
```

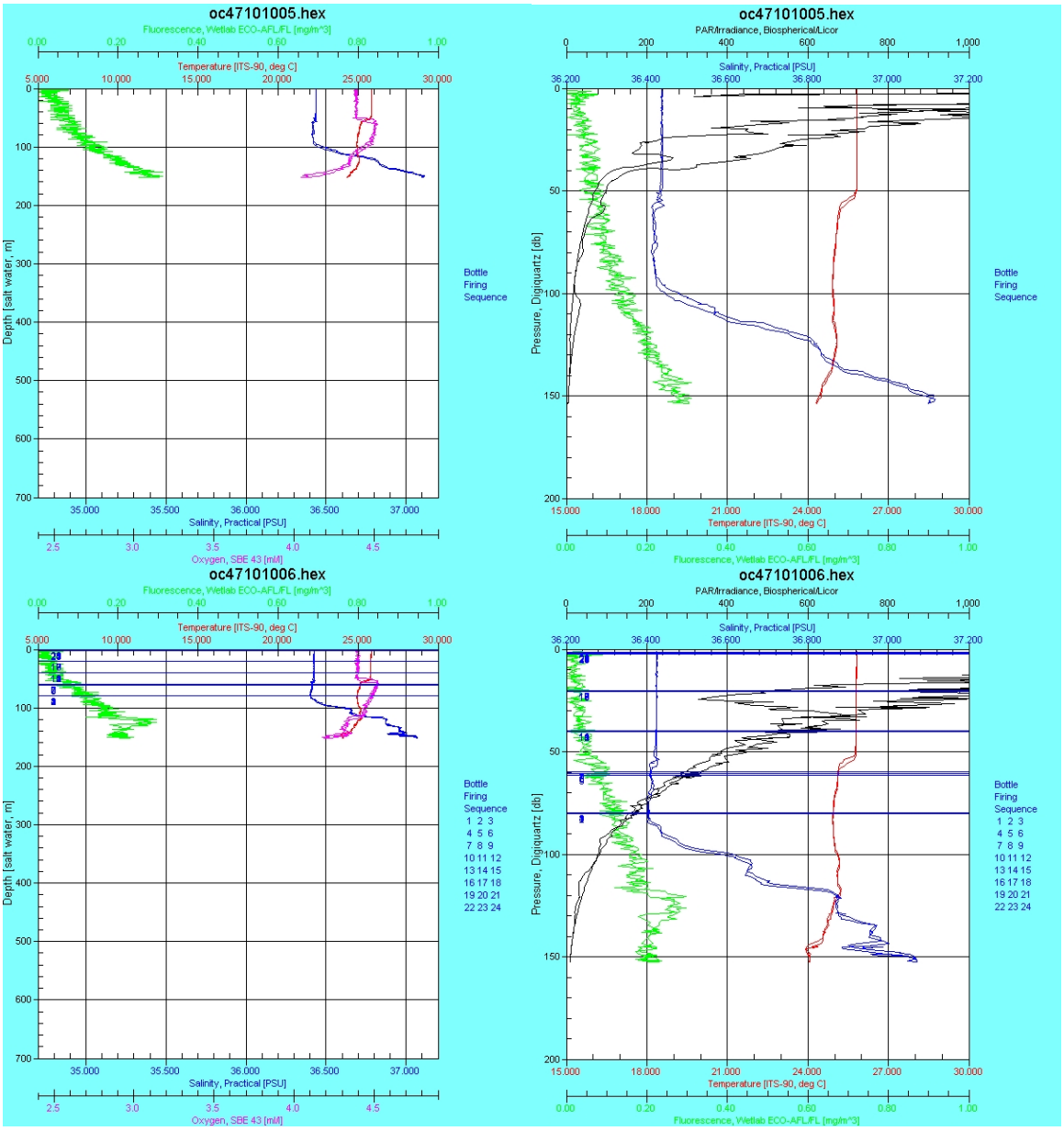
Appendix F. VPR tow log

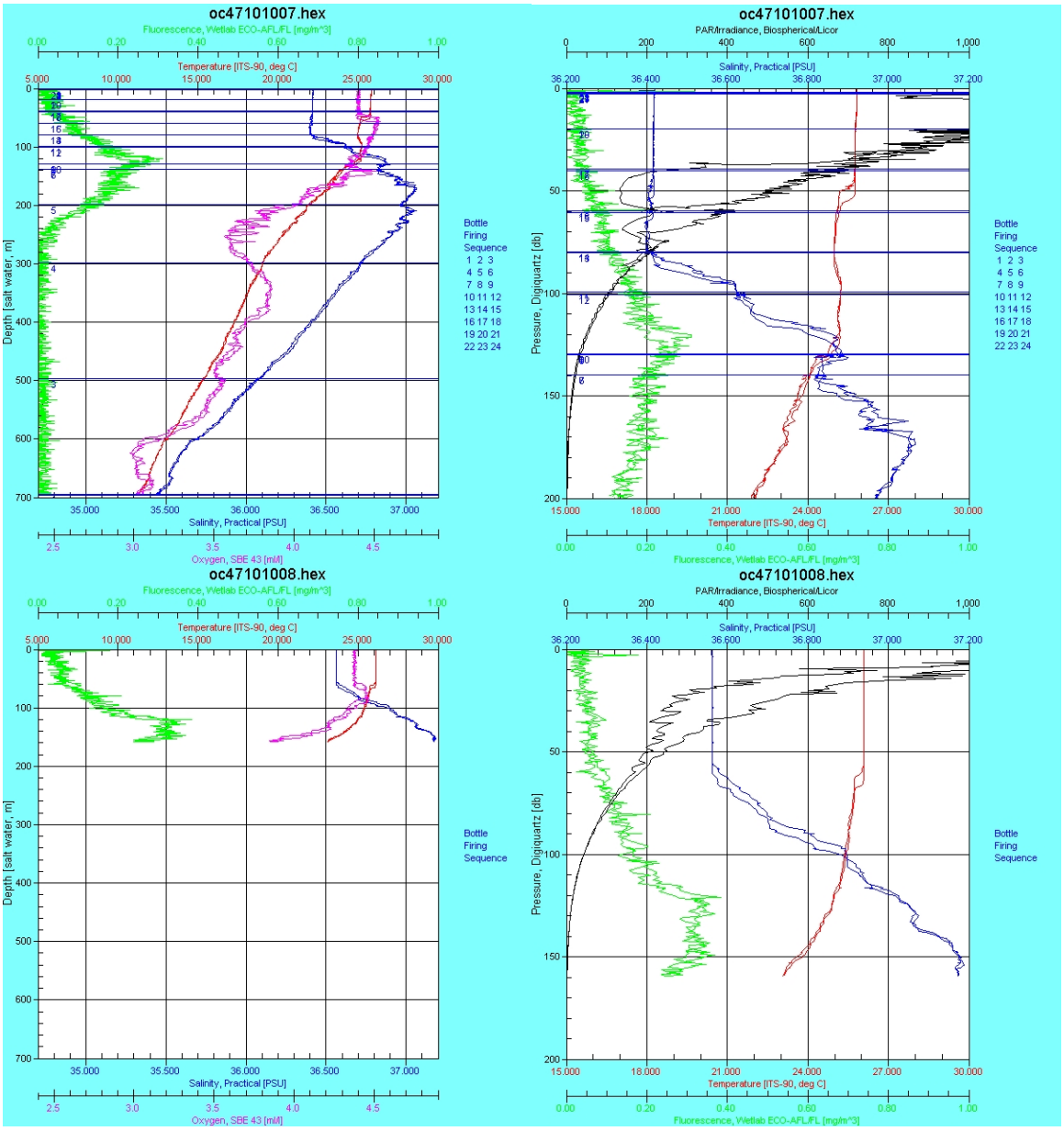
Tow ID	Start	End	Comments
VPR1	4/26/11 1330	4/28/11 0745	BATS/C1, AC1, toward C2/C3
VPR2	4/28/11 1300	4/29/11 0745	C3 to AC2
VPR3	4/29/11 1245	4/30/11 0745	AC2 to AC3
VPR4	4/30/11	5/1/11 0700	AC3 to C4
VPR5	5/1/11	5/2/11 0700	C4 survey
VPR6	5/2/11	5/3/11	C4 toward AC4
VPR7	5/3/11	5/4/11	AC4 S then E
VPR8	5/4/11	5/5/11	C5 survey
VPR9	5/5/11	5/6/11	Toward AC5 center
VPR10	5/6/11	5/7/11	NNE toward C6; station at frontal boundary
VPR11	5/7/11	5/8/11	NNE into C6
VPR12	5/8/11	5/9/11	C6 survey; no optode, SBE43 only
VPR13	5/9/11	5/9/11	Failed launch
VPR14	5/10/11	5/10/11	Optode configuration incorrect, making the data from the tow unusable. Wait loop removed from Optode acquisition software.
VPR15	5/10/11	5/11/11	Optode firmware updated. Multiple tries at Optode data stream at the beginning; settled on old version a couple hours into the tow.
VPR16	5/11/11	5/12/11	Survey toward SW

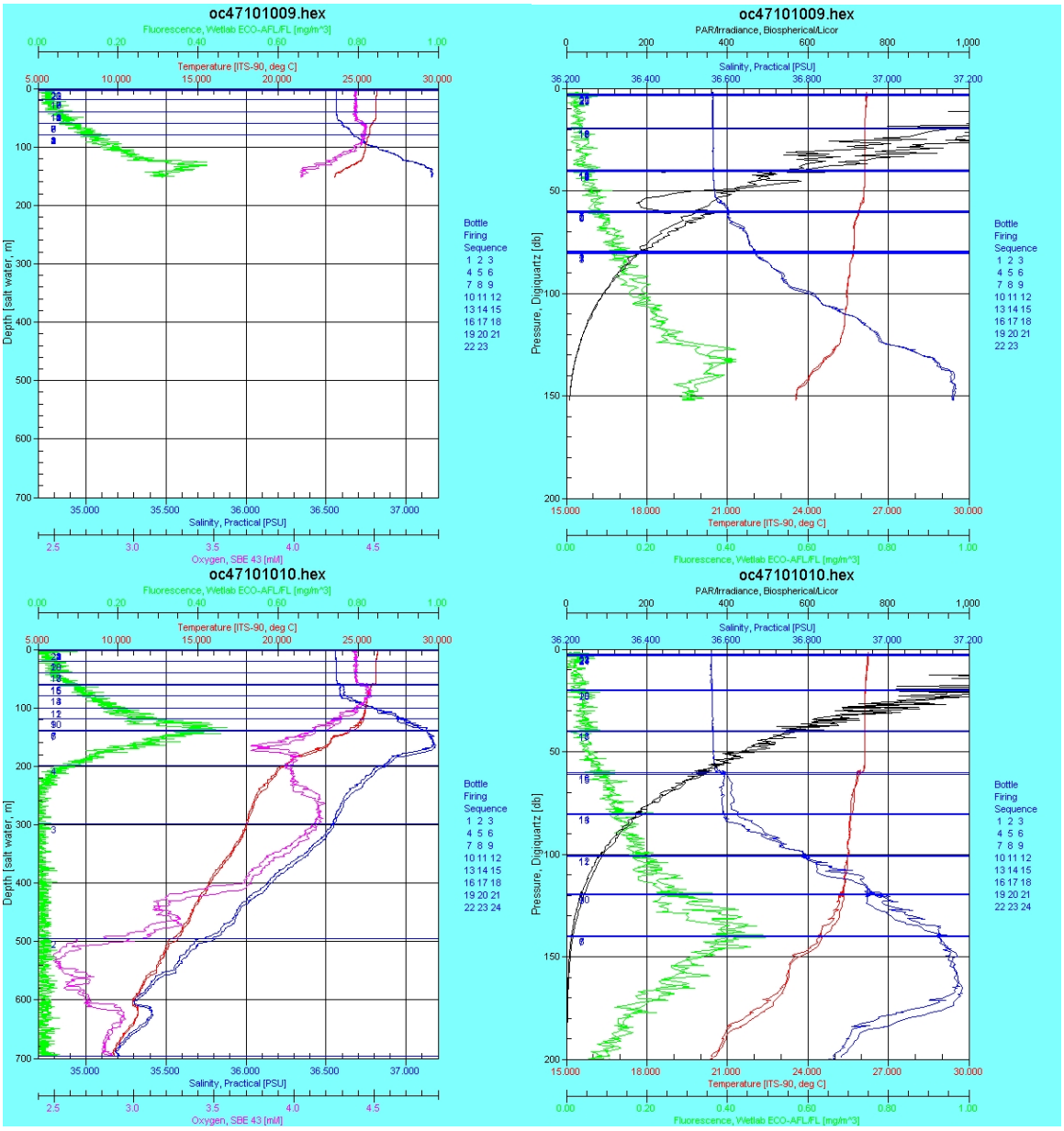
Appendix G. CTD Profiles: each cast is plotted in two formats: 0-700m (T,S,F,O_2, bottle depths) and 0-200m (T,S,F,PAR).

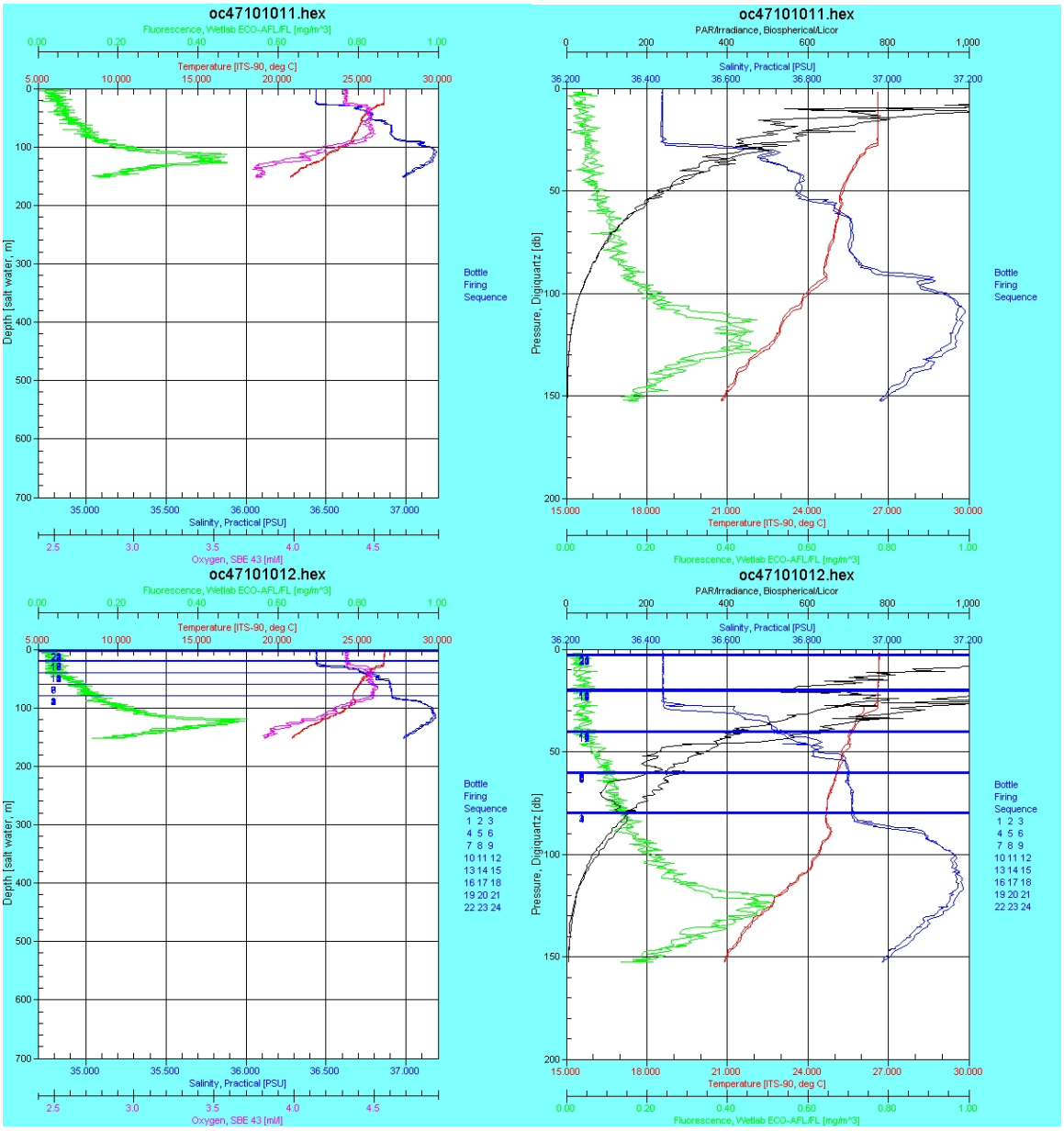


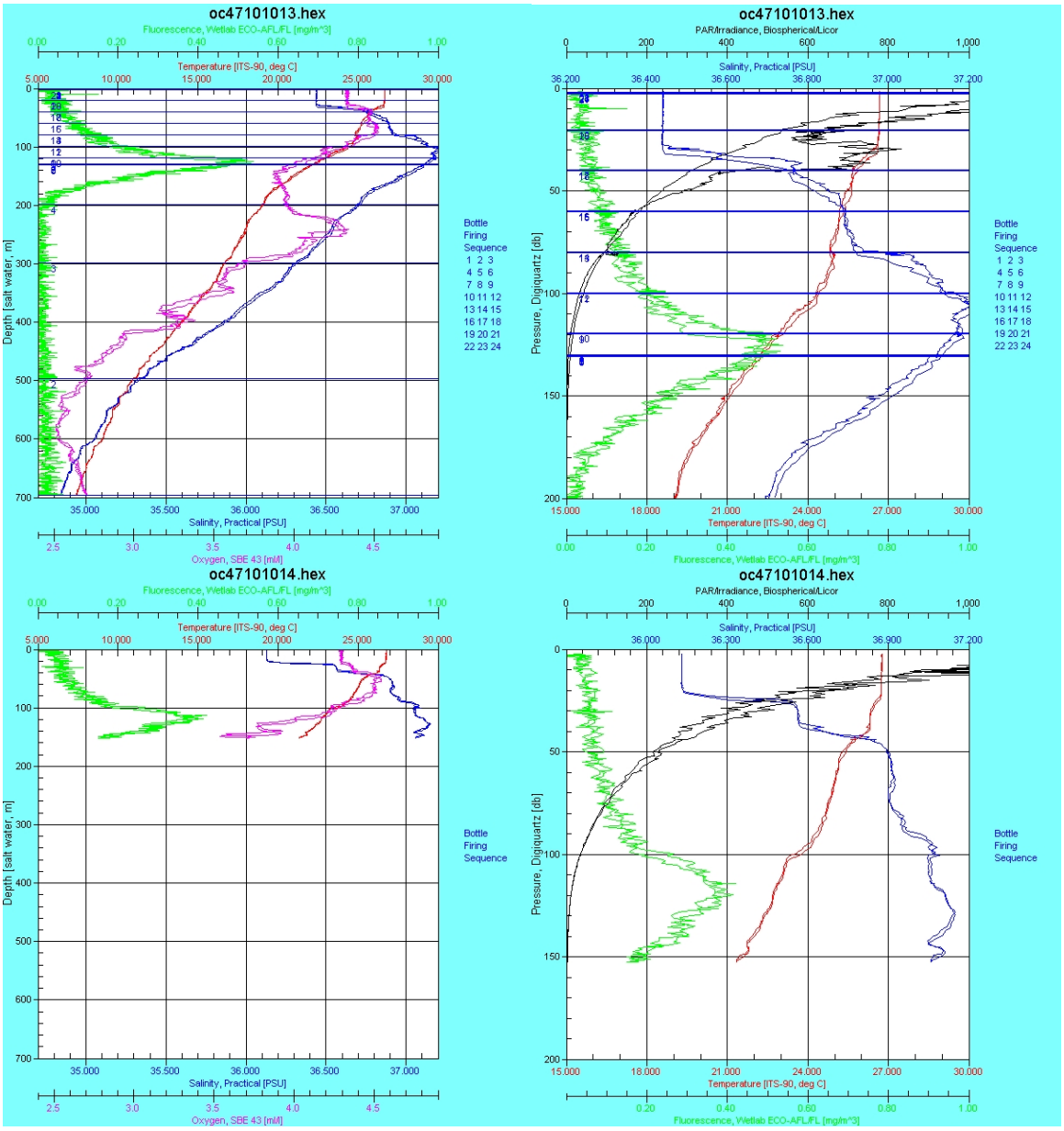

oc47101003.hex
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
1 2 3
4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
19 20 21
22 23 24
oc47101003.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
1 2 3
4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
19 20 21
22 23 24
oc47101004.hex
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
1 2 3
4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
19 20 21
22 23 24
oc47101004.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
1 2 3
4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
19 20 21
22 23 24


oc47101005.hex
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
oc47101005.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
oc47101006.hex
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
1 2 3
4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
19 20 21
22 23 24
oc47101006.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
1 2 3
4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
19 20 21
22 23 24


oc47101007.hex
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
1 2 3
4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
19 20 21
22 23 24
oc47101007.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
1 2 3
4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
19 20 21
22 23 24
oc47101008.hex
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
oc47101008.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence


oc47101009.hex
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
oc47101009.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
oc47101010.hex
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
oc47101010.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence


oc47101011.hex
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
oc47101012.hex
oc47101011.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
oc47101012.hex
1 2 3
4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
19 20 21
22 23 24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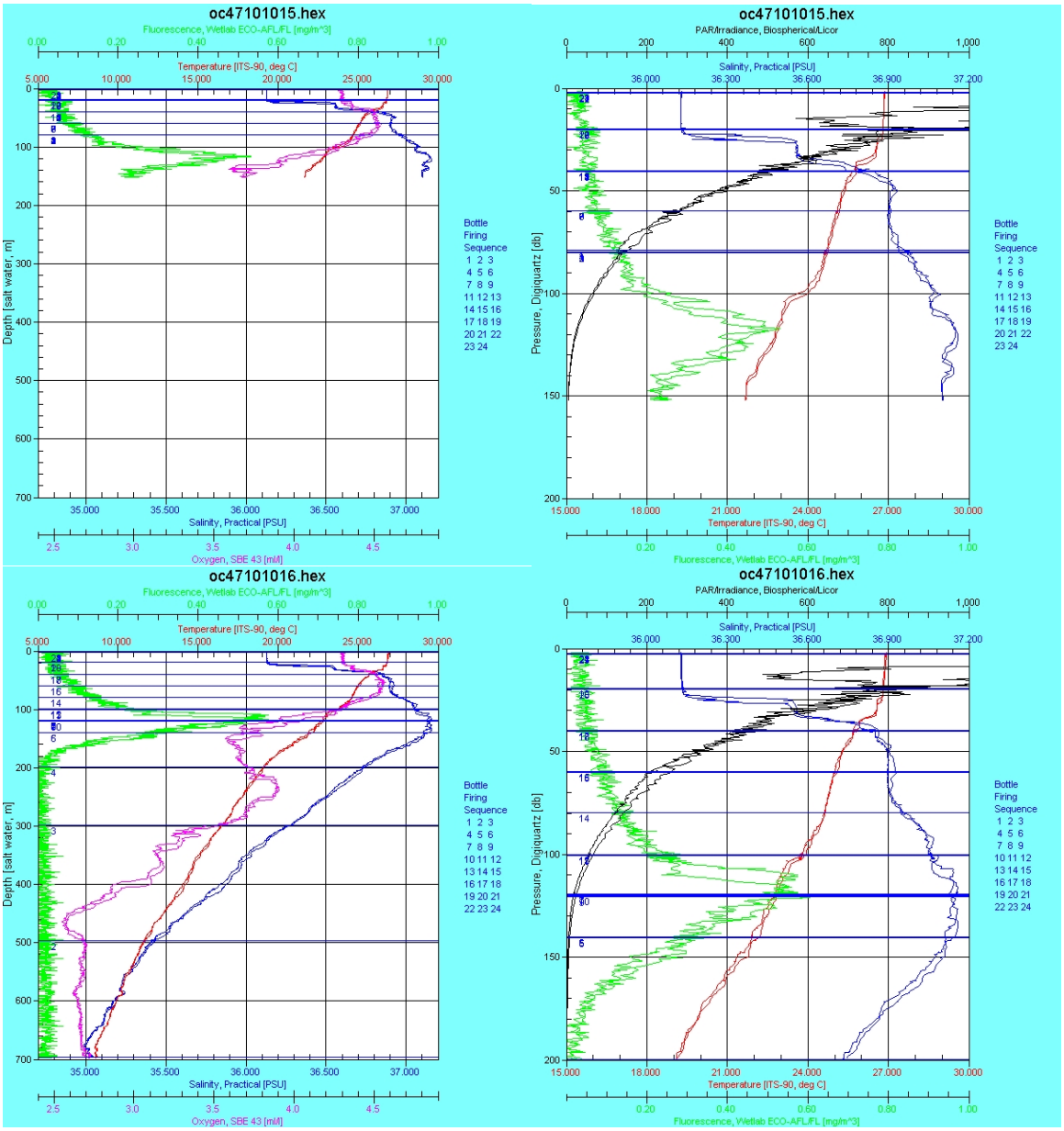
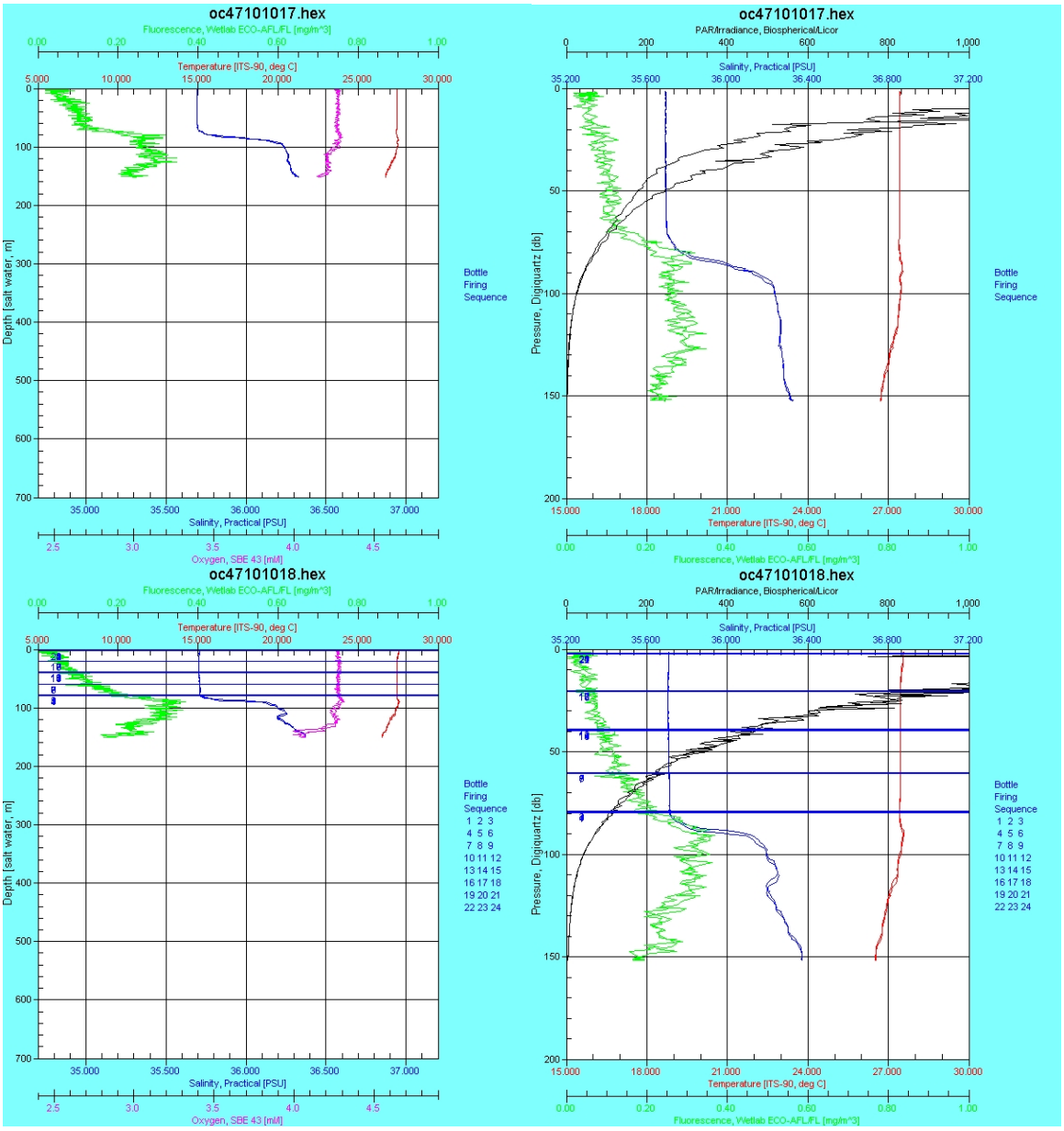
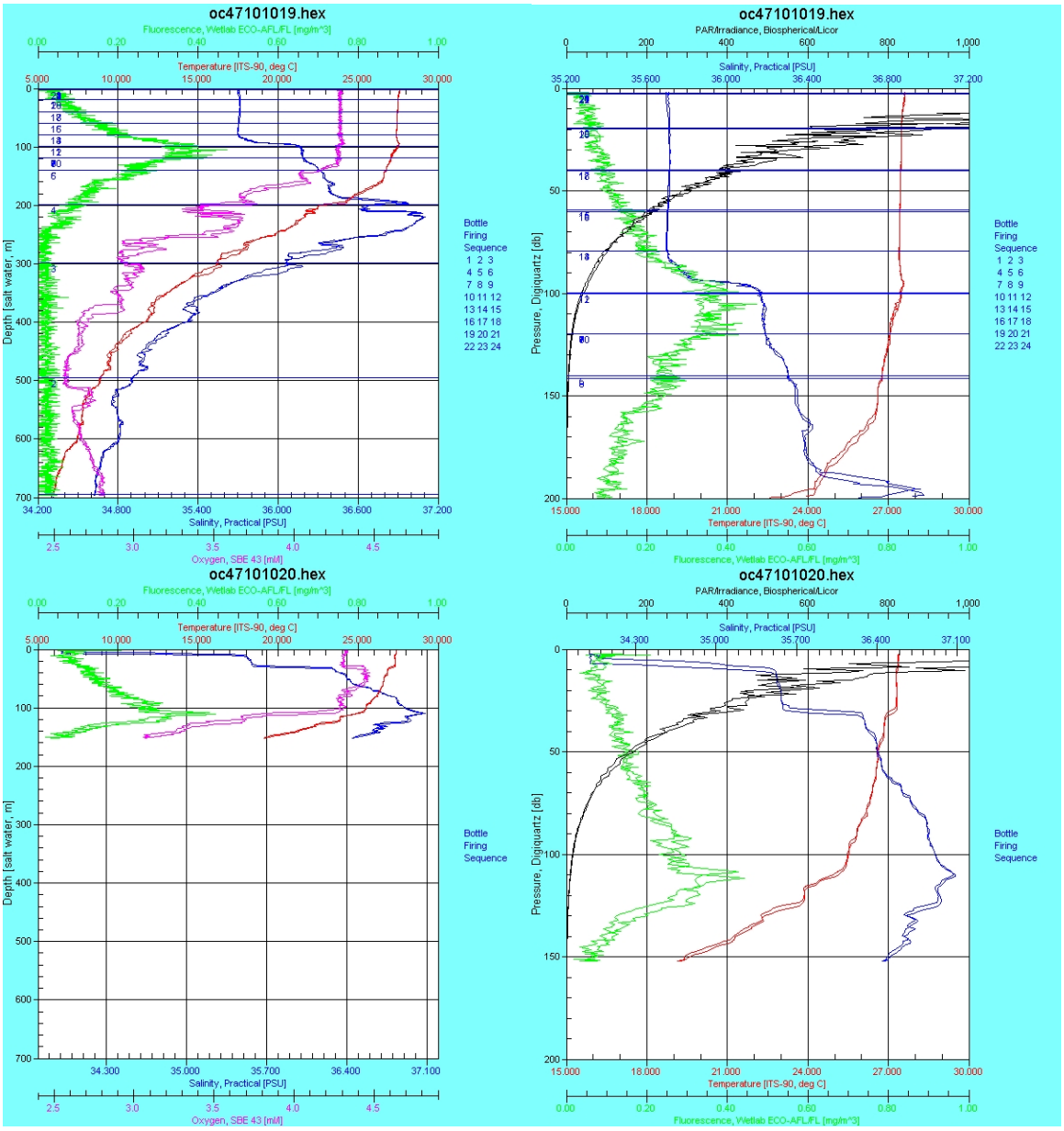
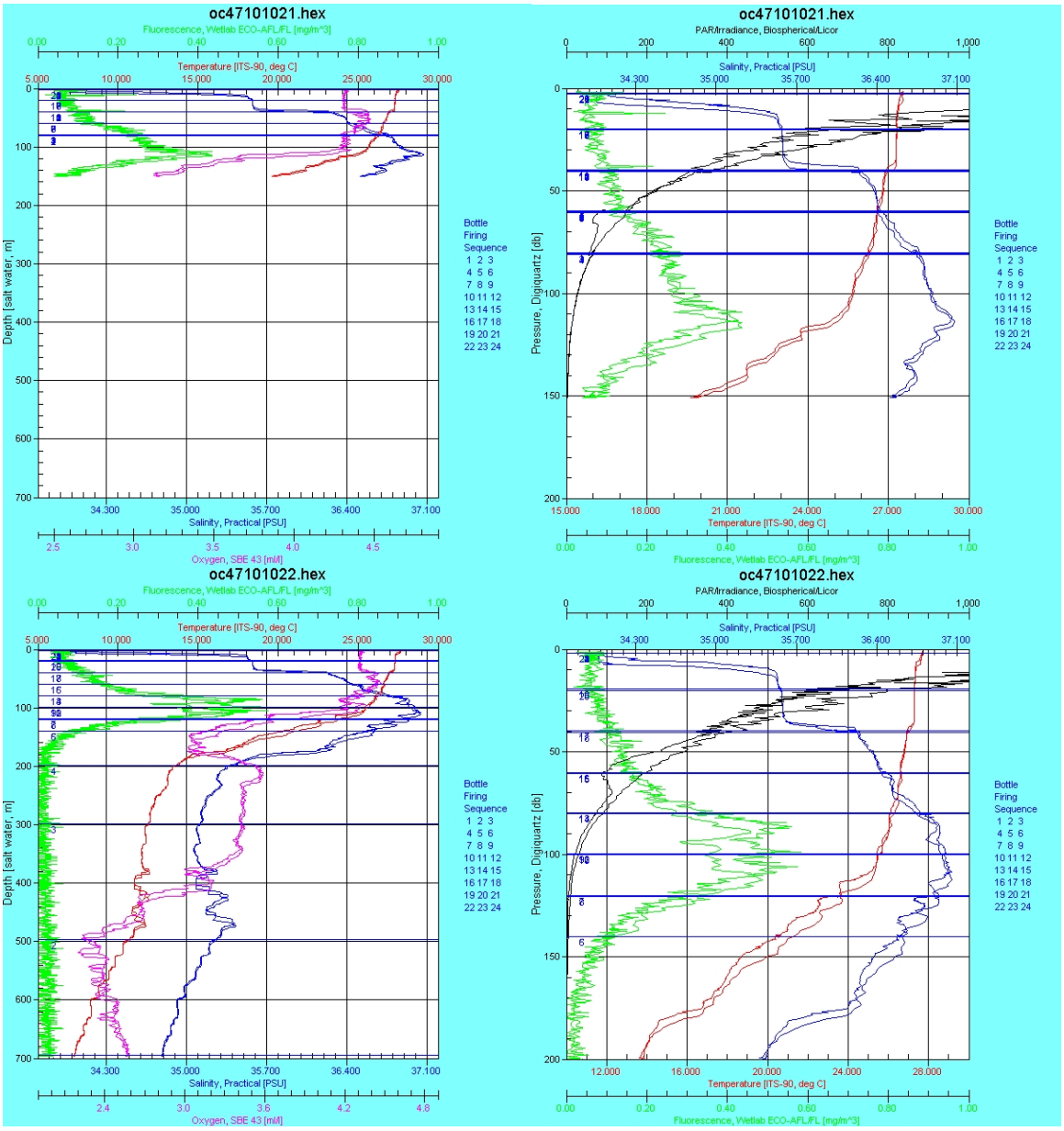
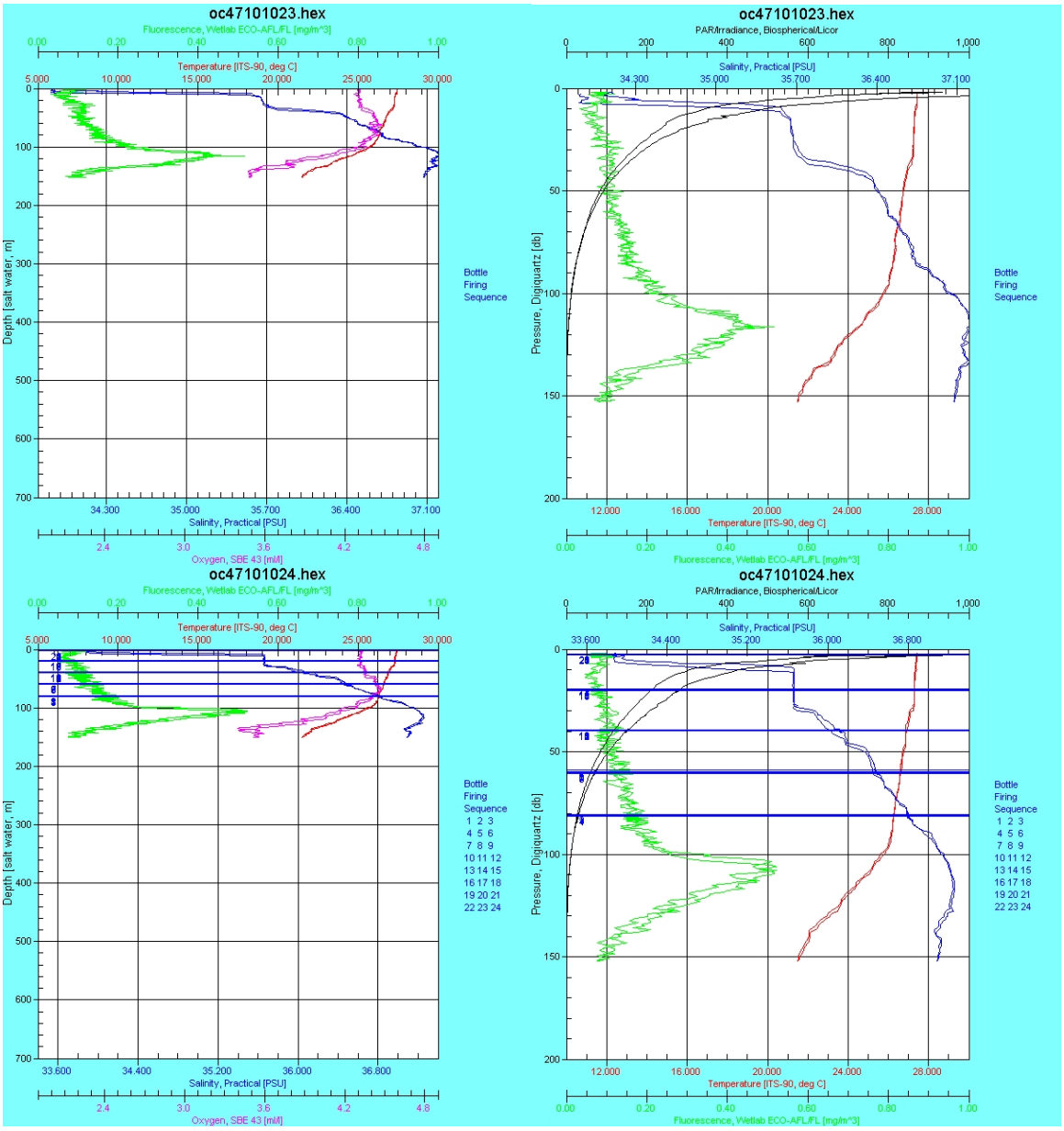
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
oc47101013.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
oc47101014.hex
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
oc47101014.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence


oc47101015.hex
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
oc47101015.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
oc47101016.hex
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
oc47101016.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence


oc47101017.hex
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
oc47101017.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
oc47101018.hex
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
1 2 3
4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
19 20 21
22 23 24
oc47101018.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
1 2 3
4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
19 20 21
22 23 24


oc47101019.hex
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
oc47101019.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
oc47101020.hex
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
oc47101020.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence


oc47101021.hex
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
1 2 3
4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
19 20 21
22 23 24
oc47101021.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
1 2 3
4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
19 20 21
22 23 24
oc47101022.hex
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
1 2 3
4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
19 20 21
22 23 24
oc47101022.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
1 2 3
4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
19 20 21
22 23 24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Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
oc47101023.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
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Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
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4 5 6
7 8 9
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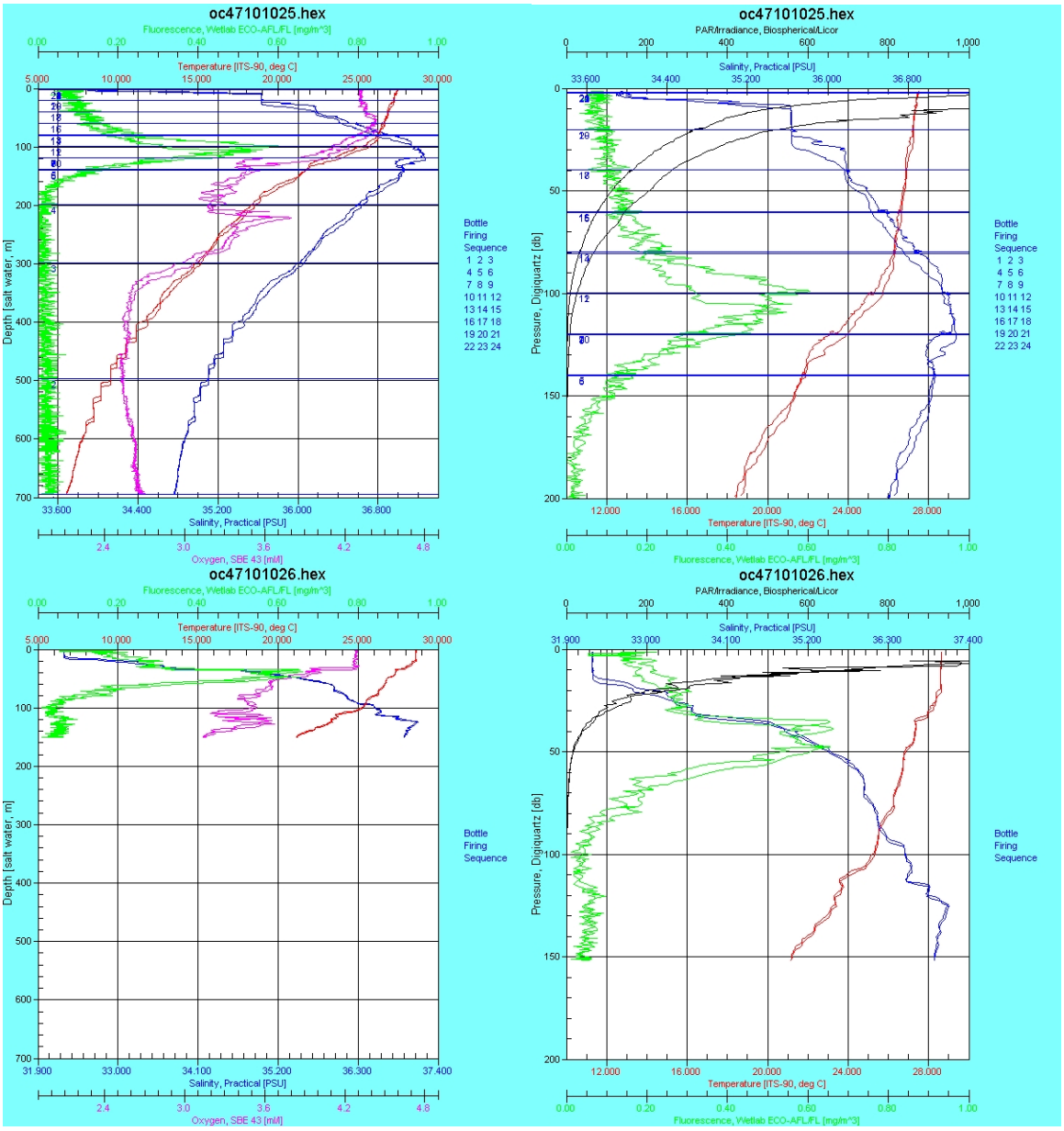
13 14 15
16 17 18
19 20 21
22 23 24
oc47101024.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
1 2 3
4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
19 20 21
22 23 24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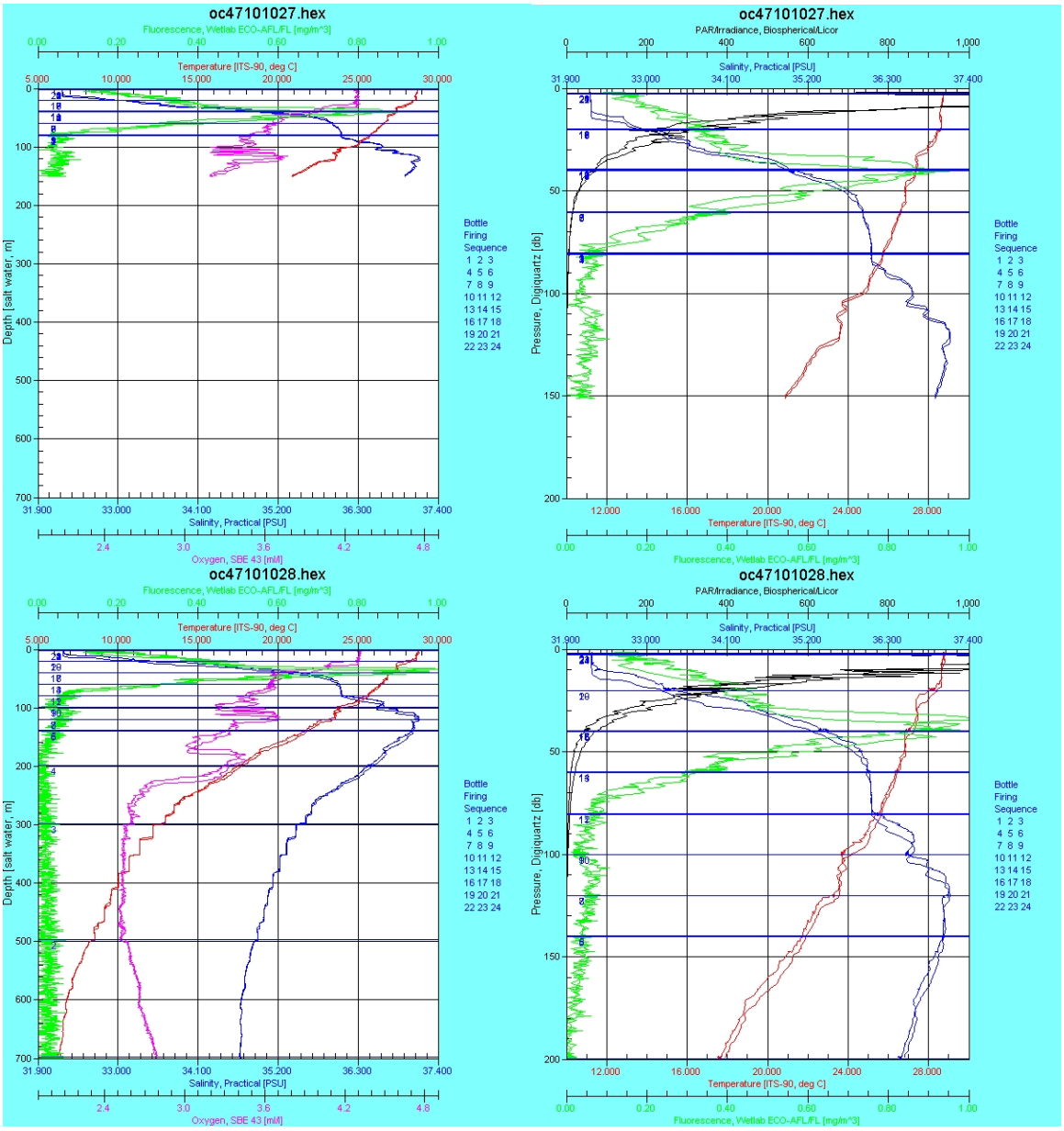
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
oc47101025.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
oc47101026.hex
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
oc47101026.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence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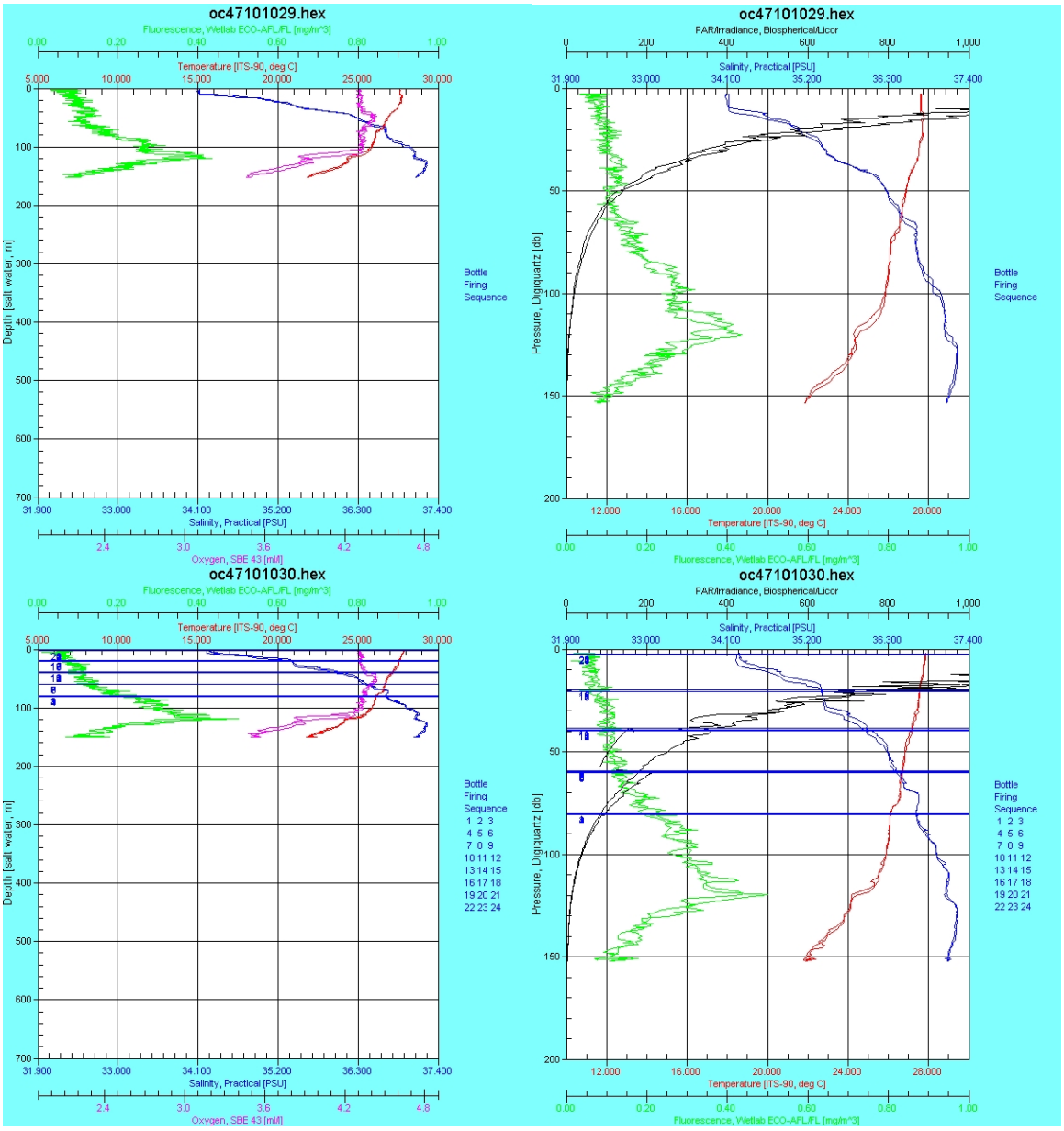
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
oc47101027.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
oc47101028.hex
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
oc47101028.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence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Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
oc47101029.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
oc47101030.hex
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
1 2 3
4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
19 20 21
22 23 24
oc47101030.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
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7 8 9
10 11 12
13 14 15
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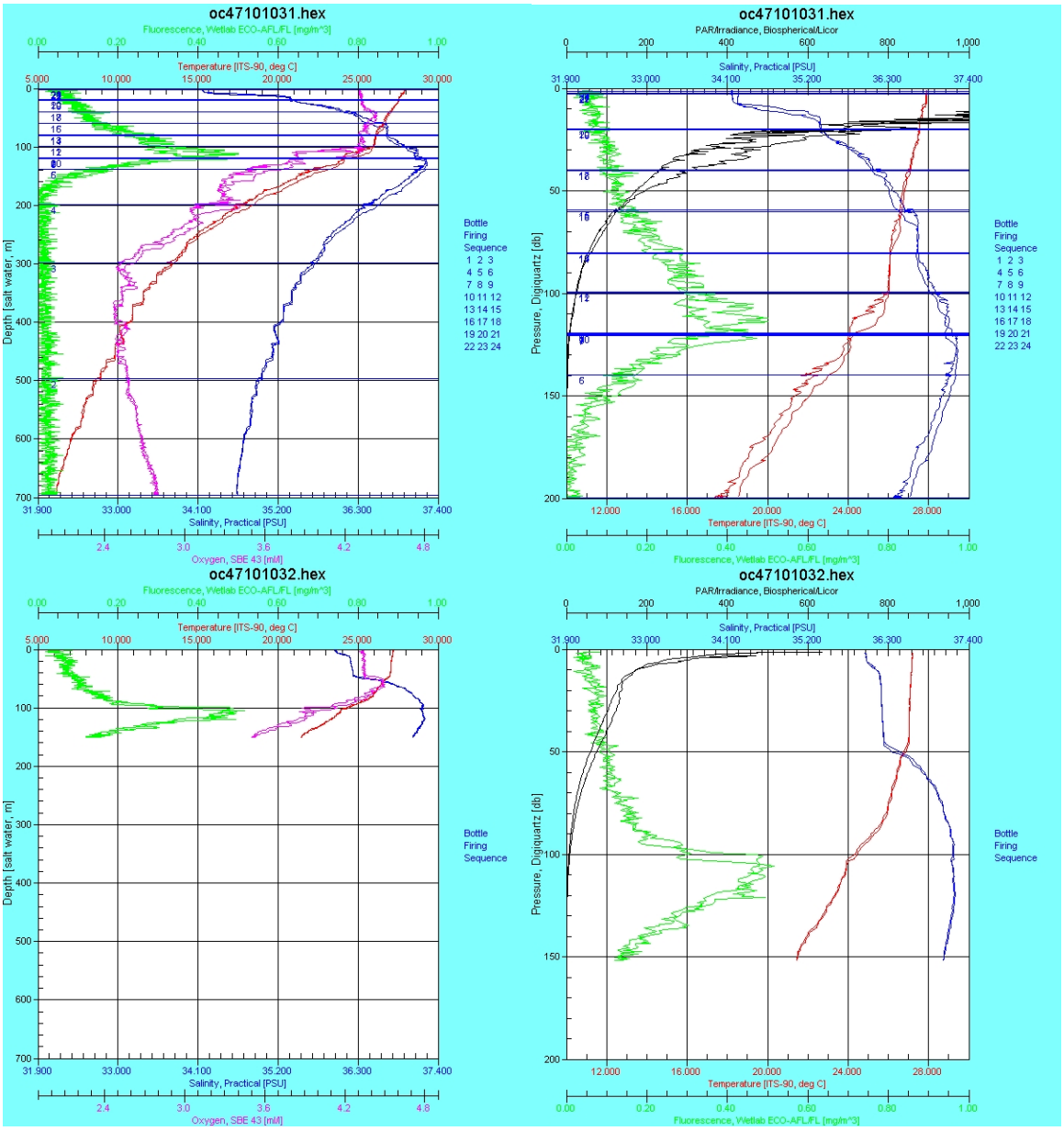
19 20 21
22 23 24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Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
oc47101031.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
oc47101032.hex
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
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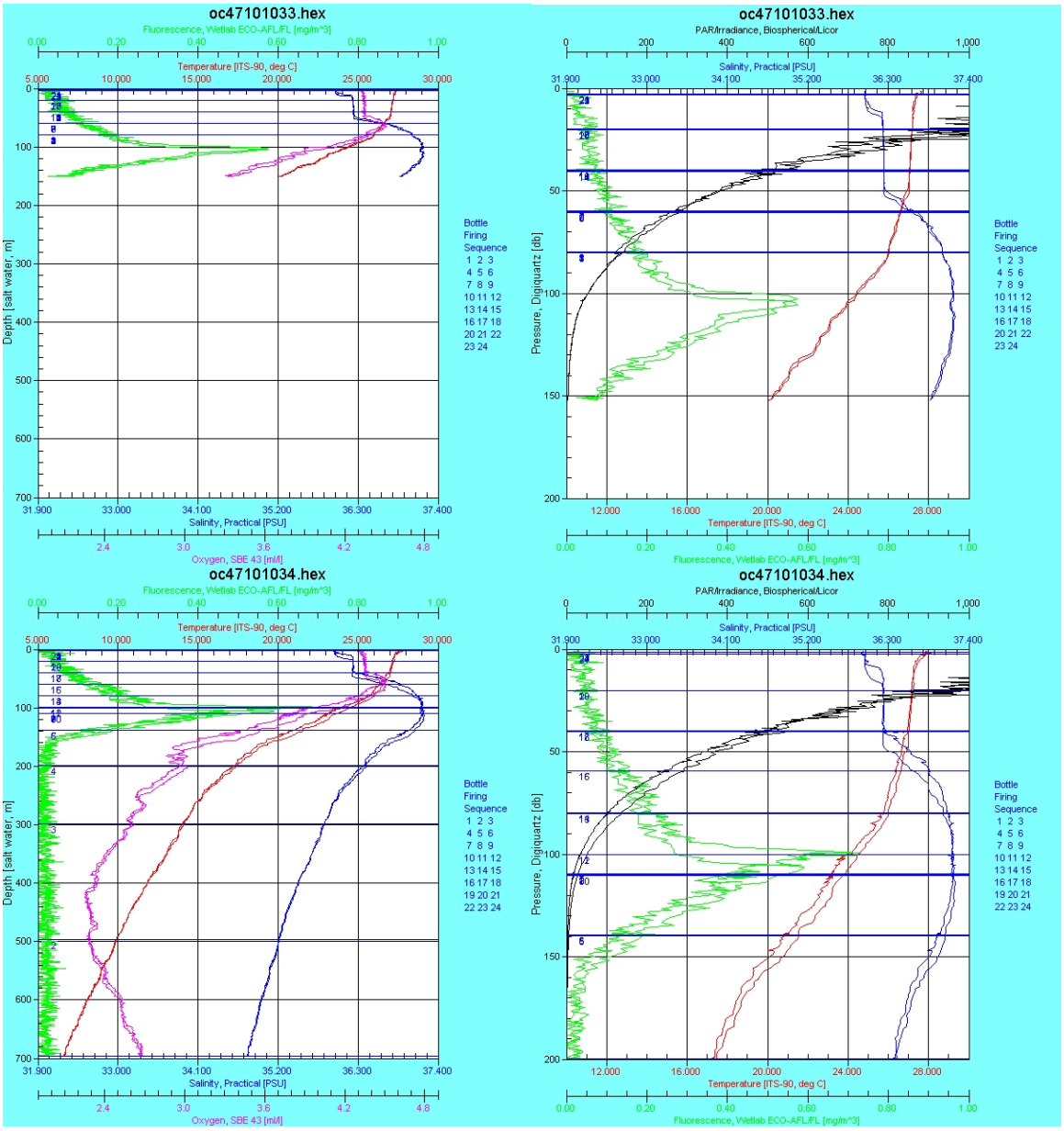
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence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Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
1 2 3
4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
20 21 22
23 24
oc47101033.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
1 2 3
4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
20 21 22
23 24
oc47101034.hex
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
1 2 3
4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
19 20 21
22 23 24
oc47101034.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
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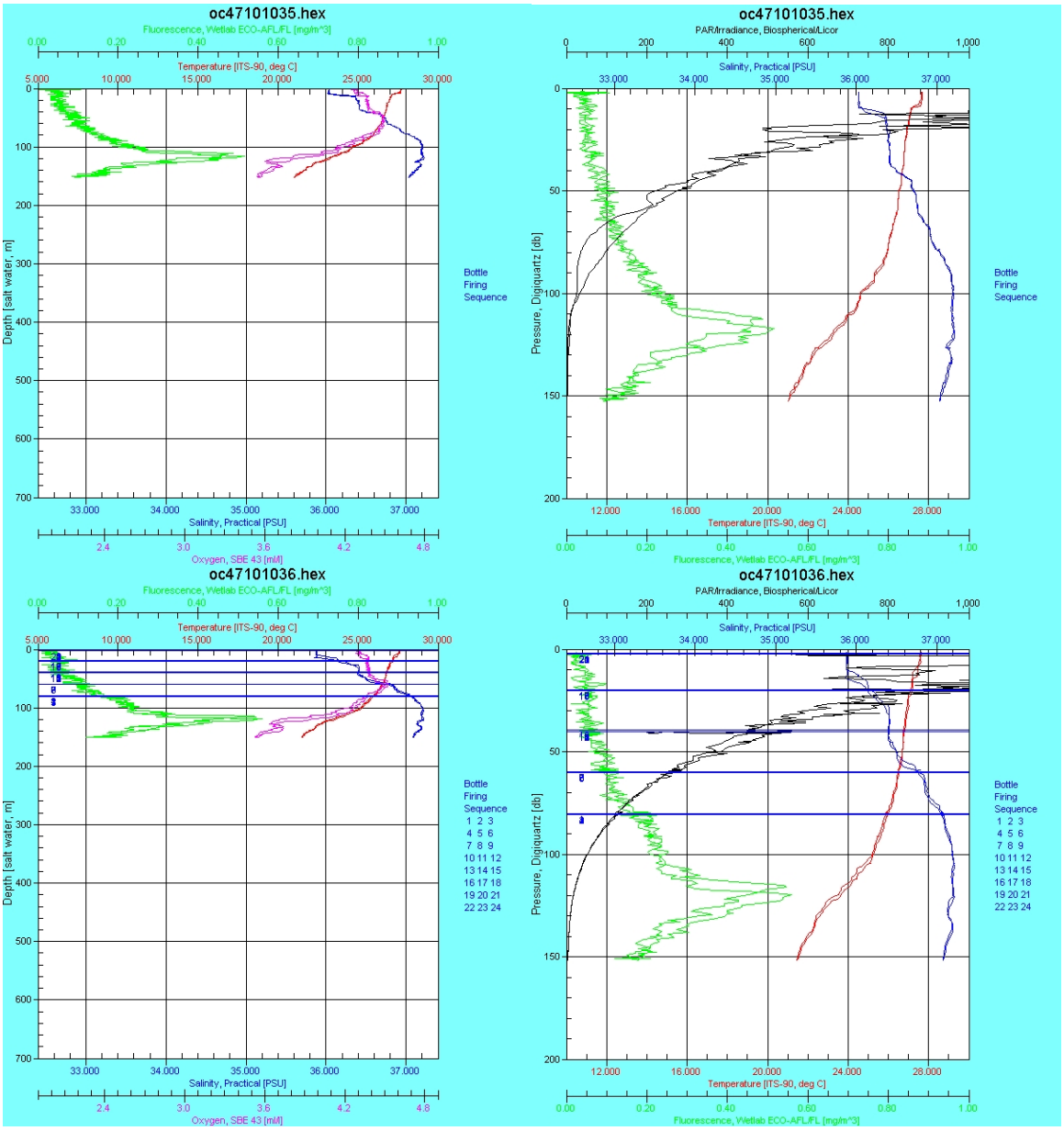
4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
19 20 21
22 23 24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Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
oc47101035.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
oc47101036.hex
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
1 2 3
4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
19 20 21
22 23 24
oc47101036.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
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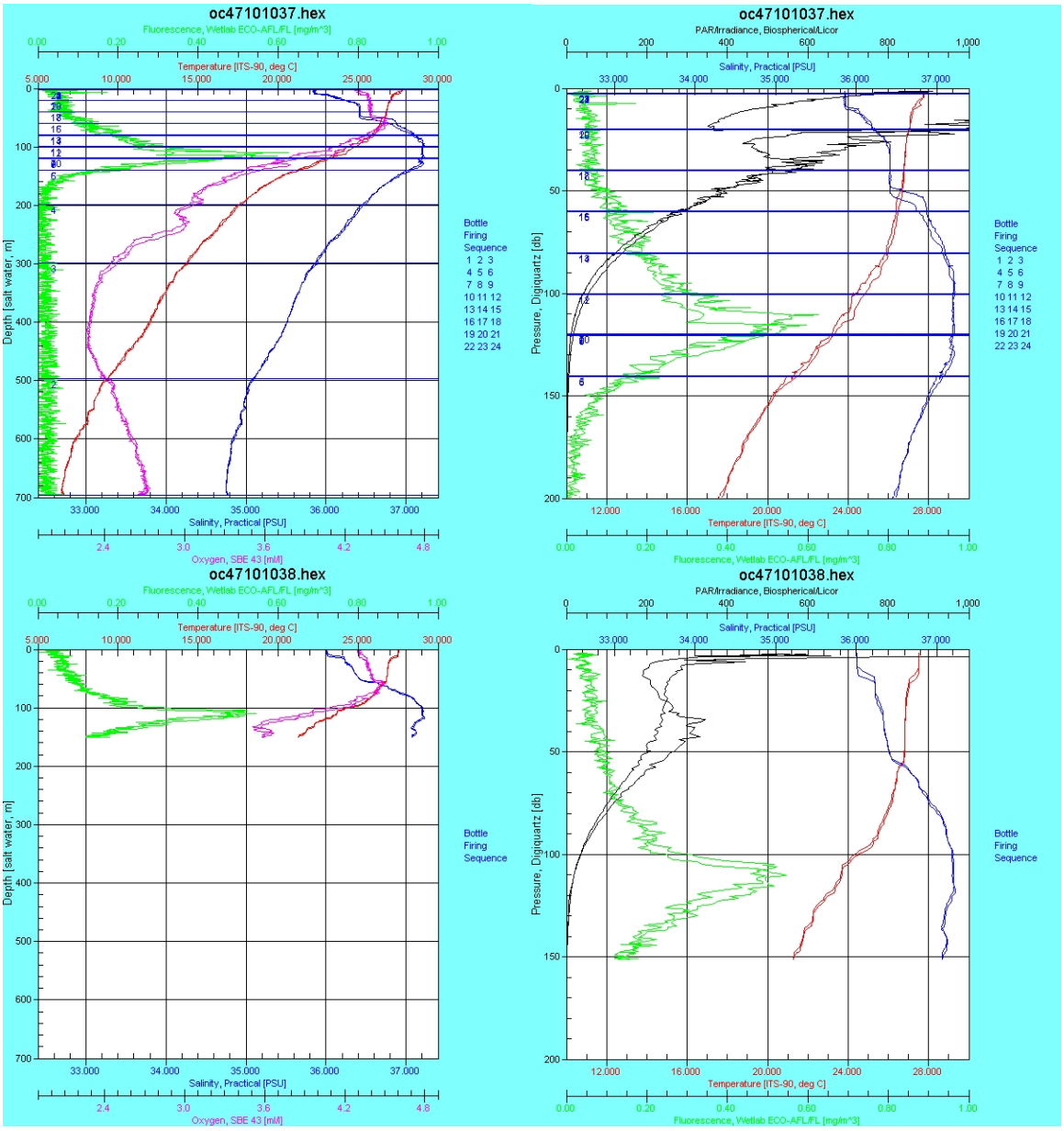
4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
19 20 21
22 23 24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Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
oc47101037.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
oc47101038.hex
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
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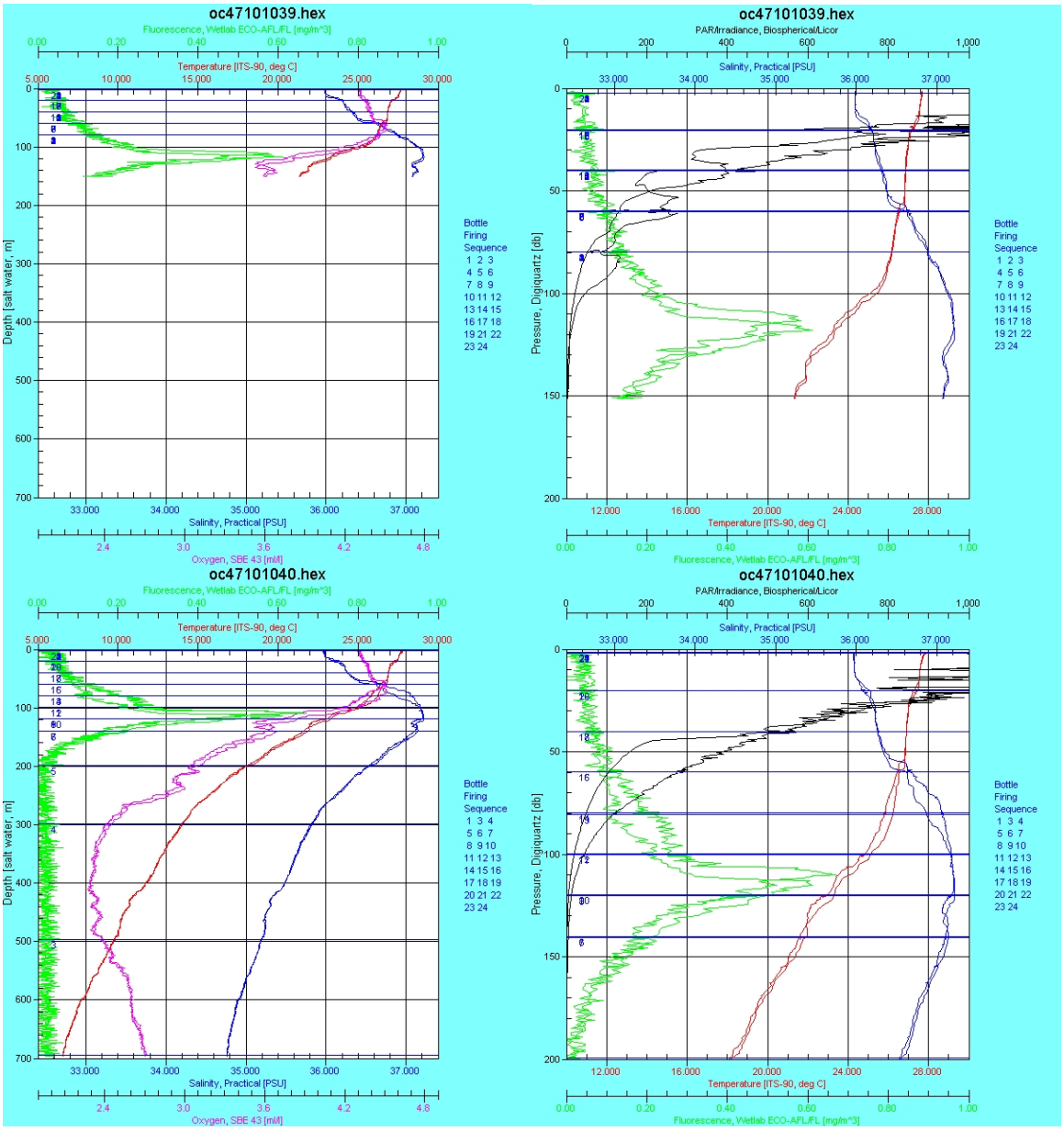
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence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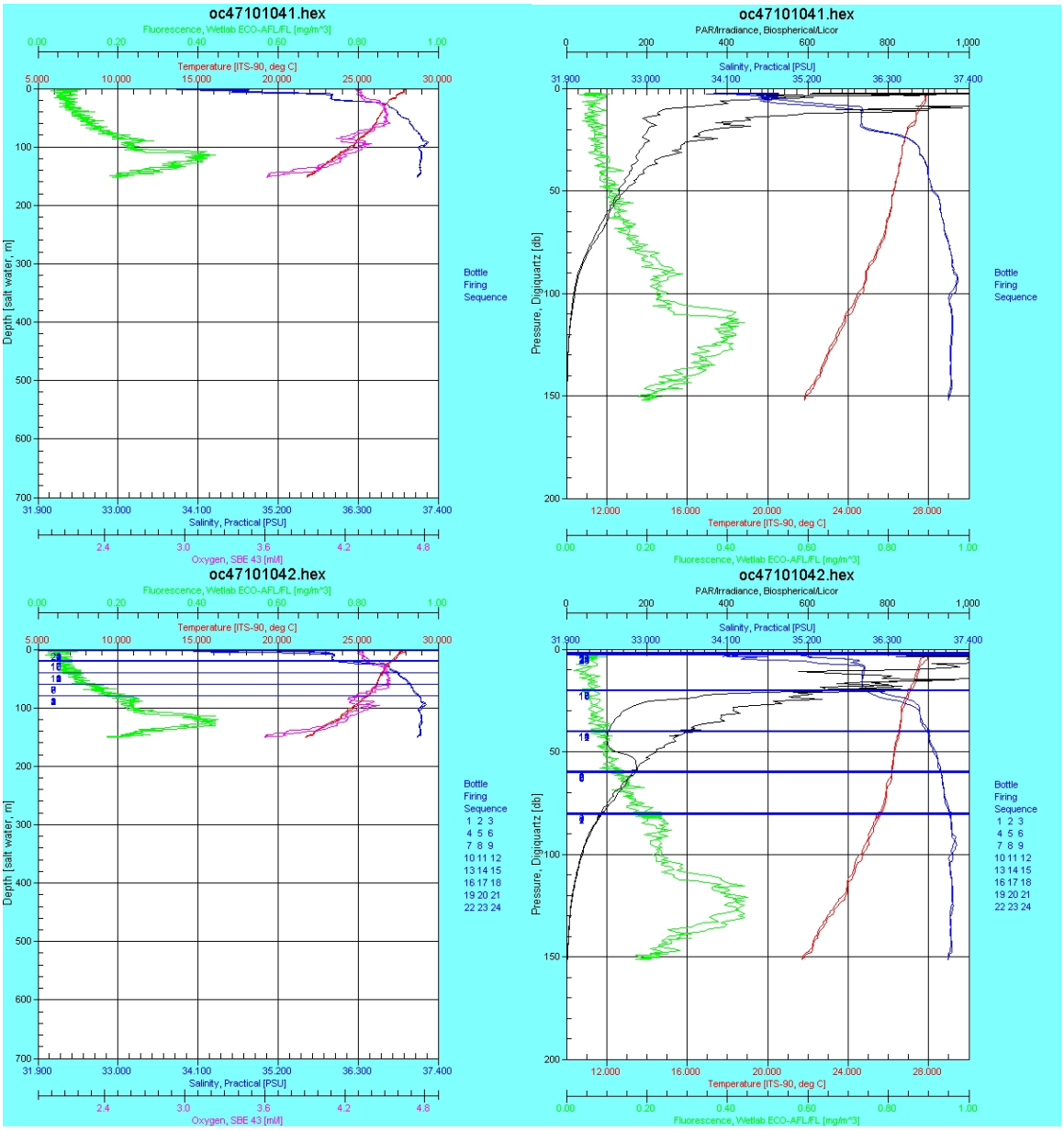
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
oc47101039.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
oc47101040.hex
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
oc47101040.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence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Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
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PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
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Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
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4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
19 20 21
22 23 24
oc47101042.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
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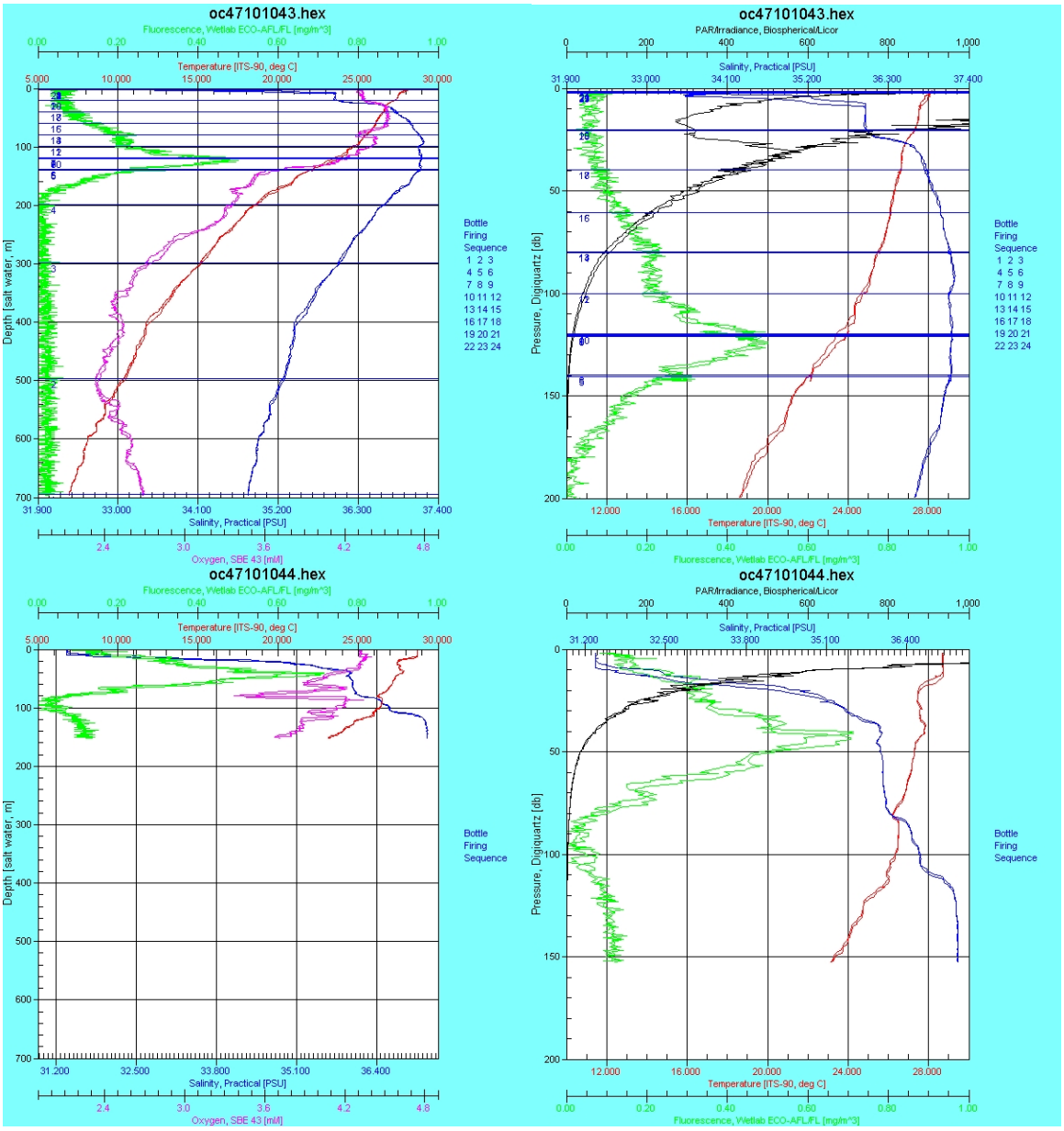
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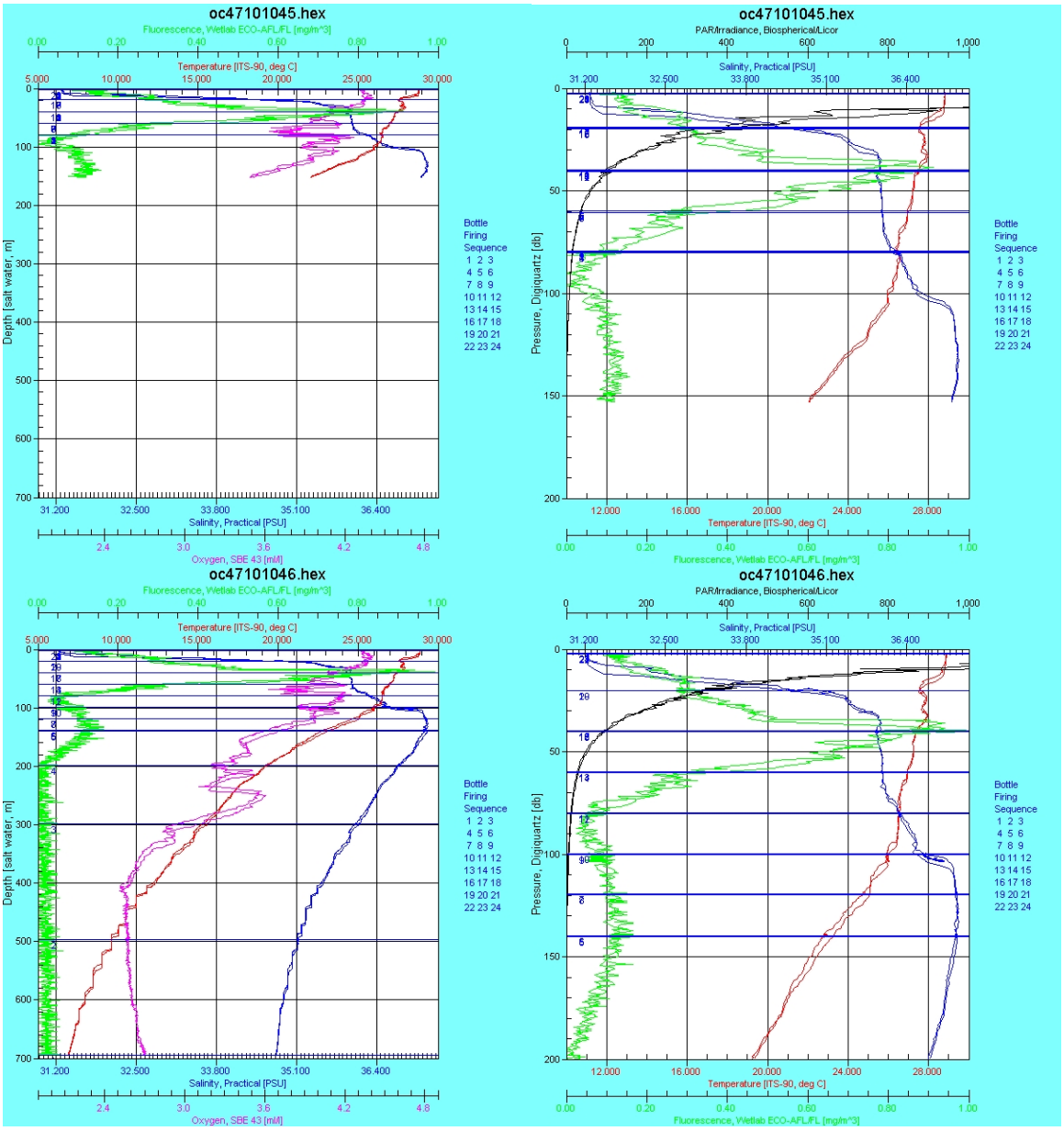
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
oc47101043.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
oc47101044.hex
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
oc47101044.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence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Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
1 2 3
4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
19 20 21
22 23 24
oc47101045.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
1 2 3
4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
19 20 21
22 23 24
oc47101046.hex
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Temperature [ITS-90, deg C]
Depth [salt water, m]
Salinity, Practical [PSU]
Oxygen, SBE 43 [ml/l]
Bottle Firing Sequence
1 2 3
4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
19 20 21
22 23 24
oc47101046.hex
PAR/Irradiance, Biospherical/Licor
Salinity, Practical [PSU]
Pressure, Digiquartz [db]
Temperature [ITS-90, deg C]
Fluorescence, Wetlab ECO-AFL/FL [mg/m^3]
Bottle Firing Sequence
1 2 3
4 5 6
7 8 9
10 11 12
13 14 15
16 17 18
19 20 21
22 23 24

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