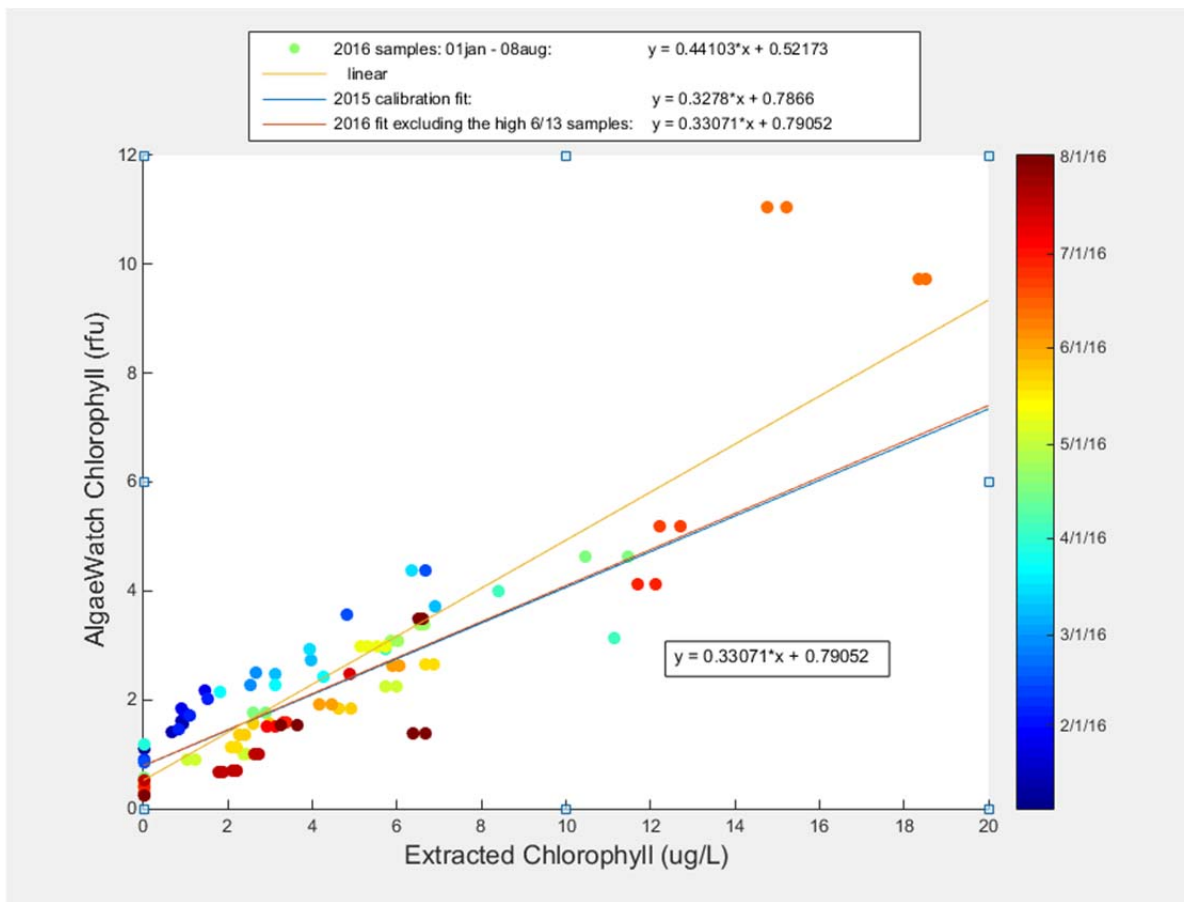


# SATURN-03 Chlorophyll Sensor Field Calibration (1/1/16 - 8/15/16)

## Calibration Details:

The AlgaeWatch sensor was calibrated against extracted chlorophyll samples taken from weekly field samples collected between January and early August 2015. The corresponding sensor reading was determined by interpolating the *in situ* sensor data to the grab sample time-point. Data from 106 grab samples and 28 *in-situ* DI readings made at SATURN-03 were used to calculate the relationship between sensor response and extracted chlorophyll concentration (see figure & table below). The data were fit with the sensor output as the dependent variable and then translated to the following calibration equation: Chlorophyll ( $\mu\text{g/L}$ ) =  $2.996 * \text{rfu} - 2.298$ . The calibration quality has been flagged as good (QL1).



**Figure 1.** Chlorophyll samples collected from SATURN-03 between January and August 8th, 2016. Four high chlorophyll samples were not included in the final calibration fit. Including these samples shifted the slope of the calibration significantly from previous calibrations while the exclusion of these points resulted in a calibration virtually identical to the 2015 sensor calibration. We have seen that this sensor has been fairly stable and the excluded 4 samples were collected from the 8.2m & 13m depths, not typically where the highest chlorophyll readings are seen and where interference from turbidity is more likely. The relationship between sensor output and chlorophyll concentration seems to have a time component, as can be seen by the generally lower values for the samples collected later (orange-red) as compared to samples collected earlier in the year (blues). This difference is possibly due to the known effect of temperature quenching on fluorescence signals. The calibration does not address this slight shift in relationship but represents the average response.

**Field Sample Data for calibration:**

	time	Level (m)	Extracted Chl (ug/L)	AlgaeWatch Reading (RFU)
	1/5/2016 10:55	DI	0.00	1.10
	1/13/2016 11:34	13	0.92	1.56
	1/13/2016 11:37	8.2	0.89	1.62
	1/13/2016 11:38	2.4	0.66	1.40
	1/13/2016 12:00	DI	-0.01	1.13
	1/26/2016 11:21	8.2	0.98	1.77
	1/26/2016 11:27	13	1.44	2.17
	1/26/2016 11:29	2.4	0.90	1.83
	1/26/2016 12:00	DI	-0.01	0.69
	2/4/2016 10:01	13	1.52	2.02
	2/4/2016 10:08	8.2	1.08	1.71
	2/4/2016 10:09	2.4	0.83	1.47
	2/4/2016 12:00	DI	0.00	0.87
	2/8/2016 10:14	DI	0.00	0.90
	2/16/2016 10:33	8.2	4.82	3.57
	2/16/2016 10:38	13	6.68	4.37
	2/16/2016 12:00	DI	0.02	0.85
	2/23/2016 12:00	DI	-0.01	0.86
	2/29/2016 10:07	8.2	2.65	2.50
	2/29/2016 10:09	2.4	2.53	2.26
	2/29/2016 12:00	DI	-0.01	0.86
	3/8/2016 10:29	2.4	3.11	2.47
	3/8/2016 10:31	8.2	3.98	2.72
	3/8/2016 10:33	13	6.91	3.72
	3/8/2016 12:00	DI	-0.01	1.04
	3/14/2016 9:27	8.2	3.94	2.93
	3/14/2016 9:32	13	6.35	4.37
	3/14/2016 12:00	DI	-0.01	0.87
	3/21/2016 9:46	2.4	1.80	2.14
	3/21/2016 9:48	8.2	3.11	2.26
	3/21/2016 9:52	13	4.26	2.41
	3/21/2016 12:00	DI	-0.01	1.21
	3/28/2016 10:08	DI	0.00	1.19
	4/4/2016 9:29	2.4	5.74	2.93
	4/4/2016 9:31	8.2	11.15	3.14
	4/4/2016 9:33	13	8.41	4.00
	4/4/2016 12:00	DI	-0.01	1.08
	4/18/2016 0:00	DI	0.00	0.58
	4/18/2016 9:07	2.4	2.58	1.77
	4/18/2016 9:07	2.4	2.89	1.77
	4/18/2016 9:08	13	10.47	4.64
	4/18/2016 9:08	13	11.48	4.64
	4/25/2016 0:00	DI	0.00	0.51

4/25/2016 9:06	2.4	5.87	3.09
4/25/2016 9:06	2.4	6.02	3.09
4/25/2016 9:08	8.2	6.54	3.39
4/25/2016 9:08	8.2	6.64	3.39
5/2/2016 0:00	DI	0.00	0.45
5/2/2016 8:45	2.4	1.03	0.89
5/2/2016 8:45	2.4	1.22	0.89
5/2/2016 8:47	8.2	2.38	1.01
5/2/2016 8:47	8.2	2.42	1.01
5/2/2016 8:50	13	5.74	2.24
5/2/2016 8:50	13	5.98	2.24
5/9/2016 0:00	DI	0.00	0.52
5/9/2016 9:07	2.4	5.15	2.98
5/9/2016 9:07	2.4	5.30	2.98
5/9/2016 9:10	8.2	5.51	2.98
5/9/2016 9:10	8.2	5.73	2.98
5/18/2016 0:00	DI	0.00	0.49
5/18/2016 9:22	2.4	2.08	1.12
5/18/2016 9:22	2.4	2.19	1.12
5/18/2016 9:24	8.2	6.67	2.65
5/18/2016 9:24	8.2	6.86	2.65
5/23/2016 0:00	DI	0.00	0.41
5/23/2016 9:37	2.4	2.28	1.36
5/23/2016 9:37	2.4	2.39	1.36
5/23/2016 9:39	13	4.60	1.85
5/23/2016 9:39	13	4.91	1.85
5/23/2016 9:41	8.2	2.61	1.57
5/23/2016 9:41	8.2	2.99	1.57
6/1/2016 0:00	DI	0.00	0.27
6/1/2016 9:57	2.4	4.15	1.92
6/1/2016 9:57	2.4	4.46	1.92
6/1/2016 9:59	8.2	5.91	2.63
6/1/2016 9:59	8.2	6.07	2.63
6/8/2016 0:00	DI	0.00	0.29
6/13/2016 0:00	DI	0.01	0.41
6/20/2016 0:00	DI	0.00	0.28
6/20/2016 10:49	13	12.22	5.18
6/20/2016 10:49	13	12.70	5.18
6/27/2016 0:00	DI	0.01	0.40
6/27/2016 10:50	13	11.68	4.12
6/27/2016 10:50	13	12.12	4.12
6/27/2016 10:55	2.4	3.30	1.58
6/27/2016 10:55	2.4	3.38	1.58
7/5/2016 0:00	DI	0.00	0.24
7/5/2016 10:17	8.2	2.91	1.50
7/5/2016 10:17	8.2	3.10	1.50
7/11/2016 0:00	DI	0.00	0.25
7/11/2016 9:00	8.2	4.87	2.47

7/11/2016 9:00	8.2	4.89	2.47	
7/18/2016 0:00	DI	0.00	0.52	
7/18/2016 9:35	2.4	1.79	0.67	
7/18/2016 9:35	2.4	1.86	0.67	
7/18/2016 9:38	8.2	2.10	0.70	
7/18/2016 9:38	8.2	2.21	0.70	
7/18/2016 9:40	13	2.64	1.01	
7/18/2016 9:40	13	2.73	1.01	
8/1/2016 0:00	DI	0.00	0.24	
8/1/2016 9:52	2.4	3.24	1.53	
8/1/2016 9:52	2.4	3.64	1.53	
8/1/2016 9:54	8.2	6.38	1.37	
8/1/2016 9:54	8.2	6.68	1.37	
8/1/2016 10:00	13	6.50	3.48	
8/1/2016 10:00	13	6.60	3.48	
6/13/2016 9:56	8.2	18.35	9.72	
6/13/2016 9:56	8.2	18.53	9.72	*excluded from final calibration
6/13/2016 9:57	13	14.75	11.04	
6/13/2016 9:57	13	15.22	11.04	fit