During the very first CTD cast there were issues with the O2 sensor going crazy (first evidence at about 1200 meters depth). The cast was aborted (~1600 meters) and the package brought to the surface. During the upcast, the O2 data were erratic until about 600 meters depth at which point the value returned and maintained a reasonable output. Initial thought was that biofouling had occurred and was flushed out. A second cast was attempted. Again, at depth (~1320 meters) the data started spiking and the O2 data were all over the place. The cast was continued so that the science party could obtain water samples. When the CTD was back on deck the TC duct and tubing was checked for fouling (none). It was too dark to spend time checking bulkhead connectors, etc for moisture.

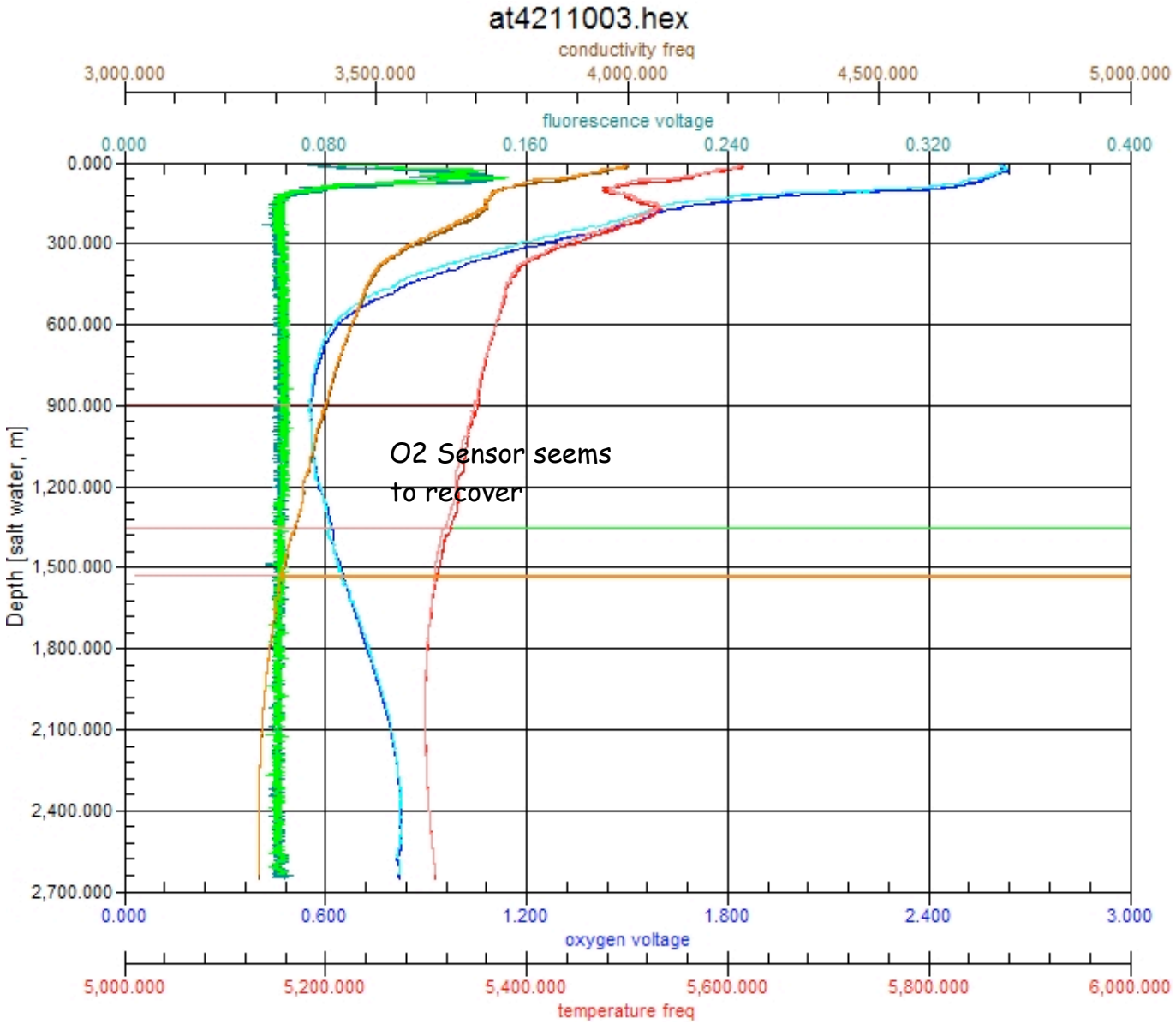
The following day, the O2 sensor was removed (no moisture observed in connector as it was removed and no fouling of the membrane detected). Both the cable it was on and the O2 sensor itself were changed out (still using V0/1). The rest of the package was inspected for loose cables or connections and nothing out of the ordinary was discovered.

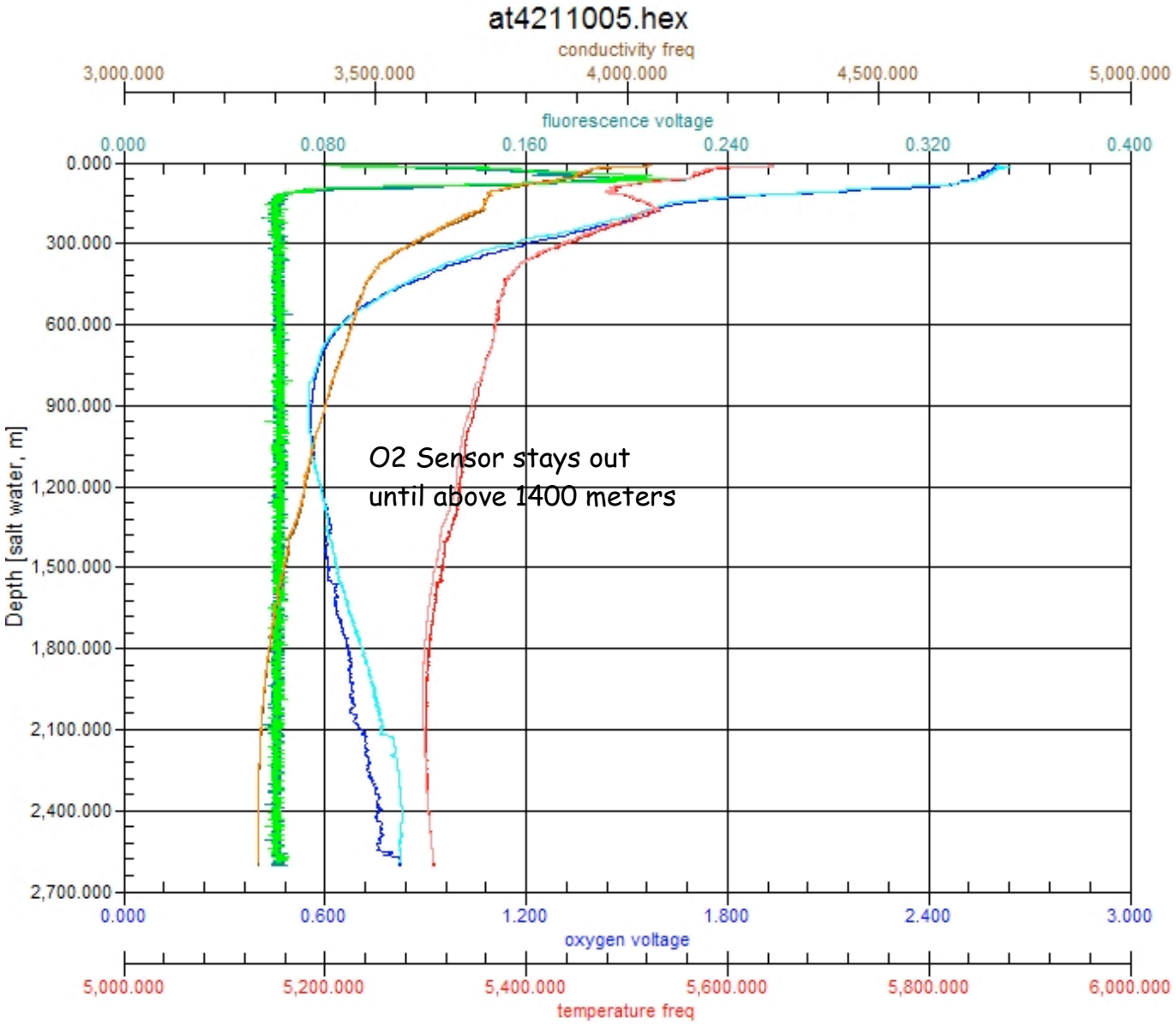
A third cast was performed. The entire downcast looked completely fine - down to 2660 meters (Upon later examination, one spiking event did occur around 1500 meters depth, but it was not reflected in the real-time data plots). On the up cast (~1550 meters) the sensors again started going crazy (O2 being the worst). Upon examining the data it could be seen that the pressure was registering obscene values (like -24433.969). Sometimes, all of the sensors followed suit and registered some type of spike at the same time. On several occasions it appeared that the sensors on v0/1 (O2) and V2/3 (Xmiss) would lead the charge – spiking first, and then most all sensors spiking on the next recorded sample time.

Oddly, the T0 sensor was affected much less often (of the 55 times that were found when almost all the sensors spiked during cast 3, the T0 sensor only spiked 9 times). In fact, out of some 223 spiking events (when almost all sensors spiked on a regular basis) the T0 sensor only spiked 17 times and 13 of those were within the first three casts. Maybe this doesn't mean anything, but here's hoping it is a clue!

After each spiking incident, most of the sensors would recover and return to a normal behavior. This was not so true of the O2 sensor.

It was discovered that the Tau & Hysteresis corrections were turned on. This really messed with the O2 sensor values during the cast (particularly the Hysteresis correction as it depends on pressure). When those were turned off, and/or just the voltage channel plotted, it could be seen that the O2 data "usually" came back to normal after the spiking events (sometimes it took a long time though).


at4211003.hex
conductivity freq
3,000.000
3,500.000
4,000.000
4,500.000
5,000.000
fluorescence voltage
0.000
0.080
0.160
0.240
0.320
0.400
Depth [salt water, m]
0.000
300.000
600.000
900.000
1,200.000
1,500.000
1,800.000
2,100.000
2,400.000
2,700.000
O2 Sensor seems
to recover
0.000
0.600
1.200
1.800
2.400
3.000
oxygen voltage
5,000.000
5,200.000
5,400.000
5,600.000
5,800.000
6,000.000
temperature freq

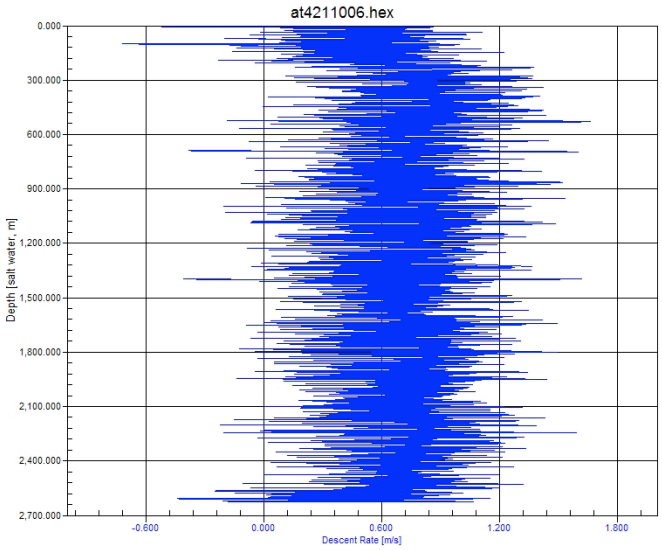


We saw very few Modulo Errors during the casts. One modulo error occurred on the down cast of cast 3. It seems to occur far from any of the problems. Another modulo error occurred on the upcast around 1200 m depth way after everything had already gone awry and now seemed to be acting normal. Cast 3 was the only cast with any modulo errors.

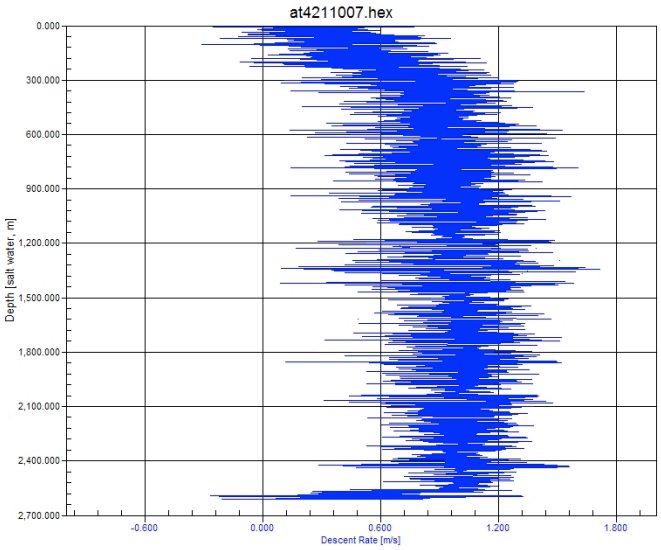
We also had two kinking events happen during this cruise. The first was discovered after cast 3. The second was discovered after cast 6. The wire was re-terminated both times and continuity and insulation resistance tests performed. After the first event, we stayed down for weather for three days before attempting another cast. The second time, we waited nearly two days before attempting another cast. We were experiencing slack loading conditions during the casts that caused the kinks.

Part of the issue seemed to be that the rosette frame was underweighted for the conditions. ~75 pounds of extra weight was added to the frame. We saw a vast improvement in the loading on the wire during the cast we just did after the weight was added. We were experiencing large sudden rolls that would pull the rosette up through the water and then when we rolled back the

other way the rosette had not been appearing to sink fast enough with the roll. I (Allison) believe that is where the kinks happened. The rosette might be at a slight angle still seemingly stationary or moving up due to momentum from the initial pull while the wire/termination are forcing downward.



CAST 6 – Before weight added



Cast 7 – After weight added

Cast 6 was in slightly rougher weather, but not rougher enough to justify the move away from zero loading and the diminishment of the range of fluctuation of the descent rate.

Some winch data have been sent to the server for Marshall to examine. We plan to send off the remainder as well during the port stop.

SUMMARY TABLE OF CTD CASTS:

Date / Time (GMT)	Date / Time (local)	Cast	Event	Wind	Max Tension	
5/18 03:00	5/17 20:00	1	Launch CTD	15.0 knots, 7.73 m/s @ 166.25 °		
5/18		1-2	Bring CTD to surface, power cycle deck unit, restart as cast 2	13.9 knots, 7.18 m/s @ 160.48 °		
5/18 06:23	5/17 23:23	2	Recover CTD		2734	
			Change O2 sensor and cable – still V0/1 channel			
5/18 20:12	5/18 13:12	3	Launch CTD	18.6 knots, 9.61 m/s @ 110.80 °		
5/18 22:30	5/18 15:30	3	Recover CTD	18.3 knots, 9.43 m/s @ 126.61 °	3286	
			Found kink in wire right above block;			

			reterminate. Put altimeter & Xmiss together on V6/7 (respectively), O2 moved to V2/3			
5/21 15:29	5/21 08:29	4	Launch CTD	7.6 knots, 3.92 m/s @ 30.25 °		
5/21 17:56	5/21 10:56	4	Recover CTD	12.6 knots, 6.49 m/s @ 349.87 °	3256	
			Changed sea cable extender (put on a used one)			
5/21 21:12	5/21 14:12	5	Launch CTD	19.1 knots, 9.87 m/s @ 329.87 °		
5/21 23:36	5/21 16:36	5	Recover CTD	29.3 knots, 15.10 m/s @ 327.41 °	2928	
5/22 01:37	5/21 18:37	6	Launch CTD	29.8 knots, 15.37 m/s @ 327.82 °		
5/22 04:07	5/21 21:06	6	Recover CTD	26.2 knots, 13.50 m/s @ 318.05 °	3016	
			Kink found (was on 1st ish wrap on winch) – reterminate. Added ~ 75 lbs of weight to the frame. Changed sea cable extender to a brand new that was found			
5/23 15:50	5/23 08:50	7	Launch CTD	21.6 knots, 11.15 m/s @ 320.04 °		
5/23 18:00	5/23 11:00	7	Recover CTD	23.2 knots, 11.95 m/s @ 312.21 °	3006	
5/23 21:04	5/23 14:04	8	Launch CTD	25.6 knots, 13.17 m/s @ 314.27 °		
5/23 23:10	5/23 16:10	8	Recover CTD	23.1 knots, 11.89 m/s @ 324.39 °	2698	