Causes and Monitoring of Hypoxia in Corpus Christi Bay

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Final Report

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Coastal Bend Bays & Estuaries Program
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Abstract

Hypoxia (low dissolved oxygen concentration) is known to occur in the southeast corner of Corpus Christi Bay each summer since its discovery in 1988. In 2006, it was discovered that the hypoxia area has a greater extent spatially and temporally than previously thought. Although it was known that hypoxia was associated with salinity stratification, it was not until 2007 that is was discovered that salty water from both Oso Bay and Laguna Madre were contributing to hypoxia. However, there are also three major wastewater treatment plants discharging (more than one million gallons per day) into Oso Creek and Oso Bay so there is a source of nutrients as well. The purpose of the current study was to gain more information on the spatial and temporal extent of hypoxia and begin to explore the potential role of nutrients. Hypoxia can begin as early as the first week of June, and occurs as late as the last week of August. Hypoxic conditions can extend from Ward Island to Shamrock Island. Nutrient concentrations are not at high levels. However, ammonium levels are higher in the hypoxic zone, but this is more likely due to microbial remineralization. At the current time, it appears that salty water driven by prevailing winds into Corpus Christi Bay is the main cause of the hypoxia.

Introduction

Hypoxia (low dissolved oxygen concentration) is known to occur in the southeast corner of Corpus Christi Bay each summer since its discovery in 1988 (Ritter and Montagna 1999). Although hypoxia is usually defined as concentrations less than or equal to 2 mg/L (Diaz and Rosenberg 1995), effects are known to occur at less than or equal to 3 mg/L in Corpus Christi Bay (Ritter and Montagna 1999). Hypoxia can cause reduction of benthic biomass, abundance, diversity, species richness and species evenness because of physiological intolerance (Montagna and Ritter 2006). It is now nearly certain that the hypoxia has a greater extent spatially and temporally than previously thought (Coopersmith et al. 2007) and that it is caused by stratification of hyper-saline water that moves from Laguna Madre or Oso Bay into the southeastern corner of the Corpus Christi Bay (Hodges et al. 2007).

Since 1994, monitoring has been confined to July and August. This was expanded to June in 2005 and 2006 and it is now apparent that hypoxia is just as prevalent in early June and late August as in July, thus we do not know when it starts or when it stops. Since 1999, the areal extent was thought to be limited; extending only as far west as the entrance to Laguna Madre (Applebaum et al. 2005). Based on current sampling outside this area, we now know that it extends west to at least Ward Island. It is now clear that we have underestimated the spatial and temporal extent because of the limited sampling scope in the past.

While it has been confirmed that stratification still plays an important role in the onset of hypoxia, the role of nutrients from ground water sources or Oso Bay has not been explored as a causal mechanism of hypoxia in Corpus Christi Bay. In contrast, opening Packery Channel may alleviate the occurrence of hypoxia by introducing cooler and less salty water from the Gulf of Mexico to Corpus Christi Bay or by increasing circulation and mixing in the southeastern corner of the bay. However, no information existed on water quality exported from Oso Bay, Packery Channel, or Laguna Madre.

In the summer of 2006, several fish kills were reported due to low dissolved oxygen conditions near Packery Channel, raising concern by the general public and resource managers about this issue. Oso Bay is currently impaired for low dissolved oxygen and nutrient data could be useful in future TMDL in the area.

The objectives of the current study were to characterize the spatial and temporal extent of hypoxia and to distinguish between nutrient-driven and circulation-driven changes in dissolved oxygen. The approach was to conduct spatial survey of grab samples and deploy continuous monitors at strategic locations. In addition, water was collected and nutrient concentrations were measured.

Methods

Study Location

Corpus Christi Bay is a shallow (~3.2 m; Orlando *et al.* 1991), almost enclosed bay with a level bottom (Figure 1). See maps in Montagna and Kalke 1992; Martin and Montagna 1995; Ritter and Montagna 1999. Corpus Christi Bay has a total open water surface area of 432.9 km^2 and is microtidal, which makes it sensitive to meteorological forcing. Average monthly wind speeds range from 17 km h^{-1} to 28 km h^{-1}. Two principle wind regimes dominate the Corpus Christi Bay: persistent, southeasterly winds from March through September and north-northeasterly winds from October through March (Behrens and Watson 1973; Brown *et al.* 1976). Corpus Christi Bay receives an average of 74 cm yr^{-1} of rainfall and 25 m^3 s^{-1} inflow (Orlando *et al.* 1991). The average evaporation rate is high at 150 cm yr^{-1}.

Hypoxia has been monitored by Paul Montagna since 1988, and it was discovered in 2006 that the hypoxic area is likely much larger than previously thought, and it likely occurs in spring and fall as well. The current project expanded the scale of the past grab sample monitoring effort in both space and time.

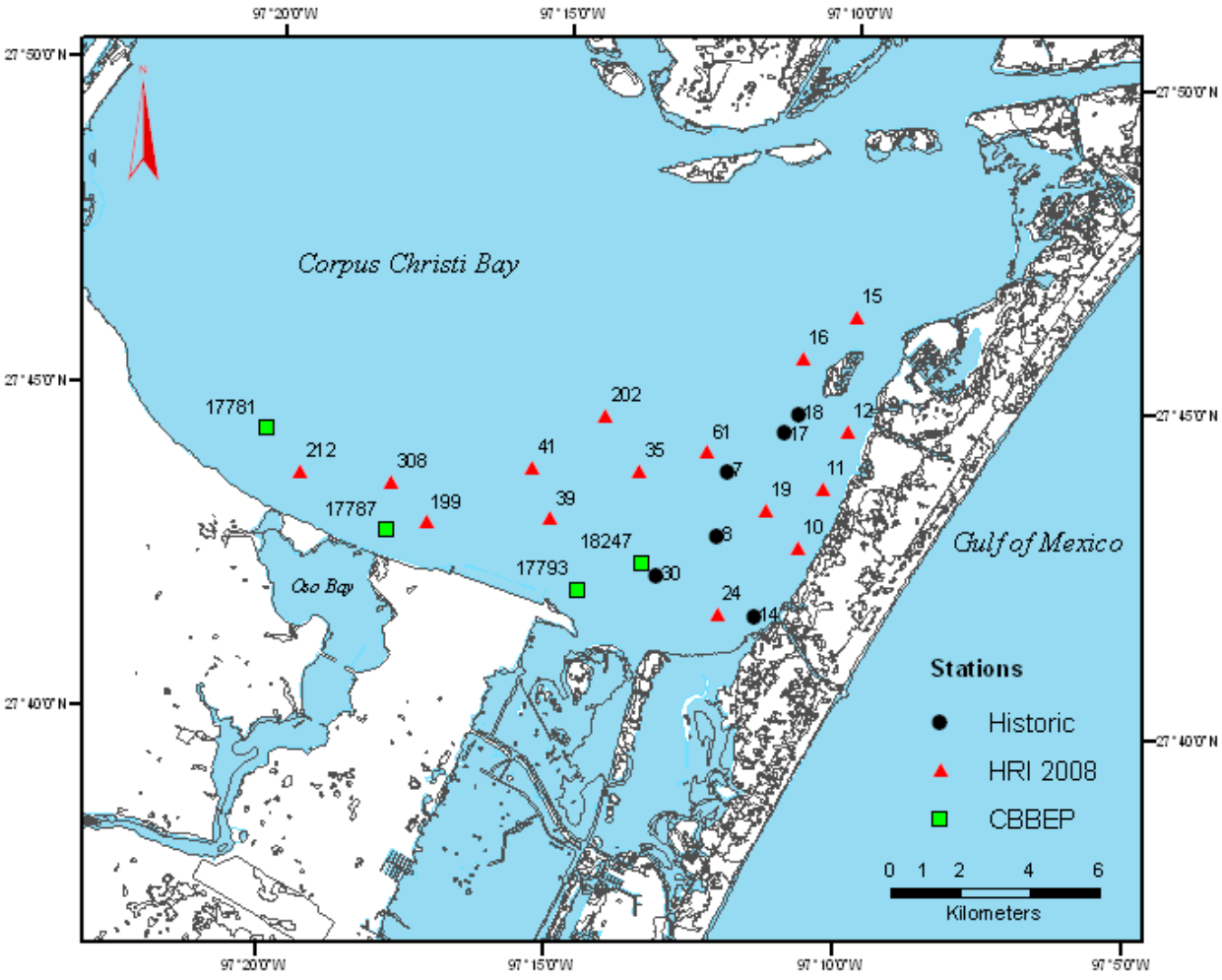

Figure 1. Map of 2008 Study Area

Sampling began in May, 2008 and continued into late September, 2008. To determine if hypoxia is intermittent, four stations were established; in the historic epicenter, as well as stations near Oso Bay, Laguna Madre, and Packery Channel. Continuous sampling was conducted at these locations for 5 -7 day time periods between May 1, and September 24.

Equipment

YSI multi-parameter water quality sondes, models 6920-S, 6920 v2, and 600XLM were used to measure water quality for the temporal and spatial surveys of Corpus Christi Bay. The YSI sondes have the following accuracy and units: temperature (±0.15 ºC), pH (± 0.2 units), dissolved oxygen (mg l^{-1} ± 0.2), dissolved oxygen saturation (± 2%), specific conductivity (± 0.5% of reading depending on range), depth (± 0.2m), and salinity (± 1% of reading or 0.1 ppt, whichever is greater, automatically corrected to 25 ºC) (YSI Incorporated 1999). Quality control is assured by following procedures for dissolved oxygen measurements written in *Causes and Monitoring of Hypoxia in Corpus Christi Bay QAPP, Revision 1, March 20, 2008*.

Nutrient Samples

Once a water sample is collected, 12 ml of sample was filtered using 0.45 micron glass fiber filters and a hand syringe. Filtrate was stored in a pre-cleaned, non-glass 15 ml capped tube. Information about the sample was recorded on the tube. Samples were frozen at ≤-10 ºC until analysis. Quality control is assured by following procedures for dissolved oxygen measurements written in *Causes and Monitoring of Hypoxia in Corpus Christi Bay QAPP, Revision 1, March 20, 2008*.

Chlorophyll-a

After collection, 12 ml of sample was filtered using a 0.45 micron glass fiber filter and a hand syringe. The filter containing the sample to be analyzed for chlorophyll-*a* concentration was frozen at ≤-10 ºC until analysis. Quality control is assured by following procedures for dissolved oxygen measurements written in *Causes and Monitoring of Hypoxia in Corpus Christi Bay QAPP, Revision 1, March 20, 2008*.

Spatial and Temporal Extent

Dissolved oxygen concentration, dissolved oxygen saturation, salinity, conductivity, depth, pH, and temperature data were collected at stations 17781, 17787, 17793, and 18247 (Figure 2). These stations were chosen both for their proximity to Oso Bay, Laguna Madre, Packery Channel as well as

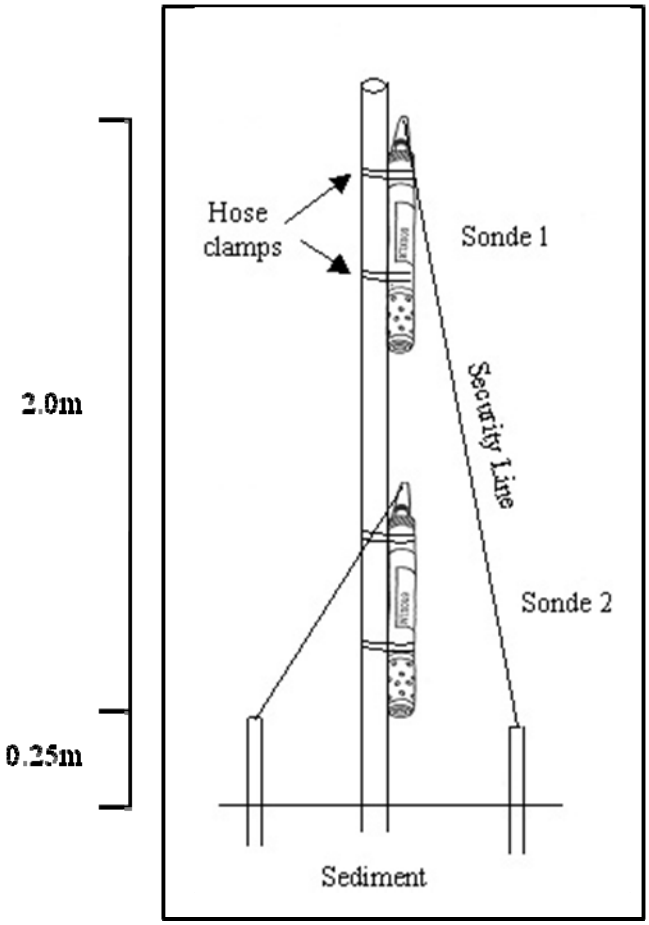

Figure 2. YSI Sonde Deployment

collect data beyond the known historical spatial extent. Sampling was conducted from May 19, 2008 through September 24, 2008. Sampling in May and September were conducted in order to determine whether or not hypoxia occurred before or after the known temporal extent.

Surface and bottom water hydrographic data were collected via YSI 600XLM or YSI 6820 v2 sondes attached to semi-permanent, low-relief moorings (Figure 2). Surface water sondes were attached 1 m below the surface and bottom water sondes were attached 0.25 m above the sediment surface at all stations. YSI sondes were deployed and retrieved by SCUBA, and data downloaded in the laboratory.

Grab samples were taken at the surface and at the bottom at each site using a YSI multi-parameter data sonde. If hypoxia was discovered during a grab sample, vertical hydrographic profiles at 0.5 m depth intervals were taken. At each interval, dissolved oxygen concentration, dissolved oxygen saturation, salinity, conductivity, depth, pH, and temperature were recorded.

Results

Temporal Extent

The 2008 season's earliest deployment, from May19, 2008 to May 25, 2008 observed no hypoxic conditions at any sampled locations. The lowest DO measurement from the May deployment was 3.08 mg/L on May 24, 2008. Bottom water dissolved oxygen concentration readings from this deployment do not include station 18247. The sonde deployed at site 18247 failed QAQC upon return to the lab. The earliest-in-the-year hypoxic measurement this season was a June 18th, 2008 measurement of 1.87mg/L.

This season's latest deployment, from September 18, 2008 to September 25, 2008, recorded no hypoxia. The lowest dissolved oxygen concentration observed in the September deployment was 5.8mg/L at site 17781on September 24, 2008. The latest-in-the-year hypoxic observation for the summer of 2008 was a value of 1.86mg/L on August 6, 2008.

Spatial Extent

A study station, 17781, was established approximately 1.0 km offshore, 2.2 Km northwest of the mouth of Oso Bay. This station was established beyond the western extent of previous study locations in order to determine a maximum position of the western boundary of the hypoxic zone (Figure 1.) Hydrographic measurements and sonde deployments at site 17781 found no hypoxia. The lowest dissolved oxygen concentration found at site 17781 during the 2008 deployments was 3.61mg/L on August 4, 2008.

Nutrient and Chlorophyll-a Concentrations

Grab samples were collected from surface and bottom waters at all sites on all dates in 2008. Mean surface and bottom water nutrient and chlorophyll-*a* concentrations by station are shown in Table 1.

Table 1. Mean chlorophyll (μ g/L) and nutrient (μM) concentrations by station. Minimum and Maximum values are denoted in bold.

		Chl-a		NH4		PO4		SiO4		N+N	
	STA	**Mean**	**STD**	**Mean**	**STD**	**Mean**	**STD**	**Mean**	**STD**	**Mean**	**STD**
Surface	10	1.88	0.94	0.40	1.08	0.33	0.24	152.34	130.42	**0.54**	0.49
	11	1.54	0.86	0.67	1.55	0.42	0.63	158.94	132.84	0.45	0.39
	12	2.18	1.21	0.48	1.07	0.29	0.22	155.29	128.14	0.41	0.37
	15	2.15	1.23	0.44	1.25	0.31	0.22	141.49	118.12	0.28	0.23
	16	1.82	0.70	**0.23**	0.56	0.30	0.18	149.53	123.35	0.25	0.20
	19	2.17	1.97	0.65	1.67	0.36	0.29	158.92	126.20	0.43	0.30
	24	1.83	1.25	0.53	1.36	0.38	0.27	166.30	139.10	0.33	0.28
	35	1.92	1.24	0.52	1.49	0.34	0.27	139.13	97.58	0.25	0.22
	39	1.87	0.76	0.60	1.18	0.36	0.24	131.53	94.72	0.31	0.29
	41	**1.41**	0.64	0.62	1.37	0.37	0.27	**116.32**	85.13	0.28	0.28
	61	1.66	0.75	0.60	1.55	0.31	0.21	144.74	116.41	0.30	0.38
	199	1.85	0.99	0.55	1.31	0.43	0.38	137.01	99.19	0.34	0.39
	202	1.62	0.78	0.29	0.78	0.37	0.28	132.76	94.17	0.24	0.22
	212	2.07	0.88	**0.98**	2.85	0.46	0.39	147.57	109.89	0.28	0.25
	308	2.01	1.25	0.92	2.44	**0.52**	0.81	145.81	107.55	0.56	1.08
	17781	2.06	1.03	0.59	1.38	0.39	0.26	152.98	114.93	**0.19**	0.18
	17787	2.77	1.31	0.84	2.04	0.40	0.38	**167.76**	129.58	**0.19**	0.16
	17793	**2.89**	1.53	0.42	1.18	**0.18**	0.09	153.03	106.33	0.24	0.22
	18247	2.47	1.32	0.61	1.48	0.33	0.20	152.81	117.03	0.29	0.24
Bottom	10	1.97	1.31	1.32	2.97	0.48	0.44	166.05	148.56	0.42	0.35
	11	2.01	1.14	1.27	2.49	0.44	0.38	174.60	155.65	0.38	0.32
	12	1.62	0.67	0.55	1.08	0.26	0.22	154.17	133.10	0.26	0.18
	15	1.59	0.67	0.54	1.42	0.35	0.24	150.48	121.59	0.30	0.21
	16	1.71	0.68	**0.20**	0.59	0.29	0.19	149.21	122.20	0.24	0.16
	19	1.71	1.15	1.69	2.39	**0.60**	0.40	174.33	161.00	**0.64**	0.39
	24	2.06	1.52	0.51	1.48	0.46	0.29	172.82	148.65	0.44	0.25
	35	1.85	1.21	0.69	1.54	0.39	0.27	**134.46**	96.69	0.26	0.22
	39	1.98	1.24	0.61	1.18	0.35	0.22	149.24	111.85	0.34	0.28
	41	1.48	0.74	0.77	1.46	0.43	0.31	139.99	102.79	0.36	0.35
	61	1.67	0.85	0.78	1.72	0.40	0.24	160.75	129.65	0.31	0.26
	199	1.91	1.44	0.96	1.43	0.50	0.27	147.90	111.62	0.37	0.24
	202	1.91	0.81	0.26	0.50	0.40	0.20	141.83	106.94	0.34	7.54
	212	**1.46**	0.92	0.64	1.38	0.48	0.27	149.49	121.33	0.34	0.25
	308	**3.68**	3.90	1.00	1.54	0.41	0.29	259.77	370.66	0.33	0.30
	17781	2.02	1.31	0.76	1.87	0.44	0.31	164.99	123.63	0.29	0.36
	17787	3.18	1.93	**2.02**	3.19	0.43	0.38	**345.47**	614.41	**0.25**	0.29
	17793	2.82	1.29	0.38	0.62	**0.16**	0.13	187.96	152.79	**0.25**	0.24
	18247	3.04	1.98	1.00	1.71	0.35	0.25	177.87	141.03	**0.25**	0.22

Hydrographic Parameters

Hydrographic grab samples were collected from surface and bottom waters at all sites on all dates in 2008. Mean hydrographic parameters are shown in Table 2.

Table 2. Mean hydrologic grab values by station. Minimum and maximum values for each parameter are denoted in bold.

	Station	Temp (C)		Salinity (ppt)		[DO] (mg/L)		pH	
		Mean	**STD**	**Mean**	**STD**	**Mean**	**STD**	**Mean**	**STD**
Surface	10	27.88	1.90	35.73	2.74	5.94	0.36	8.22	0.11
	11	27.99	1.92	35.64	2.81	5.93	0.41	8.23	0.12
	12	27.88	1.84	35.47	2.67	6.00	0.46	8.21	0.11
	15	28.00	1.84	35.53	2.77	6.00	0.42	8.23	0.11
	16	27.99	1.91	35.48	2.68	5.95	0.40	8.21	0.11
	19	27.99	1.81	35.68	2.75	**5.86**	0.39	8.22	0.11
	24	**27.86**	1.75	**35.97**	2.91	5.87	0.49	8.22	0.11
	35	28.01	1.78	35.50	2.76	5.97	0.51	8.22	0.10
	39	28.97	2.75	35.26	2.63	6.02	0.63	8.20	0.08
	41	28.01	1.79	35.07	2.65	5.98	0.44	8.18	0.08
	61	28.03	1.85	35.55	2.69	6.00	0.43	8.22	0.13
	199	28.09	1.78	34.93	2.52	6.16	0.44	8.18	0.08
	202	28.07	1.81	35.13	2.49	6.01	0.44	8.20	0.10
	212	28.06	1.82	34.63	2.42	6.04	0.54	8.18	0.07
	308	28.06	1.83	**34.33**	2.69	6.08	0.54	8.20	0.08
	17781	28.14	1.75	34.86	2.38	6.18	0.37	8.15	0.11
	17787	28.20	1.85	35.03	2.30	6.24	0.48	**8.13**	0.12
	17793	28.20	2.00	35.93	2.98	6.31	0.53	**8.25**	0.17
	18247	**28.42**	1.92	35.73	2.88	**6.33**	0.53	8.23	0.11
Bottom	10	27.86	1.94	36.20	3.35	5.28	1.64	8.23	0.10
	11	27.96	1.91	36.21	3.37	5.18	1.71	8.23	0.12
	12	27.83	1.79	35.83	2.92	5.74	0.71	8.23	0.11
	15	28.02	1.92	35.63	2.86	5.88	0.45	8.24	0.12
	16	27.99	1.92	35.53	2.70	5.76	0.54	8.21	0.10
	19	28.04	1.84	36.37	3.54	4.91	1.95	8.22	0.13
	24	27.95	1.81	36.71	3.70	5.25	1.31	8.26	0.12
	35	28.02	1.80	36.03	3.05	5.55	0.98	8.23	0.11
	39	28.09	1.98	36.74	3.54	5.51	0.78	8.25	0.12
	41	28.04	1.86	36.16	3.20	5.38	0.84	8.23	0.11
	61	28.02	1.86	36.00	2.97	5.53	1.05	8.22	0.13
	199	28.07	1.80	35.64	2.78	5.20	1.77	8.17	0.10
	202	28.03	1.80	35.63	2.83	5.57	0.92	8.19	0.10
	212	28.04	1.89	**34.97**	2.35	5.48	0.80	8.16	0.10
	308	28.14	1.85	37.01	2.43	4.62	1.63	8.18	0.08
	17781	**29.07**	3.09	35.01	2.32	**6.05**	0.47	**8.14**	0.10
	17787	**27.74**	1.98	36.76	2.36	**4.40**	1.49	8.08	0.12
	17793	27.98	1.98	**37.96**	3.62	5.49	1.16	8.36	0.22
	18247	28.16	1.90	37.94	4.33	5.37	0.93	**8.37**	0.19

Continuous Measurements

Continuous measurements were made at four sites in Corpus Christ Bay, see Figure 1. Sondes were deployed in 2008 on May 19 - 27, June 16 - 25, July 16 - 25, August 1 - 6, and September 18 - 24. See Table 3. The May sonde at site 17787 failed at some point in the deployment and no data was recovered. All other sondes performed well with the exception of several dissolved oxygen sensors failing post calibration quality assurance tests resulting in the rejection of the dissolved oxygen data.

Table 3. Mean hydrographic values for continuous sonde deployments.

	Station	Month	Depth (m)		Temp (C)		Salinity (ppt)		[DO] mg/L		pH	
			Mean	STD	Mean	STD	Mean	STD	Mean	STD	Mean	STD
Surface	17781	5	0.69	0.16	27.68	0.95	32.25	0.88	5.34	1.09	8.10	0.11
	17787	5	.	.	.	.	.	.	.	.	.	.
	17793	5	1.01	0.13	28.21	0.77	32.75	0.97	.	.	8.34	0.15
	18247	5	0.52	0.14	28.07	0.76	32.12	0.60	6.37	0.51	8.09	0.09
	17781	6	0.55	0.08	30.21	0.42	33.89	0.30	6.04	0.34	8.15	0.04
	17787	6	0.56	0.07	29.84	0.49	31.72	0.47	.	.	8.14	0.02
	17793	6	0.84	0.08	29.68	0.52	35.51	1.50	.	.	8.25	0.10
	18247	6	0.97	0.08	29.90	0.64	35.79	1.17	6.19	0.93	8.29	0.05
	17781	7	0.74	0.23	29.71	0.89	36.33	0.58	5.85	0.26	8.19	0.02
	17787	7	0.46	0.23	29.53	0.85	36.54	0.68	6.17	0.36	8.17	0.05
	17793	7	0.57	0.21	29.48	1.10	38.27	1.44	5.10	0.67	8.55	0.13
	18247	7	0.72	0.16	29.65	1.00	39.09	1.20	5.62	0.70	8.25	0.07
	17781	8	0.60	0.07	30.48	0.45	35.15	0.10	.	.	8.17	0.02
	17787	8	0.41	0.07	30.05	0.57	35.45	0.32	5.90	0.73	8.10	0.03
	17793	8	0.53	0.07	30.34	0.51	37.75	0.88	5.93	0.47	8.40	0.12
	18247	8	0.81	0.06	30.29	0.54	36.48	0.22	6.04	0.44	8.38	0.04
	17781	9	0.88	0.11	25.98	0.61	36.43	0.13	6.93	0.46	8.22	0.04
	17787	9	0.92	0.11	25.91	0.78	36.56	0.25	7.16	0.50	8.24	0.03
	17793	9	0.82	0.11	25.93	0.71	37.32	0.13	6.86	0.72	8.25	0.07
	18247	9	0.82	0.10	26.03	0.54	36.69	0.08	6.96	0.36	8.21	0.02
Bottom	17781	5	3.96	0.14	27.79	1.04	31.52	1.07	5.91	0.56	8.14	0.07
	17787	5	3.27	0.14	27.92	1.05	33.77	1.48	5.13	1.11	8.26	0.07
	17793	5	3.43	0.14	28.26	0.74	34.51	1.83	6.06	0.73	8.14	0.15
	18247	5	3.91	0.14	27.84	0.74	33.04	0.87	.	.	8.41	0.17
	17781	6	4.01	0.08	29.69	0.27	33.82	0.91	5.52	0.37	8.11	0.03
	17787	6	3.32	0.08	29.62	0.47	37.12	2.33	3.94	1.03	8.22	0.09
	17793	6	3.43	0.08	29.50	0.29	39.88	2.27	3.05	1.15	8.35	0.20
	18247	6	3.90	0.08	29.54	0.20	40.34	2.04	2.65	1.34	8.35	0.14
	17781	7	4.27	0.20	29.36	0.77	36.32	0.51	5.70	0.41	8.19	0.05
	17787	7	3.49	0.18	29.37	0.74	38.10	1.21	4.42	1.42	8.16	0.11
	17793	7	3.99	0.17	29.23	1.03	39.11	1.72	5.00	0.85	8.30	0.12
	18247	7	4.11	0.16	29.39	0.85	40.61	2.71	.	.	8.29	0.10
	17781	8	3.99	0.07	29.90	0.26	35.04	1.48	5.34	0.63	8.06	0.03
	17787	8	3.23	0.07	29.96	0.34	35.56	1.44	4.05	1.24	8.25	0.08
	17793	8	3.34	0.06	30.47	0.52	38.23	0.77	5.11	1.14	8.59	0.09
	18247	8	3.86	0.06	30.21	0.29	36.89	0.84	4.03	1.28	8.54	0.08
	17781	9	4.20	0.11	25.69	0.61	36.47	0.13	6.82	0.45	8.28	0.04
	17787	9	3.36	0.11	25.83	0.82	36.94	0.18	6.81	0.44	8.27	0.03
	17793	9	3.40	0.11	25.98	0.73	40.06	0.13	6.67	0.56	8.31	0.08
	18247	9	4.10	0.10	25.83	0.64	39.40	0.09	6.47	0.25	8.32	0.02

Table 4 summarizes hypoxia occurrences during the study period in 2008. A complete listing of hypoxic events can be found in the Appendix C. As expected, hypoxia occurred only in the bottom waters and mostly during the night. The total time that hypoxia was recorded increased by station from Ward Island to Shamrock Island.

Table 4. Summary of hypoxia events.

Station	≤3 mg/L		≤2 mg/L		≤1 mg/L	
	Total (hrs)	% at night	Total (hrs)	% at night	Total (hrs)	% at night
17781	0.00	N.D.	0.00	N.D.	0.00	N.D.
17787	89.00	40.45	8.25	63.64	2.00	0.00
17793	99.25	53.27	37.50	76.00	0.00	N.D.
18247	133.50	47.94	75.50	61.25	13.25	98.11

Nutrient Distributions

Nutrient concentrations during the sampling periods were not at high levels (Table 1). There was however, a pattern to the distribution of nutrients. Ammonium and phosphorous concentrations were higher in areas with low mean dissolved oxygen concentrations (**Error! Reference source not found.** and **Error! Reference source not found.**). While concentrations were higher than in other regions of the sampling area with higher dissolved oxygen concentrations, the levels can be explained by microbial remineralization. Thus, it was the hypoxia that caused the high nutrient concentrations, because dissolved oxygen is consumed by microbial respiration, and ammonium is produced. The high phosphate is likely due to release from sediments because of the high salinity.

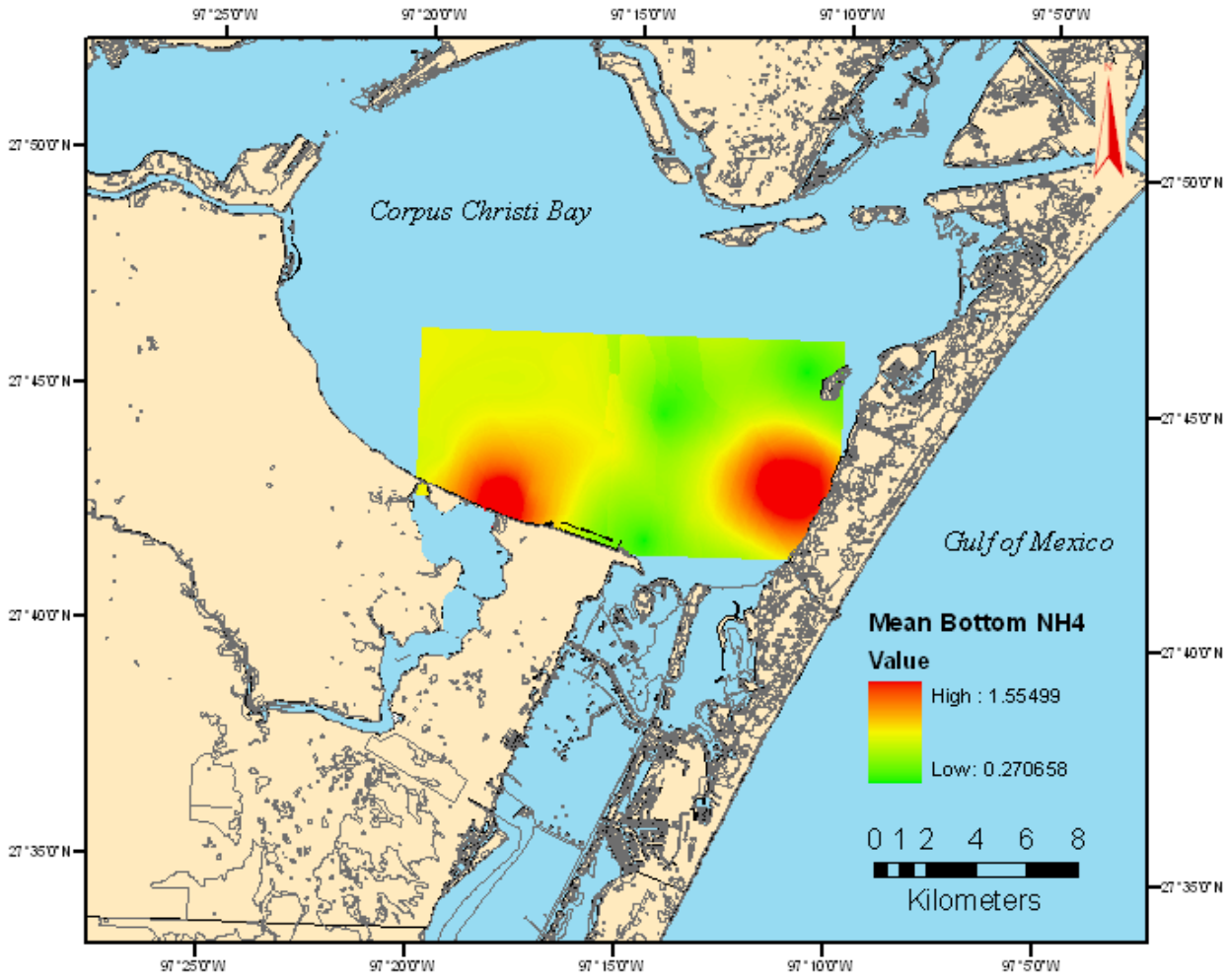

Figure 3. Interpolation of mean bottom ammonium concentrations in the southeast region of Corpus Christi Bay.

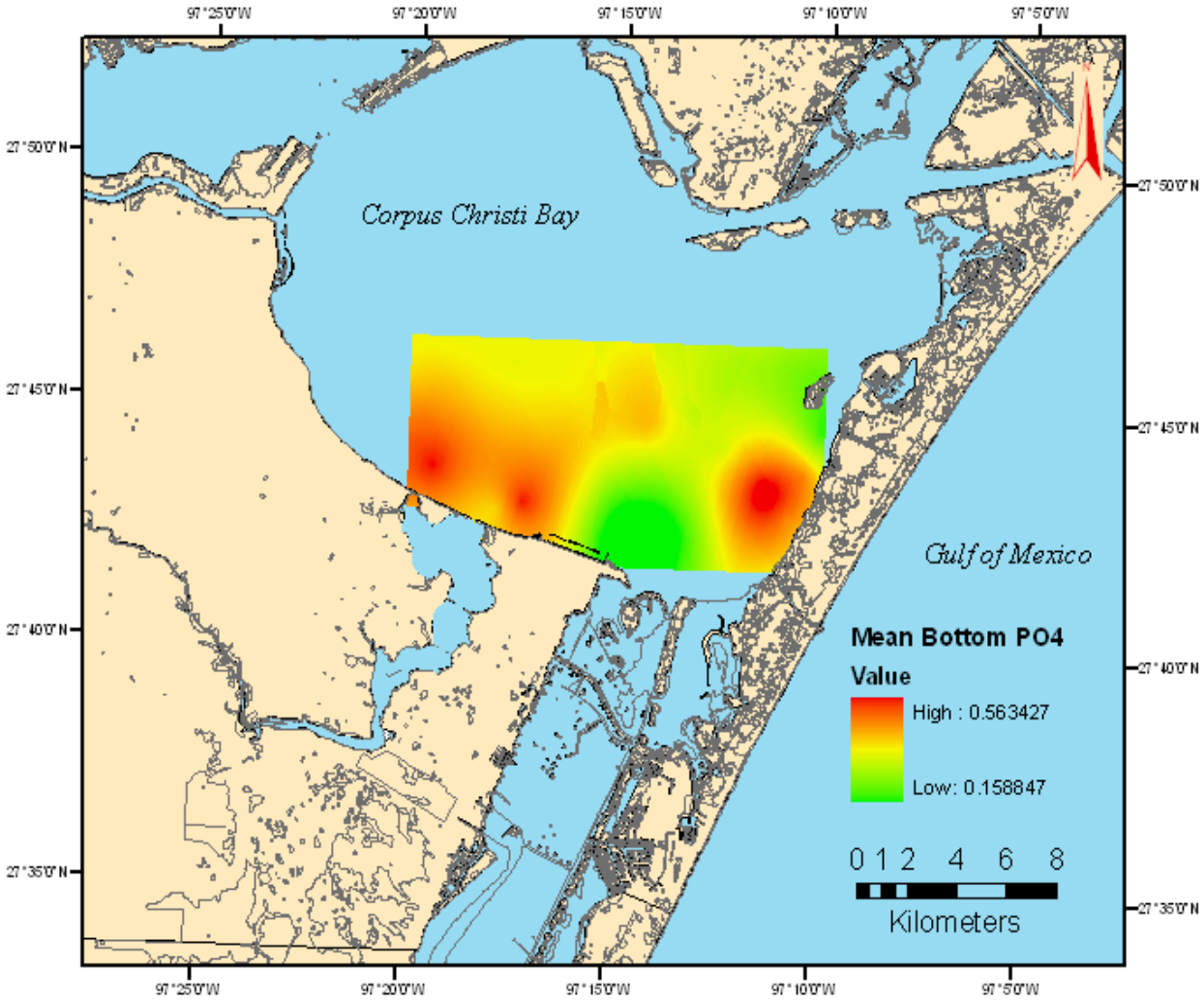

Figure 4. Interpolation of mean bottom orthophosphate concentrations in the southeast region of Corpus Christi Bay.

Discussion

Temporal Extent

The earliest-in-the-year hypoxic measurement in Corpus Christi Bay occurred in 2007 on June 5 (Table 5). Hypoxic measurements were recorded on this day of the year in various years at stations in the southeast region of the bay. In 2008, there was no hypoxia between May19, 2008 to May 25, 2008. The lowest DO measurement from the May deployment was 3.08 mg/L on May 24, 2008. This value is near the 3.0mg/L shown to have effects on the benthos in Corpus Christi Bay (Ritter and Montagna 1999). The earliest hypoxic event observed in 2008 was June 18th, with a measurement of 1.87mg/L. Based on historical data and data from this project, the earliest onset of hypoxia is sometime between the last week of May and the middle of June.

Table 5. Earliest Hypoxic Observation by Year.

Year	Month	Day	[DO] mg/L	Station
1996	7	24	1.41	8
1997	7	24	1.60	15
1998	7	16	0.49	17
1999	8	3	1.71	18
2000	8	24	1.99	7
2001	6	5	0.62	12
2002	7	6	1.35	12
2004	6	28	1.94	8
2005	6	21	0.60	7
2006	6	5	1.99	19
2007	6	5	1.14	11
2008	7	18	1.48	17787

The latest-in-the-year hypoxic measurement in Corpus Christi Bay occurred in 2006 on August 31st (Table 6). There was no hypoxia from September 18, 2008 to September 25, 2008. The lowest dissolved oxygen concentration observed in the September deployment was 5.8mg/L at site 17781on September 24, 2008. The latest hypoxic event observation for the summer of 2008 was a value of 1.86mg/L on August 6, 2008. Based on historical data and the data from this project, the latest occurrence of hypoxia is sometime between the last week of August and the third week of September.

Table 6. Latest Hypoxic Observation by Year.

Year	Month	Day	[DO] mg/L	Station
1996	7	30	1.03	14
1997	7	24	1.83	10
1998	7	16	0.49	17
1999	8	3	1.24	30
2000	8	24	1.99	7
2001	8	21	1.08	7
2002	8	8	1.26	18
2004	8	2	1.58	39
2005	8	23	1.81	39
2006	8	31	1.75	39
2007	8	28	1.48	202
2008	8	6	1.86	18247

Spatial Extent

Initial historical observations of hypoxia were generally located in the southeast region of Corpus Christi Bay. In recent years, hypoxia has been observed west of this location in the region of Oso Bay. Station 17781 was chosen because it was west of the known hypoxic area. No hypoxia was observed at station 17781 in the summer of 2008 during any of the surveys or continuous deployments. It is possible that this station 17781 is outside the spatial extent of the hypoxic area. This evidence places the western-most extent of the hypoxic zone between station 17781 and station 212, where hypoxia has been observed

(see Figure 5). The total area of the hypoxic zone is now estimated to be 79.6 km^2 (30.7 mi^2). In contrast, the area was estimated to be 57 km^2 last year (Applebaum et al., 2005).

Mean dissolved oxygen from bottom water grab samples showed to be lower in two regions of the bay- at the mouth of Oso bay, and in the southeast corner near Laguna Madre (see Figure 6). These two areas correspond well with areas hypothesized to result from containment of high-salinity gravity currents based on bathymetry (To 2009). The areas also correlate well with the presence of higher ammonium (Figure 3) and orthophosphate levels (Figure 4).

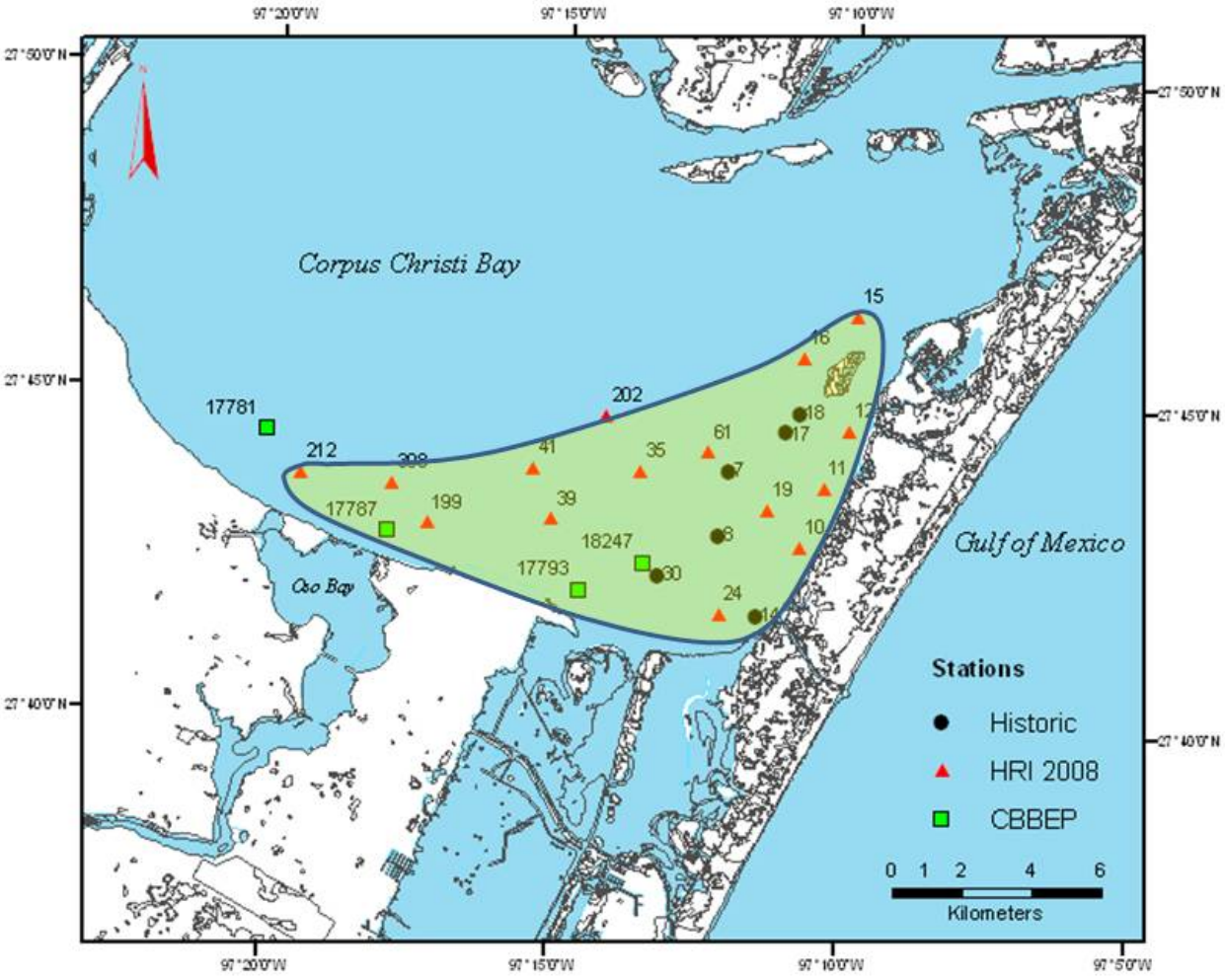

Figure 5. Known spatial extent of hypoxic zone. Over all years.

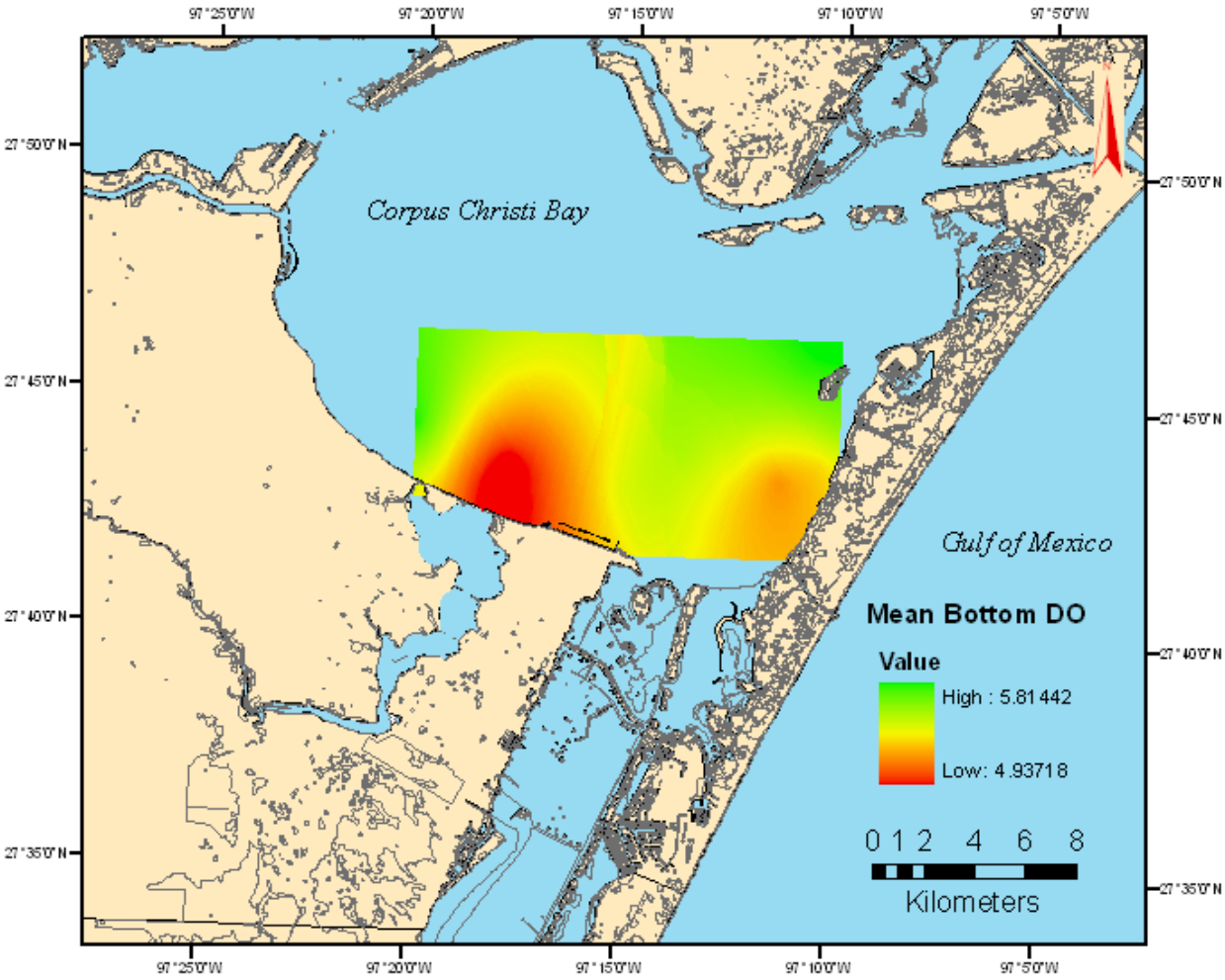

Figure 6. Interpolation of mean bottom dissolved oxygen concentration in southeast region of Corpus Christi Bay for 2008.

Possible Indications of Groundwater Flow

Several instances of low salinity spikes occurred during the study period. These are summarized in Table 7. These spikes are typically less than thirty minutes in duration and range from 0.5 ppt to 12.0 ppt less than ambient salinity. The majority of these events, 87%, occur in the bottom observations. One possible explanation for these occurrences is the percolation of groundwater into the bay. While there is no indication of sondes malfunctioning, only further study incorporating replicate sonde measurements can rule out the possibility.

Table 7. Observed Low-salinity Spikes

Station	Date	Depth	δ (ppt)	Figure
17781	20-May	bottom	-12.0	D.2
17793	22-May	bottom	-2.0	D.5
17793	22-May	bottom	-4.0	D.5
18247	26-May	bottom	-1.5	D.7
18247	27-May	bottom	-1.0	D.7
17781	21-Jun	surface	-1.0	D.8
17781	21-Jun	surface	-1.5	D.8
17781	18-Jun	bottom	-9.0	D.9
17787	20-Jun	surface	-0.8	D.10
17793	18-Jun	bottom	-12.0	D.13
18247	19-Jun	bottom	-3.0	D.15
17781	1-Aug	bottom	-5.0	D.25
17781	2-Aug	bottom	-10.0	D.25
17787	5-Aug	bottom	-11.0	D.27
17781	21-Sep	bottom	-9.0	D.33

Summary

The purpose of the current study was to gain more information on the spatial and temporal extent of hypoxia and begin to explore the potential role of nutrients. Hypoxia in Corpus Christi Bay can begin as early as the first week of June, and occurs as late as the last week of August. Hypoxic conditions can extend from Ward Island to Shamrock Island covering an area of about 80 km^2. Nutrient concentrations are not at high levels. Although ammonium and phosphate levels are higher in the hypoxic zone, this is more likely due to microbial remineralization than loading from Oso Bay. However, discovery of groundwater inputs to the hypoxic zone is troubling and may be an important route for nutrient loading to the bay. At the current time, it appears that salty water driven by prevailing winds into Corpus Christi Bay is the main cause of stratification, and dissolved oxygen is quickly depleted from the bottom layer of water leading to the hypoxia.

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Appendix A.

Nutrient Concentrations

DATE	Station	Rep.	Depth	[Chl] (µg/L)	[NH4] (µM)	[PO4] (µM)	[SIO4] (µM)	[NN] (µM)
5/19/2008	10	1	0.1	0.90	<0.03	0.05	217.38	0.20
5/19/2008	10	2	0.1	1.39	<0.03	<0.03	262.10	0.29
5/19/2008	10	1	4.2	1.55	<0.03	0.03	220.80	0.17
5/19/2008	10	2	4.2	1.72	<0.03	<0.03	213.50	0.22
5/19/2008	11	1	0.1	1.00	<0.03	0.04	198.10	0.27
5/19/2008	11	2	0.1	0.72	<0.03	0.03	208.15	0.18
5/19/2008	11	1	3.9	2.10	2.97	0.14	246.24	0.47
5/19/2008	11	2	3.9	2.16	<0.03	0.15	229.53	0.27
5/19/2008	12	1	0.1	1.55	<0.03	<0.03	181.45	0.21
5/19/2008	12	2	0.1	0.98	<0.03	0.04	193.95	0.29
5/19/2008	12	1	2.8	1.32	<0.03	<0.03	189.99	0.22
5/19/2008	12	2	2.8	1.35	<0.03	0.04	194.24	0.18
5/19/2008	15	1	0.1	0.54	<0.03	<0.03	178.59	0.21
5/19/2008	15	2	0.1	0.07	<0.03	<0.03	176.65	0.23
5/19/2008	15	1	3.6	1.39	0.08	0.04	177.89	0.33
5/19/2008	15	2	3.6	0.94	<0.03	0.04	185.16	0.40
5/19/2008	16	1	0.1	1.72	<0.03	0.23	200.14	0.22
5/19/2008	16	2	0.1	2.40	<0.03	0.21	209.50	0.23
5/19/2008	16	1	3.4	1.93	<0.03	0.13	196.70	0.18
5/19/2008	16	2	3.4	1.82	<0.03	0.09	201.01	0.16
5/19/2008	19	1	0.1	1.19	0.23	<0.03	214.31	0.31
5/19/2008	19	2	0.1	1.59	<0.03	0.04	226.08	0.19
5/19/2008	19	1	4.2	0.67	<0.03	0.05	224.57	0.19
5/19/2008	19	2	4.2	0.63	0.75	0.15	290.25	0.47
5/19/2008	24	1	0.1	2.24	<0.03	0.08	212.46	0.17
5/19/2008	24	2	0.1	1.51	<0.03	0.10	204.09	0.28
5/19/2008	24	1	3.0	2.69	<0.03	0.08	202.73	0.38
5/19/2008	24	2	3.0	1.34	<0.03	0.07	176.81	0.26
5/19/2008	35	1	0.1	4.90	<0.03	0.11	211.42	0.13
5/19/2008	35	2	0.1	0.55	<0.03	0.12	211.66	0.24
5/19/2008	35	1	4.2	0.69	<0.03	0.16	208.75	0.25
5/19/2008	35	2	4.2	0.91	<0.03	0.14	219.99	0.16
5/19/2008	39	1	0.1	1.50	<0.03	0.26	216.72	0.18
5/19/2008	39	2	0.1	1.44	<0.03	0.27	215.37	0.24
5/19/2008	39	1	4.4	0.82	<0.03	0.22	192.49	0.36
5/19/2008	39	2	4.4	0.72	<0.03	0.23	195.71	0.33
5/19/2008	41	1	0.1	1.36	<0.03	0.34	191.84	0.31
5/19/2008	41	2	0.1	0.97	<0.03	0.20	201.74	0.17
5/19/2008	41	1	4.4	0.54	<0.03	0.28	219.76	0.25
5/19/2008	41	2	4.4	0.79	<0.03	0.26	223.42	0.28
5/19/2008	61	1	0.1	1.77	<0.03	0.08	206.17	0.18
5/19/2008	61	2	0.1	1.29	0.08	0.10	221.05	0.33
5/19/2008	61	1	4.2	0.66	<0.03	0.09	220.75	0.22
5/19/2008	61	2	4.2	0.80	<0.03	0.20	257.64	0.29
5/19/2008	199	1	0.1	2.05	<0.03	0.12	230.65	0.44

DATE	Station	Rep.	Depth	[Chl] (µg/L)	[NH4] (µM)	[PO4] (µM)	[SIO4] (µM)	[NN] (µM)
5/19/2008	199	2	0.1	1.67	<0.03	0.06	270.76	0.29
5/19/2008	199	1	4.3	0.99	<0.03	0.20	301.79	0.25
5/19/2008	199	2	4.3	1.35	<0.03	0.19	267.10	0.23
5/19/2008	202	1	0.1	1.47	<0.03	0.14	224.47	0.21
5/19/2008	202	2	0.1	1.75	<0.03	0.13	218.15	0.19
5/19/2008	202	1	4.2	1.53	<0.03	0.28	261.21	0.29
5/19/2008	202	2	4.2	2.76	<0.03	0.18	216.66	0.17
5/19/2008	212	1	0.1	1.33	<0.03	0.28	296.70	0.33
5/19/2008	212	2	0.1	1.34	<0.03	0.18	279.57	0.15
5/19/2008	212	1	4.1	1.16	<0.03	0.30	323.92	0.29
5/19/2008	212	2	4.1	1.02	<0.03	0.42	328.77	0.48
5/19/2008	308	1	0.1	1.17	<0.03	0.16	337.80	0.31
5/19/2008	308	2	0.1	1.47	<0.03	0.10	330.86	0.20
5/19/2008	308	1	4.0	3.69	<0.03	<0.03	1618.25	<0.03
5/19/2008	308	2	4.0	4.93	<0.03	<0.03	725.37	<0.03
5/19/2008	17781	1	0.1	0.66	<0.03	0.29	298.62	0.29
5/19/2008	17781	2	0.1	1.16	<0.03	0.28	291.57	0.18
5/19/2008	17781	1	4.3	0.89	<0.03	0.26	316.86	0.27
5/19/2008	17781	2	4.3	1.47	<0.03	0.36	345.94	0.23
5/19/2008	17787	1	0.1	1.54	<0.03	0.16	314.24	0.25
5/19/2008	17787	2	0.1	1.58	<0.03	0.15	314.37	0.31
5/19/2008	17787	1	3.5	3.22	<0.03	<0.03	2824.91	<0.03
5/19/2008	17787	2	3.5	2.81	<0.03	<0.03	742.69	<0.03
5/19/2008	17793	1	0.1	7.81	<0.03	0.19	224.52	0.32
5/19/2008	17793	2	0.1	3.06	<0.03	0.21	232.12	0.15
5/19/2008	17793	1	3.7	6.18	<0.03	0.29	243.62	0.22
5/19/2008	17793	2	3.7	4.01	<0.03	0.22	231.42	0.22
5/19/2008	18247	1	0.1	1.22	<0.03	0.25	235.83	0.17
5/19/2008	18247	2	0.1	1.29	<0.03	0.22	234.32	0.21
5/19/2008	18247	1	4.2	2.66	<0.03	<0.03	346.15	0.20
5/19/2008	18247	2	4.2	3.73	<0.03	<0.03	285.51	0.19
5/27/2008	10	1	0.1	0.43	<0.03	0.41	322.00	0.79
5/27/2008	10	2	0.1	1.09	<0.03	0.38	197.14	0.95
5/27/2008	10	1	3.4	0.91	<0.03	0.32	155.43	0.93
5/27/2008	10	2	3.4	1.02	<0.03	0.32	232.01	0.54
5/27/2008	11	1	0.1	1.76	<0.03	0.21	236.80	0.40
5/27/2008	11	2	0.1	0.76	<0.03	0.36	162.31	1.01
5/27/2008	11	1	4.0	1.38	<0.03	0.35	216.90	0.57
5/27/2008	11	2	4.0	1.46	<0.03	0.32	204.49	0.46
5/27/2008	12	1	0.1	1.20	<0.03	0.11	235.62	0.54
5/27/2008	12	2	0.1	1.12	<0.03	0.27	214.13	0.53
5/27/2008	12	1	3.1	0.47	<0.03	0.27	204.66	0.48
5/27/2008	12	2	3.1	0.56	<0.03	0.26	149.79	0.65
5/27/2008	15	1	0.1	0.64	<0.03	0.26	204.36	0.54
5/27/2008	15	2	0.1	1.64	<0.03	0.49	139.96	0.96
5/27/2008	15	1	4.0	1.32	<0.03	0.29	211.98	0.64
5/27/2008	15	2	4.0	2.69	<0.03	0.30	220.84	0.55
5/27/2008	16	1	0.1	1.38	<0.03	0.08	200.42	0.61

DATE	Station	Rep.	Depth	[Chl] (µg/L)	[NH4] (µM)	[PO4] (µM)	[SIO4] (µM)	[NN] (µM)
5/27/2008	16	2	0.1	0.66	<0.03	0.19	197.41	0.57
5/27/2008	16	1	3.4	0.78	<0.03	0.21	191.28	0.64
5/27/2008	16	2	3.4	1.38	<0.03	0.18	189.96	0.54
5/27/2008	19	1	0.1	1.74	<0.03	0.41	226.16	0.94
5/27/2008	19	2	0.1	0.74	<0.03	0.33	248.95	0.69
5/27/2008	19	1	4.5	1.26	<0.03	0.38	111.48	0.89
5/27/2008	19	2	4.5	0.89	<0.03	0.59	168.01	1.61
5/27/2008	24	1	0.1	0.65	<0.03	0.34	138.92	1.17
5/27/2008	24	2	0.1	0.56	<0.03	0.34	257.48	0.07
5/27/2008	24	1	3.4	1.22	<0.03	0.27	241.73	1.00
5/27/2008	24	2	3.4	0.56	<0.03	0.35	246.79	0.47
5/27/2008	35	1	0.1	1.46	<0.03	0.23	183.63	0.77
5/27/2008	35	2	0.1	1.58	<0.03	0.20	192.69	0.62
5/27/2008	35	1	4.6	0.77	<0.03	0.24	143.27	0.62
5/27/2008	35	2	4.6	1.44	<0.03	0.18	134.78	0.67
5/27/2008	39	1	0.1	0.89	<0.03	0.24	226.59	0.71
5/27/2008	39	2	0.1	1.16	<0.03	0.25	218.06	0.98
5/27/2008	39	1	4.6	4.86	<0.03	0.15	276.27	0.59
5/27/2008	39	2	4.6	1.92	<0.03	0.25	303.07	1.08
5/27/2008	41	1	0.1	1.70	<0.03	0.26	136.07	0.87
5/27/2008	41	2	0.1	1.09	<0.03	0.28	187.00	0.50
5/27/2008	41	1	4.3	2.26	0.49	1.22	213.95	0.72
5/27/2008	41	2	4.3	1.84	<0.03	0.34	130.40	1.32
5/27/2008	61	1	0.1	0.54	<0.03	0.22	130.60	0.92
5/27/2008	61	2	0.1	1.77	<0.03	0.31	109.64	1.57
5/27/2008	61	1	4.2	1.33	<0.03	0.30	130.64	1.11
5/27/2008	61	2	4.2	2.04	<0.03	0.25	186.11	0.58
5/27/2008	199	1	0.1	3.13	<0.03	0.40	221.68	0.43
5/27/2008	199	2	0.1	2.63	<0.03	0.25	303.07	0.38
5/27/2008	199	1	4.6	1.59	<0.03	0.31	227.36	0.38
5/27/2008	199	2	4.6	5.19	<0.03	0.45	231.66	0.41
5/27/2008	202	1	0.1	1.76	<0.03	0.42	199.40	0.67
5/27/2008	202	2	0.1	1.65	<0.03	0.45	215.17	0.60
5/27/2008	202	1	4.2	2.30	<0.03	0.42	170.42	1.00
5/27/2008	202	2	4.2	1.41	<0.03	0.43	172.13	1.13
5/27/2008	212	1	0.1	2.98	<0.03	0.24	317.30	0.43
5/27/2008	212	2	0.1	2.02	<0.03	0.26	297.30	0.61
5/27/2008	212	1	4.1	2.35	<0.03	0.27	288.48	0.55
5/27/2008	212	2	4.1	4.11	<0.03	0.30	292.76	0.60
5/27/2008	308	1	0.1	6.31	<0.03	0.08	162.50	0.19
5/27/2008	308	2	0.1	2.15	<0.03	0.29	277.76	0.42
5/27/2008	308	1	4.4	16.35	<0.03	0.24	354.41	0.55
5/27/2008	308	2	4.4	12.30	<0.03	0.26	438.14	0.61
5/27/2008	17781	1	0.1	1.93	<0.03	0.25	318.33	0.59
5/27/2008	17781	2	0.1	1.79	<0.03	0.27	334.40	0.58
5/27/2008	17781	1	4.5	5.72	<0.03	0.30	370.21	0.63
5/27/2008	17781	2	4.5	1.94	<0.03	0.24	344.02	0.44
5/27/2008	17787	1	0.1	5.38	<0.03	0.15	376.08	0.59

DATE	Station	Rep.	Depth	[Chl] (µg/L)	[NH4] (µM)	[PO4] (µM)	[SIO4] (µM)	[NN] (µM)
5/27/2008	17787	2	0.1	1.87	<0.03	0.11	391.42	0.42
5/27/2008	17787	1	3.8	1.55	<0.03	0.15	494.39	1.01
5/27/2008	17787	2	3.8	1.10	<0.03	0.14	311.92	1.05
5/27/2008	17793	1	0.1	4.17	<0.03	0.13	190.17	0.88
5/27/2008	17793	2	0.1	3.77	<0.03	0.11	311.63	0.52
5/27/2008	17793	1	3.9	0.90	<0.03	0.15	213.84	1.03
5/27/2008	17793	2	3.9	1.50	<0.03	<0.03	568.86	0.41
5/27/2008	18247	1	0.1	1.51	<0.03	0.17	294.97	0.57
5/27/2008	18247	2	0.1	1.81	<0.03	0.24	271.11	0.38
5/27/2008	18247	1	4.5	10.66	<0.03	0.30	289.34	0.55
5/27/2008	18247	2	4.5	1.86	<0.03	0.31	299.21	0.48
6/18/2008	10	1	0.1	1.12	<0.03	0.26	154.28	2.22
6/18/2008	10	2	0.1	1.45	<0.03	0.25	373.22	0.09
6/18/2008	10	1	2.7	1.59	<0.03	0.26	364.93	0.19
6/18/2008	10	2	2.7	1.06	<0.03	0.26	360.31	0.05
6/18/2008	11	1	0.1	1.03	<0.03	0.25	357.35	0.07
6/18/2008	11	2	0.1	0.71	<0.03	0.24	351.74	0.04
6/18/2008	11	1	4.0	1.25	<0.03	0.40	370.55	0.20
6/18/2008	11	2	4.0	1.34	<0.03	0.39	375.12	0.12
6/18/2008	12	1	0.1	1.78	<0.03	0.29	349.91	0.07
6/18/2008	12	2	0.1	2.05	<0.03	0.30	356.26	0.03
6/18/2008	12	1	2.9	1.32	<0.03	0.26	384.97	0.09
6/18/2008	12	2	2.9	0.56	<0.03	0.26	370.44	0.11
6/18/2008	15	1	0.1	2.21	<0.03	0.22	373.53	0.05
6/18/2008	15	2	0.1	1.41	<0.03	0.27	304.35	0.05
6/18/2008	15	1	3.8	2.03	<0.03	0.24	361.63	0.11
6/18/2008	15	2	3.8	1.48	<0.03	0.29	381.95	0.11
6/18/2008	16	1	0.1	1.57	<0.03	0.31	347.95	0.15
6/18/2008	16	2	0.1	1.48	<0.03	0.33	353.20	0.03
6/18/2008	16	1	3.6	1.34	<0.03	0.39	367.82	0.24
6/18/2008	16	2	3.6	1.50	<0.03	0.38	341.54	0.19
6/18/2008	19	1	0.1	1.17	<0.03	0.30	295.35	0.77
6/18/2008	19	2	0.1	1.34	<0.03	0.29	348.96	0.12
6/18/2008	19	1	4.3	1.54	2.99	0.79	444.61	0.81
6/18/2008	19	2	4.3	0.73	4.38	0.98	418.92	1.17
6/18/2008	24	1	0.1	0.77	<0.03	0.27	379.12	0.17
6/18/2008	24	2	0.1	1.07	<0.03	0.30	391.75	0.03
6/18/2008	24	1	3.2	1.69	<0.03	0.88	441.73	0.69
6/18/2008	24	2	3.2	1.39	<0.03	0.84	439.24	0.86
6/18/2008	35	1	0.1	0.61	<0.03	0.18	247.66	0.42
6/18/2008	35	2	0.1	1.12	<0.03	0.16	196.54	0.06
6/18/2008	35	1	4.6	1.36	0.96	0.52	222.81	0.68
6/18/2008	35	2	4.6	1.48	0.58	0.52	233.06	0.48
6/18/2008	39	1	0.1	1.87	<0.03	0.29	179.09	0.06
6/18/2008	39	2	0.1	1.48	<0.03	0.29	178.34	0.08
6/18/2008	39	1	4.6	2.45	0.11	0.20	256.03	0.39
6/18/2008	39	2	4.6	1.33	0.28	0.20	271.37	0.38
6/18/2008	41	1	0.1	1.67	<0.03	0.30	155.61	0.76

DATE	Station	Rep.	Depth	[Chl] (µg/L)	[NH4] (µM)	[PO4] (µM)	[SIO4] (µM)	[NN] (µM)
6/18/2008	41	2	0.1	1.01	<0.03	0.30	183.65	0.04
6/18/2008	41	1	4.6	1.18	<0.03	0.34	266.36	0.25
6/18/2008	41	2	4.6	0.87	<0.03	0.37	242.58	0.52
6/18/2008	61	1	0.1	1.12	<0.03	0.27	379.26	0.17
6/18/2008	61	2	0.1	1.29	<0.03	0.28	307.46	0.04
6/18/2008	61	1	4.5	1.02	2.11	0.81	456.04	0.39
6/18/2008	61	2	4.5	2.35	1.68	0.60	357.99	0.64
6/18/2008	199	1	0.1	0.87	<0.03	0.34	153.27	0.07
6/18/2008	199	2	0.1	1.05	<0.03	0.34	165.55	0.05
6/18/2008	199	1	4.5	1.83	3.34	0.85	209.06	0.79
6/18/2008	199	2	4.5	1.00	4.79	1.00	231.21	0.75
6/18/2008	202	1	0.1	0.66	<0.03	0.25	186.47	0.05
6/18/2008	202	2	0.1	1.06	<0.03	0.25	183.46	0.03
6/18/2008	202	1	4.4	1.86	0.09	0.51	262.18	0.58
6/18/2008	202	2	4.4	2.43	0.59	0.62	252.09	1.62
6/18/2008	212	1	0.1	1.36	<0.03	0.46	171.75	0.06
6/18/2008	212	2	0.1	0.95	<0.03	0.45	179.62	0.05
6/18/2008	212	1	4.3	1.89	0.03	0.65	219.25	0.21
6/18/2008	212	2	4.3	0.93	<0.03	0.60	208.61	0.15
6/18/2008	308	1	0.1	1.84	<0.03	0.40	168.50	0.05
6/18/2008	308	2	0.1	1.44	<0.03	0.41	166.12	0.06
6/18/2008	308	1	4.2	4.61	2.10	0.45	323.42	0.46
6/18/2008	308	2	4.2	4.28	1.76	0.42	298.97	0.44
6/18/2008	17781	1	0.1	0.65	<0.03	0.45	164.11	0.06
6/18/2008	17781	2	0.1	0.84	<0.03	0.47	175.94	0.07
6/18/2008	17781	1	4.5	0.74	<0.03	0.56	195.67	0.07
6/18/2008	17781	2	4.5	0.94	<0.03	0.57	198.79	0.04
6/18/2008	17787	1	0.1	0.61	<0.03	0.48	204.27	0.06
6/18/2008	17787	2	0.1	1.41	<0.03	0.48	211.07	0.07
6/18/2008	17787	1	3.7	1.95	0.52	0.56	277.00	0.10
6/18/2008	17787	2	3.7	1.17	0.75	0.55	285.32	0.15
6/18/2008	17793	1	0.1	0.64	<0.03	0.30	199.03	0.04
6/18/2008	17793	2	0.1	0.88	<0.03	0.31	206.59	0.05
6/18/2008	17793	1	3.9	2.76	<0.03	0.23	324.90	0.15
6/18/2008	17793	2	3.9	2.92	1.32	0.32	361.53	0.18
6/18/2008	18247	1	0.1	0.60	<0.03	0.26	234.79	0.06
6/18/2008	18247	2	0.1	1.65	<0.03	0.26	217.42	0.03
6/18/2008	18247	1	4.4	3.22	<0.03	0.23	366.46	0.06
6/18/2008	18247	2	4.4	3.50	<0.03	0.20	366.83	0.18
6/25/2008	10	1	0.1	3.98	<0.03	0.20	309.20	0.45
6/25/2008	10	2	0.1	1.51	<0.03	0.21	233.28	0.69
6/25/2008	10	1	2.9	1.88	<0.03	0.23	294.04	0.52
6/25/2008	10	2	2.9	1.18	<0.03	0.25	307.62	0.45
6/25/2008	11	1	0.1	2.03	<0.03	0.13	307.82	0.18
6/25/2008	11	2	0.1	2.33	<0.03	0.14	305.69	0.36
6/25/2008	11	1	3.8	3.17	<0.03	0.27	314.74	0.44
6/25/2008	11	2	3.8	1.72	<0.03	0.29	316.32	0.24
6/25/2008	12	1	0.1	3.21	<0.03	0.18	291.25	0.34

DATE	Station	Rep.	Depth	[Chl] (µg/L)	[NH4] (µM)	[PO4] (µM)	[SIO4] (µM)	[NN] (µM)
6/25/2008	12	2	0.1	2.34	<0.03	0.19	297.17	0.33
6/25/2008	12	1	2.8	1.96	<0.03	0.23	302.03	0.43
6/25/2008	12	2	2.8	2.14	<0.03	0.15	307.32	0.28
6/25/2008	15	1	0.1	2.17	<0.03	0.27	261.66	0.39
6/25/2008	15	2	0.1	4.44	<0.03	0.27	264.57	0.48
6/25/2008	15	1	3.5	1.49	<0.03	0.29	268.83	0.50
6/25/2008	15	2	3.5	1.34	<0.03	0.35	282.50	0.49
6/25/2008	16	1	0.1	1.68	<0.03	0.24	292.19	0.48
6/25/2008	16	2	0.1	1.16	<0.03	0.21	298.77	0.51
6/25/2008	16	1	3.3	1.95	<0.03	0.25	275.71	0.40
6/25/2008	16	2	3.3	1.74	<0.03	0.22	301.05	0.32
6/25/2008	19	1	0.1	1.79	<0.03	0.29	285.80	0.43
6/25/2008	19	2	0.1	2.60	<0.03	0.28	292.36	0.44
6/25/2008	19	1	4.1	1.72	<0.03	0.40	301.17	0.48
6/25/2008	19	2	4.1	1.35	<0.03	0.34	299.81	0.56
6/25/2008	24	1	0.1	2.65	<0.03	0.28	292.04	0.49
6/25/2008	24	2	0.1	1.55	<0.03	0.26	294.90	0.52
6/25/2008	24	1	3.0	1.94	<0.03	0.36	307.32	0.56
6/25/2008	24	2	3.0	1.30	0.11	0.35	319.33	0.58
6/25/2008	35	1	0.1	3.63	<0.03	0.26	266.52	0.49
6/25/2008	35	2	0.1	1.81	<0.03	0.25	258.02	0.51
6/25/2008	35	1	4.2	1.75	<0.03	0.29	259.46	0.41
6/25/2008	35	2	4.2	1.81	<0.03	0.29	266.49	0.50
6/25/2008	39	1	0.1	2.42	0.58	0.41	247.61	0.78
6/25/2008	39	2	0.1	1.58	0.14	0.39	236.45	0.63
6/25/2008	39	1	4.3	1.39	<0.03	0.30	214.86	0.69
6/25/2008	39	2	4.3	1.15	<0.03	0.32	266.41	0.72
6/25/2008	41	1	0.1	1.43	<0.03	0.32	238.80	0.57
6/25/2008	41	2	0.1	1.47	<0.03	0.36	120.03	0.85
6/25/2008	41	1	4.3	2.28	0.16	0.39	230.86	0.86
6/25/2008	41	2	4.3	1.60	1.21	0.44	268.44	0.83
6/25/2008	61	1	0.1	2.48	<0.03	0.33	272.96	0.58
6/25/2008	61	2	0.1	1.40	<0.03	0.33	276.75	0.52
6/25/2008	61	1	4.1	1.49	<0.03	0.33	269.80	0.37
6/25/2008	61	2	4.1	1.26	<0.03	0.36	285.48	0.54
6/25/2008	199	1	0.1	0.76	<0.03	0.31	233.18	0.50
6/25/2008	199	2	0.1	0.85	<0.03	0.31	176.07	0.66
6/25/2008	199	1	4.2	0.68	<0.03	0.32	223.23	0.69
6/25/2008	199	2	4.2	0.80	<0.03	0.33	184.56	0.49
6/25/2008	202	1	0.1	1.33	<0.03	0.22	231.33	0.75
6/25/2008	202	2	0.1	0.96	<0.03	0.22	249.33	0.54
6/25/2008	202	1	4.3	0.68	<0.03	0.35	256.31	0.34
6/25/2008	202	2	4.3	1.02	<0.03	0.32	272.48	0.54
6/25/2008	212	1	0.1	1.32	<0.03	0.43	192.74	0.58
6/25/2008	212	2	0.1	3.96	<0.03	0.41	204.65	0.71
6/25/2008	212	1	4.0	0.95	<0.03	0.45	103.61	0.79
6/25/2008	212	2	4.0	1.97	<0.03	0.42	218.94	0.88
6/25/2008	308	1	0.1	1.07	<0.03	0.30	221.17	0.55

DATE	Station	Rep.	Depth	[Chl] (µg/L)	[NH4] (µM)	[PO4] (µM)	[SIO4] (µM)	[NN] (µM)
6/25/2008	308	2	0.1	2.33	<0.03	0.32	211.60	0.33
6/25/2008	308	1	3.9	2.62	<0.03	0.41	214.08	0.93
6/25/2008	308	2	3.9	0.88	<0.03	0.37	107.68	1.02
6/25/2008	17781	1	0.1	2.81	<0.03	0.34	240.10	0.40
6/25/2008	17781	2	0.1	1.61	<0.03	0.30	242.46	0.30
6/25/2008	17781	1	4.2	2.16	<0.03	0.31	236.76	0.40
6/25/2008	17781	2	4.2	1.33	<0.03	0.32	251.14	0.41
6/25/2008	17787	1	0.1	2.72	<0.03	0.10	250.16	0.36
6/25/2008	17787	2	0.1	2.42	<0.03	0.10	256.08	0.35
6/25/2008	17787	1	3.5	4.33	<0.03	0.07	329.64	0.30
6/25/2008	17787	2	3.5	6.72	<0.03	0.08	317.55	0.41
6/25/2008	17793	1	0.1	1.66	<0.03	0.14	305.60	0.43
6/25/2008	17793	2	0.1	4.10	<0.03	0.12	291.86	0.35
6/25/2008	17793	1	3.6	2.89	<0.03	0.17	322.40	0.44
6/25/2008	17793	2	3.6	4.58	<0.03	0.25	326.92	0.50
6/25/2008	18247	1	0.1	3.22	<0.03	0.36	307.24	0.50
6/25/2008	18247	2	0.1	2.42	<0.03	0.34	308.19	0.73
6/25/2008	18247	1	4.2	1.87	0.97	0.26	304.20	0.68
6/25/2008	18247	2	4.2	1.82	1.15	0.26	306.47	0.72
7/18/2008	10	1	0.1	1.71	<0.03	0.13	314.66	0.44
7/18/2008	10	2	0.1	2.51	<0.03	0.09	321.81	0.73
7/18/2008	10	1	3.4	4.77	8.30	1.46	389.04	0.87
7/18/2008	10	2	3.4	0.69	10.34	1.68	436.18	1.16
7/18/2008	11	1	0.1	1.15	<0.03	0.20	358.41	0.35
7/18/2008	11	2	0.1	2.07	<0.03	0.16	301.62	0.21
7/18/2008	11	1	3.8	1.33	8.85	1.49	513.98	0.34
7/18/2008	11	2	3.8	1.44	6.31	1.22	334.38	0.05
7/18/2008	12	1	0.1	0.93	<0.03	0.16	265.57	0.14
7/18/2008	12	2	0.1	2.52	<0.03	0.24	336.89	0.64
7/18/2008	12	1	2.7	2.57	0.06	0.14	310.29	0.22
7/18/2008	12	2	2.7	2.30	<0.03	0.08	301.93	0.11
7/18/2008	15	1	0.1	4.22	<0.03	<0.03	285.69	0.31
7/18/2008	15	2	0.1	1.61	<0.03	0.04	272.34	0.14
7/18/2008	15	1	3.6	1.15	<0.03	0.03	252.16	0.06
7/18/2008	15	2	3.6	1.24	<0.03	0.03	252.71	0.18
7/18/2008	16	1	0.1	2.02	<0.03	0.06	263.29	0.07
7/18/2008	16	2	0.1	2.62	<0.03	0.21	263.74	0.05
7/18/2008	16	1	3.4	0.62	<0.03	0.08	264.56	0.09
7/18/2008	16	2	3.4	2.47	<0.03	0.12	270.14	0.15
7/18/2008	19	1	0.1	2.29	<0.03	0.04	276.38	0.06
7/18/2008	19	2	0.1	0.84	<0.03	0.03	352.98	0.84
7/18/2008	19	1	4.1	1.75	4.44	0.84	406.85	0.96
7/18/2008	19	2	4.1	2.30	5.50	1.12	434.54	1.12
7/18/2008	24	1	0.1	1.00	<0.03	0.07	347.06	0.12
7/18/2008	24	2	0.1	1.02	<0.03	0.09	371.71	0.47
7/18/2008	24	1	3.0	2.23	<0.03	0.35	355.03	0.68
7/18/2008	24	2	3.0	7.37	<0.03	0.29	307.41	0.44
7/18/2008	35	1	0.1	2.04	<0.03	0.04	272.51	0.09

DATE	Station	Rep.	Depth	[Chl] (µg/L)	[NH4] (µM)	[PO4] (µM)	[SIO4] (µM)	[NN] (µM)
7/18/2008	35	2	0.1	1.25	<0.03	<0.03	266.93	0.09
7/18/2008	35	1	4.2	1.08	<0.03	<0.03	270.23	0.05
7/18/2008	35	2	4.2	0.94	<0.03	<0.03	265.52	0.08
7/18/2008	39	1	0.1	2.23	<0.03	<0.03	274.69	0.07
7/18/2008	39	2	0.1	2.04	<0.03	0.05	222.45	0.11
7/18/2008	39	1	4.4	2.08	<0.03	0.18	297.40	0.21
7/18/2008	39	2	4.4	0.99	<0.03	0.04	271.50	0.07
7/18/2008	41	1	0.1	2.17	<0.03	<0.03	252.86	<0.03
7/18/2008	41	2	0.1	2.99	<0.03	<0.03	257.02	<0.03
7/18/2008	41	1	4.3	1.99	<0.03	0.04	279.33	<0.03
7/18/2008	41	2	4.3	2.23	<0.03	0.05	276.70	0.20
7/18/2008	61	1	0.1	1.59	<0.03	0.05	267.16	0.05
7/18/2008	61	2	0.1	1.20	<0.03	<0.03	270.08	0.08
7/18/2008	61	1	4.1	3.36	<0.03	0.20	272.24	0.05
7/18/2008	61	2	4.1	1.43	<0.03	0.17	275.87	0.08
7/18/2008	199	1	0.1	1.48	<0.03	0.04	258.09	0.15
7/18/2008	199	2	0.1	1.22	<0.03	0.04	258.81	0.08
7/18/2008	199	1	4.3	1.51	1.45	0.44	324.95	0.54
7/18/2008	199	2	4.3	1.95	0.93	0.28	313.28	0.34
7/18/2008	202	1	0.1	1.86	<0.03	<0.03	256.89	0.10
7/18/2008	202	2	0.1	1.26	<0.03	<0.03	259.16	0.08
7/18/2008	202	1	4.2	0.76	<0.03	0.03	275.77	0.05
7/18/2008	202	2	4.2	1.51	<0.03	0.09	282.01	0.09
7/18/2008	212	1	0.1	1.39	<0.03	0.21	267.17	0.16
7/18/2008	212	2	0.1	2.38	<0.03	0.41	266.10	0.11
7/18/2008	212	1	4.1	0.86	0.03	0.40	291.56	0.18
7/18/2008	212	2	4.1	0.76	1.02	0.65	299.51	0.28
7/18/2008	308	1	0.1	0.75	<0.03	0.04	257.24	0.23
7/18/2008	308	2	0.1	2.20	<0.03	0.06	262.67	0.27
7/18/2008	308	1	4.0	1.56	2.73	0.42	331.03	0.32
7/18/2008	308	2	4.0	0.96	2.93	0.56	338.22	0.32
7/18/2008	17781	1	0.1	1.02	<0.03	0.27	257.60	0.10
7/18/2008	17781	2	0.1	2.14	<0.03	0.22	255.85	0.08
7/18/2008	17781	1	4.2	2.39	<0.03	0.26	254.94	0.12
7/18/2008	17781	2	4.2	1.64	0.05	0.38	260.43	1.62
7/18/2008	17787	1	0.1	4.09	<0.03	0.21	271.53	0.13
7/18/2008	17787	2	0.1	3.06	<0.03	0.28	271.39	0.14
7/18/2008	17787	1	3.5	4.40	6.81	0.43	409.39	0.25
7/18/2008	17787	2	3.5	1.03	1.86	0.29	339.91	0.17
7/18/2008	17793	1	0.1	3.45	<0.03	0.16	271.54	0.14
7/18/2008	17793	2	0.1	3.03	<0.03	0.11	279.25	0.33
7/18/2008	17793	1	3.7	2.54	<0.03	0.06	315.90	0.34
7/18/2008	17793	2	3.7	2.38	<0.03	0.03	295.54	0.10
7/18/2008	18247	1	0.1	5.24	<0.03	<0.03	264.61	0.19
7/18/2008	18247	2	0.1	5.40	<0.03	<0.03	275.70	0.14
7/18/2008	18247	1	4.2	3.35	<0.03	0.04	289.94	0.16
7/18/2008	18247	2	4.2	2.26	<0.03	<0.03	277.68	0.09
7/25/2008	10	1	0.1	0.92	4.08	0.92	55.30	0.38

DATE	Station	Rep.	Depth	[Chl] (µg/L)	[NH4] (µM)	[PO4] (µM)	[SIO4] (µM)	[NN] (µM)
7/25/2008	10	2	0.1	2.58	2.86	0.81	38.88	0.75
7/25/2008	10	1	3.8	0.97	3.66	0.90	47.10	0.45
7/25/2008	10	2	3.8	1.41	3.63	0.91	45.61	0.55
7/25/2008	11	1	0.1	1.12	3.32	0.91	51.89	0.90
7/25/2008	11	2	0.1	1.56	3.17	0.89	53.99	1.09
7/25/2008	11	1	4.3	1.20	3.55	0.90	49.92	0.32
7/25/2008	11	2	4.3	0.38	3.24	0.89	51.27	0.77
7/25/2008	12	1	0.1	5.47	3.38	0.87	44.86	0.87
7/25/2008	12	2	0.1	1.30	3.50	0.81	39.62	1.00
7/25/2008	12	1	3.2	1.54	3.20	0.78	43.88	0.42
7/25/2008	12	2	3.2	1.39	3.69	0.94	58.36	0.32
7/25/2008	15	1	0.1	3.16	3.92	0.78	33.78	0.51
7/25/2008	15	2	0.1	1.43	4.26	0.68	29.67	0.27
7/25/2008	15	1	4.0	0.52	4.56	0.86	49.32	0.35
7/25/2008	15	2	4.0	1.98	4.68	0.93	39.43	0.54
7/25/2008	16	1	0.1	0.98	1.87	0.79	47.36	0.47
7/25/2008	16	2	0.1	0.91	1.67	0.71	40.85	0.16
7/25/2008	16	1	3.8	0.70	1.94	0.83	47.24	0.30
7/25/2008	16	2	3.8	1.28	1.88	0.71	46.38	0.24
7/25/2008	19	1	0.1	0.58	5.21	1.10	61.18	0.68
7/25/2008	19	2	0.1	4.41	5.71	1.05	55.15	0.58
7/25/2008	19	1	4.6	0.52	7.04	1.00	52.81	0.49
7/25/2008	19	2	4.6	0.54	5.69	1.15	60.62	0.53
7/25/2008	24	1	0.1	1.55	4.23	0.96	55.37	0.37
7/25/2008	24	2	0.1	0.96	4.64	1.09	58.47	0.45
7/25/2008	24	1	3.5	3.16	4.83	1.04	78.09	0.36
7/25/2008	24	2	3.5	1.26	4.80	1.04	64.65	0.48
7/25/2008	35	1	0.1	0.55	4.83	1.02	79.03	0.32
7/25/2008	35	2	0.1	1.53	4.88	1.01	68.27	0.31
7/25/2008	35	1	4.6	0.81	5.18	1.04	66.91	0.30
7/25/2008	35	2	4.6	0.72	5.03	1.03	65.26	0.21
7/25/2008	39	1	0.1	0.51	3.65	0.94	59.17	0.29
7/25/2008	39	2	0.1	1.04	3.83	0.90	60.65	0.34
7/25/2008	39	1	4.7	0.84	4.11	0.91	73.60	0.33
7/25/2008	39	2	4.7	0.87	3.50	0.89	56.34	0.43
7/25/2008	41	1	0.1	1.43	3.68	0.93	54.95	0.20
7/25/2008	41	2	0.1	0.27	4.99	1.15	70.41	0.24
7/25/2008	41	1	4.6	0.79	4.84	0.95	73.48	0.29
7/25/2008	41	2	4.6	0.57	4.63	1.00	68.08	0.27
7/25/2008	61	1	0.1	1.05	5.21	0.72	70.44	0.36
7/25/2008	61	2	0.1	0.74	4.95	0.72	67.95	0.28
7/25/2008	61	1	4.5	1.05	5.20	0.71	81.40	0.28
7/25/2008	61	2	4.5	0.15	5.83	0.95	90.80	0.25
7/25/2008	199	1	0.1	1.58	4.04	1.39	74.16	1.35
7/25/2008	199	2	0.1	1.15	4.34	1.50	79.33	1.33
7/25/2008	199	1	4.7	0.58	2.77	0.93	65.68	0.29
7/25/2008	199	2	4.7	1.40	3.23	1.16	73.23	0.58
7/25/2008	202	1	0.1	0.34	3.10	1.24	64.21	0.31

DATE	Station	Rep.	Depth	[Chl] (µg/L)	[NH4] (µM)	[PO4] (µM)	[SIO4] (µM)	[NN] (µM)
7/25/2008	202	2	0.1	0.71	1.75	0.83	56.51	0.28
7/25/2008	202	1	4.5	1.04	1.33	0.81	53.36	0.30
7/25/2008	202	2	4.5	1.18	1.72	0.78	57.00	0.25
7/25/2008	212	1	0.1	1.42	8.82	1.55	81.51	0.67
7/25/2008	212	2	0.1	2.19	9.77	1.55	88.93	0.67
7/25/2008	212	1	4.5	0.71	3.74	1.08	60.96	0.37
7/25/2008	212	2	4.5	1.06	4.98	1.23	78.28	0.43
7/25/2008	308	1	0.1	2.86	8.14	2.93	101.60	3.73
7/25/2008	308	2	0.1	1.32	7.84	2.81	99.58	3.65
7/25/2008	308	1	4.6	0.86	4.54	1.16	72.52	0.27
7/25/2008	308	2	4.6	1.02	4.43	1.14	71.58	0.30
7/25/2008	17781	1	0.1	2.00	4.33	1.09	75.53	0.25
7/25/2008	17781	2	0.1	1.26	4.62	1.09	79.38	0.24
7/25/2008	17781	1	4.7	1.05	5.98	1.22	83.31	0.21
7/25/2008	17781	2	4.7	2.36	6.17	1.28	72.17	0.41
7/25/2008	17787	1	0.1	1.96	6.52	1.31	73.95	0.24
7/25/2008	17787	2	0.1	2.99	6.82	1.38	82.00	0.25
7/25/2008	17787	1	3.8	3.03	7.40	1.33	78.11	0.27
7/25/2008	17787	2	3.8	0.77	7.92	1.31	76.55	0.29
7/25/2008	17793	1	0.1	2.27	0.42	0.13	85.81	0.28
7/25/2008	17793	2	0.1	2.24	<0.03	0.10	92.01	0.34
7/25/2008	17793	1	4.0	0.52	0.17	0.08	82.18	0.35
7/25/2008	17793	2	4.0	2.11	0.41	0.14	95.55	0.30
7/25/2008	18247	1	0.1	3.29	3.91	0.72	54.93	0.34
7/25/2008	18247	2	0.1	2.40	5.55	0.67	47.49	0.43
7/25/2008	18247	1	4.5	2.53	4.75	0.70	55.93	0.42
7/25/2008	18247	2	4.5	2.06	3.33	0.73	50.18	0.41
8/1/2008	10	1	0.1	2.75	<0.03	0.55	50.84	0.25
8/1/2008	10	2	0.1	1.53	<0.03	0.58	34.81	0.89
8/1/2008	10	1	4.1	2.09	<0.03	0.51	44.98	0.29
8/1/2008	10	2	4.1	1.16	<0.03	0.51	42.36	0.51
8/1/2008	11	1	0.1	0.72	<0.03	0.33	53.73	0.89
8/1/2008	11	2	0.1	3.87	<0.03	0.31	48.88	1.13
8/1/2008	11	1	4.3	1.98	0.06	0.11	44.03	0.19
8/1/2008	11	2	4.3	3.69	0.03	0.13	48.36	0.81
8/1/2008	12	1	0.1	3.79	<0.03	0.49	57.42	0.92
8/1/2008	12	2	0.1	2.33	<0.03	0.48	55.71	1.06
8/1/2008	12	1	4.2	1.53	0.55	0.18	49.71	0.39
8/1/2008	12	2	4.2	1.98	0.55	0.19	50.34	0.27
8/1/2008	15	1	0.1	2.52	<0.03	0.45	56.18	0.43
8/1/2008	15	2	0.1	2.89	<0.03	0.45	56.63	0.16
8/1/2008	15	1	4.1	2.75	<0.03	0.48	57.18	0.25
8/1/2008	15	2	4.1	1.79	<0.03	0.47	55.34	0.59
8/1/2008	16	1	0.1	3.55	<0.03	0.22	48.64	0.35
8/1/2008	16	2	0.1	1.77	<0.03	0.20	44.42	0.14
8/1/2008	16	1	4.1	2.71	<0.03	0.20	48.99	0.31
8/1/2008	16	2	4.1	2.47	<0.03	0.23	50.54	0.15
8/1/2008	19	1	0.1	3.60	<0.03	0.54	61.43	0.68

DATE	Station	Rep.	Depth	[Chl] (µg/L)	[NH4] (µM)	[PO4] (µM)	[SIO4] (µM)	[NN] (µM)
8/1/2008	19	2	0.1	3.58	<0.03	0.59	71.11	0.51
8/1/2008	19	1	3.9	2.49	<0.03	0.55	42.37	0.47
8/1/2008	19	2	3.9	2.40	<0.03	0.52	45.62	0.63
8/1/2008	24	1	0.1	3.03	<0.03	0.59	55.88	0.31
8/1/2008	24	2	0.1	1.71	<0.03	0.55	53.04	0.33
8/1/2008	24	1	4.0	1.98	<0.03	0.61	55.86	0.29
8/1/2008	24	2	4.0	3.33	<0.03	0.55	26.80	0.40
8/1/2008	35	1	0.1	2.96	<0.03	0.30	36.10	0.15
8/1/2008	35	2	0.1	1.30	<0.03	0.32	50.05	0.18
8/1/2008	35	1	3.3	3.91	<0.03	0.34	47.90	0.18
8/1/2008	35	2	3.3	3.46	<0.03	0.33	49.46	0.20
8/1/2008	39	1	0.1	3.07	<0.03	0.25	36.59	0.43
8/1/2008	39	2	0.1	2.77	<0.03	0.28	38.01	0.29
8/1/2008	39	1	3.9	1.28	0.09	0.28	39.99	0.33
8/1/2008	39	2	3.9	2.33	0.03	0.30	41.07	0.16
8/1/2008	41	1	0.1	0.48	<0.03	0.29	43.42	0.18
8/1/2008	41	2	0.1	1.60	<0.03	0.25	34.69	0.17
8/1/2008	41	1	2.7	2.36	<0.03	0.37	46.07	0.22
8/1/2008	41	2	2.7	2.28	<0.03	0.29	40.41	0.33
8/1/2008	61	1	0.1	2.21	<0.03	0.11	32.64	0.23
8/1/2008	61	2	0.1	2.96	<0.03	0.10	46.35	0.21
8/1/2008	61	1	4.1	2.33	<0.03	0.12	46.76	0.23
8/1/2008	61	2	4.1	2.00	<0.03	0.14	46.94	0.18
8/1/2008	199	1	0.1	2.54	<0.03	0.32	42.03	0.30
8/1/2008	199	2	0.1	1.98	<0.03	0.33	42.33	0.30
8/1/2008	199	1	2.7	1.32	0.40	0.35	26.90	0.53
8/1/2008	199	2	2.7	3.01	0.33	0.34	39.39	0.44
8/1/2008	202	1	0.1	2.70	<0.03	0.31	45.09	0.17
8/1/2008	202	2	0.1	2.28	<0.03	0.27	49.31	0.13
8/1/2008	202	1	3.4	2.92	<0.03	0.29	46.48	0.16
8/1/2008	202	2	3.4	3.12	<0.03	0.29	47.18	0.20
8/1/2008	212	1	0.1	2.76	<0.03	0.18	41.22	0.33
8/1/2008	212	2	0.1	1.12	<0.03	0.20	39.32	0.32
8/1/2008	212	1	3.0	0.41	<0.03	0.18	42.24	0.37
8/1/2008	212	2	3.0	0.44	<0.03	0.16	35.08	0.43
8/1/2008	308	1	0.1	3.15	<0.03	0.16	42.78	0.33
8/1/2008	308	2	0.1	0.74	<0.03	0.16	43.04	0.36
8/1/2008	308	1	4.1	1.83	<0.03	0.21	42.65	0.40
8/1/2008	308	2	4.1	3.81	<0.03	0.23	42.97	0.44
8/1/2008	17781	1	0.1	1.96	<0.03	0.09	41.07	0.12
8/1/2008	17781	2	0.1	2.90	<0.03	0.09	41.98	0.19
8/1/2008	17781	1	3.5	0.37	<0.03	0.10	41.96	0.25
8/1/2008	17781	2	3.5	1.51	<0.03	0.04	38.47	0.14
8/1/2008	17787	1	0.1	4.37	<0.03	0.47	56.89	0.10
8/1/2008	17787	2	0.1	3.37	<0.03	0.47	55.85	0.11
8/1/2008	17787	1	3.5	1.97	<0.03	0.55	57.00	0.14
8/1/2008	17787	2	3.5	2.93	<0.03	0.58	58.23	0.20
8/1/2008	17793	1	0.1	2.06	<0.03	0.14	45.68	0.13

DATE	Station	Rep.	Depth	[Chl] (µg/L)	[NH4] (µM)	[PO4] (µM)	[SIO4] (µM)	[NN] (µM)
8/1/2008	17793	2	0.1	2.68	<0.03	0.11	45.13	0.09
8/1/2008	17793	1	4.1	3.35	0.59	0.15	48.06	0.11
8/1/2008	17793	2	4.1	1.74	0.58	0.13	50.46	0.14
8/1/2008	18247	1	0.1	2.34	<0.03	0.48	49.34	0.08
8/1/2008	18247	2	0.1	2.30	<0.03	0.47	48.57	0.08
8/1/2008	18247	1	4.2	1.82	<0.03	0.47	49.93	0.10
8/1/2008	18247	2	4.2	3.51	<0.03	0.50	50.31	0.08
8/6/2008	10	1	0.1	3.40	<0.03	0.22	30.32	<0.03
8/6/2008	10	2	0.1	1.94	0.53	0.33	14.21	<0.03
8/6/2008	10	1	3.4	5.20	0.20	0.21	29.65	<0.03
8/6/2008	10	2	3.4	4.18	0.34	0.47	29.85	<0.03
8/6/2008	11	1	0.1	3.32	0.38	0.20	34.75	<0.03
8/6/2008	11	2	0.1	1.85	0.40	0.20	31.74	<0.03
8/6/2008	11	1	3.7	2.93	0.09	0.19	29.96	<0.03
8/6/2008	11	2	3.7	5.41	0.16	0.20	27.72	<0.03
8/6/2008	12	1	0.1	3.75	0.32	0.27	29.04	<0.03
8/6/2008	12	2	0.1	3.54	0.32	0.29	36.81	<0.03
8/6/2008	12	1	2.7	2.64	0.26	0.33	34.89	<0.03
8/6/2008	12	2	2.7	2.70	0.41	0.35	12.47	<0.03
8/6/2008	15	1	0.1	3.86	<0.03	0.22	32.07	<0.03
8/6/2008	15	2	0.1	1.89	0.17	0.15	25.23	<0.03
8/6/2008	15	1	3.5	1.47	0.10	0.30	33.91	<0.03
8/6/2008	15	2	3.5	2.97	0.23	0.29	37.81	<0.03
8/6/2008	16	1	0.1	1.94	<0.03	0.29	27.24	<0.03
8/6/2008	16	2	0.1	1.51	0.09	0.31	28.04	<0.03
8/6/2008	16	1	3.3	2.51	<0.03	0.18	29.22	<0.03
8/6/2008	16	2	3.3	2.25	0.16	0.21	27.94	<0.03
8/6/2008	19	1	0.1	1.92	0.06	0.32	32.12	<0.03
8/6/2008	19	2	0.1	9.29	0.60	0.25	32.72	<0.03
8/6/2008	19	1	3.7	5.48	<0.03	0.24	32.93	<0.03
8/6/2008	19	2	3.7	3.14	0.28	0.23	35.05	<0.03
8/6/2008	24	1	0.1	3.03	<0.03	0.37	41.82	<0.03
8/6/2008	24	2	0.1	1.71	<0.03	0.41	35.13	<0.03
8/6/2008	24	1	3.0	1.98	<0.03	0.34	31.94	<0.03
8/6/2008	24	2	3.0	3.33	<0.03	0.36	39.96	<0.03
8/6/2008	35	1	0.1	2.96	0.27	0.43	40.56	<0.03
8/6/2008	35	2	0.1	1.30	0.47	0.36	28.56	<0.03
8/6/2008	35	1	4.1	3.91	0.66	0.38	37.64	<0.03
8/6/2008	35	2	4.1	3.46	0.88	0.45	37.11	<0.03
8/6/2008	39	1	0.1	3.07	0.24	0.44	27.92	<0.03
8/6/2008	39	2	0.1	2.77	0.51	0.58	40.32	<0.03
8/6/2008	39	1	4.3	1.28	0.62	0.44	25.20	<0.03
8/6/2008	39	2	4.3	2.33	0.73	0.50	27.78	<0.03
8/6/2008	41	1	0.1	0.48	0.28	0.48	37.34	<0.03
8/6/2008	41	2	0.1	1.60	0.39	0.44	32.06	<0.03
8/6/2008	41	1	4.3	2.36	0.31	0.45	34.76	<0.03
8/6/2008	41	2	4.3	2.28	0.49	0.38	29.83	<0.03
8/6/2008	61	1	0.1	2.21	0.70	0.31	34.75	<0.03

DATE	Station	Rep.	Depth	[Chl] (µg/L)	[NH4] (µM)	[PO4] (µM)	[SIO4] (µM)	[NN] (µM)
8/6/2008	61	2	0.1	2.96	0.80	0.27	30.92	<0.03
8/6/2008	61	1	4.1	2.40	0.21	0.40	37.30	<0.03
8/6/2008	61	2	4.1	1.89	0.64	0.39	32.50	<0.03
8/6/2008	199	1	0.1	0.99	0.73	0.51	18.78	<0.03
8/6/2008	199	2	0.1	1.81	1.72	0.35	29.32	<0.03
8/6/2008	199	1	4.2	1.15	0.28	0.44	35.23	<0.03
8/6/2008	199	2	4.2	1.11	0.34	0.38	30.00	<0.03
8/6/2008	202	1	0.1	1.88	0.42	0.34	32.97	<0.03
8/6/2008	202	2	0.1	1.20	0.56	0.36	35.69	<0.03
8/6/2008	202	1	4.1	3.04	0.64	0.31	36.40	<0.03
8/6/2008	202	2	4.1	1.57	0.80	0.41	34.56	<0.03
8/6/2008	212	1	0.1	2.21	<0.03	0.43	24.24	<0.03
8/6/2008	212	2	0.1	1.78	<0.03	0.53	33.74	<0.03
8/6/2008	212	1	4.0	1.34	<0.03	0.50	33.45	<0.03
8/6/2008	212	2	4.0	1.06	<0.03	0.52	35.71	<0.03
8/6/2008	308	1	0.1	0.69	<0.03	0.44	37.63	<0.03
8/6/2008	308	2	0.1	2.53	0.21	0.48	37.96	<0.03
8/6/2008	308	1	3.9	2.05	<0.03	0.37	29.65	<0.03
8/6/2008	308	2	3.9	1.97	0.08	0.44	32.73	<0.03
8/6/2008	17781	1	0.1	2.24	<0.03	0.47	39.73	<0.03
8/6/2008	17781	2	0.1	2.50	0.54	0.42	31.94	<0.03
8/6/2008	17781	1	4.1	2.68	<0.03	0.49	45.40	<0.03
8/6/2008	17781	2	4.1	1.73	0.17	0.51	39.60	<0.03
8/6/2008	17787	1	0.1	1.94	<0.03	0.80	52.21	<0.03
8/6/2008	17787	2	0.1	4.64	0.82	0.64	14.97	<0.03
8/6/2008	17787	1	3.4	8.15	1.82	0.73	63.26	<0.03
8/6/2008	17787	2	3.4	4.60	1.90	0.77	72.16	<0.03
8/6/2008	17793	1	0.1	3.14	1.22	0.22	49.99	<0.03
8/6/2008	17793	2	0.1	4.06	1.23	0.16	50.96	<0.03
8/6/2008	17793	1	3.4	2.90	1.47	<0.03	51.81	<0.03
8/6/2008	17793	2	3.4	2.95	2.10	<0.03	39.87	<0.03
8/6/2008	18247	1	0.1	4.23	1.08	0.29	11.53	<0.03
8/6/2008	18247	2	0.1	2.94	1.32	0.27	47.24	<0.03
8/6/2008	18247	1	4.0	3.67	4.06	0.69	54.45	<0.03
8/6/2008	18247	2	4.0	4.21	4.72	0.75	14.91	<0.03
9/18/2008	10	1	0.1	0.88	0.28	0.20	24.34	0.41
9/18/2008	10	2	0.1	2.14	0.33	0.22	25.18	0.74
9/18/2008	10	1	3.4	2.15	<0.03	0.16	25.89	0.66
9/18/2008	10	2	3.4	1.38	<0.03	0.17	25.62	0.85
9/18/2008	11	1	0.1	0.99	<0.03	0.25	25.51	0.62
9/18/2008	11	2	0.1	0.95	0.29	0.23	25.74	0.65
9/18/2008	11	1	4.2	2.12	<0.03	0.30	25.24	0.33
9/18/2008	11	2	4.2	1.84	0.21	0.27	25.81	0.41
9/18/2008	12	1	0.1	1.34	0.51	0.21	25.17	0.50
9/18/2008	12	2	0.1	1.57	1.49	0.21	25.33	0.82
9/18/2008	12	1	3.1	1.44	0.45	0.20	25.80	0.32
9/18/2008	12	2	3.1	1.04	1.76	0.18	25.00	0.21
9/18/2008	15	1	0.1	3.65	<0.03	0.58	35.15	0.41

DATE	Station	Rep.	Depth	[Chl] (µg/L)	[NH4] (µM)	[PO4] (µM)	[SIO4] (µM)	[NN] (µM)
9/18/2008	15	2	0.1	1.72	0.36	0.49	34.94	0.17
9/18/2008	15	1	3.8	2.32	<0.03	0.45	35.50	0.24
9/18/2008	15	2	3.8	1.28	1.24	0.53	37.35	0.36
9/18/2008	16	1	0.1	2.78	0.17	0.35	28.61	0.10
9/18/2008	16	2	0.1	1.62	0.89	0.39	28.63	0.27
9/18/2008	16	1	3.6	2.60	<0.03	0.33	29.18	0.19
9/18/2008	16	2	3.6	2.20	<0.03	0.36	28.89	0.21
9/18/2008	19	1	0.1	1.41	<0.03	0.24	14.99	0.37
9/18/2008	19	2	0.1	0.78	1.16	0.25	15.00	0.71
9/18/2008	19	1	4.4	1.97	<0.03	0.27	15.40	0.82
9/18/2008	19	2	4.4	1.82	0.67	0.32	15.55	0.72
9/18/2008	24	1	0.1	1.38	0.80	0.22	27.60	0.46
9/18/2008	24	2	0.1	6.14	0.99	0.24	27.40	0.19
9/18/2008	24	1	4.4	0.34	<0.03	0.24	27.21	0.46
9/18/2008	24	2	4.4	0.58	0.52	0.24	27.69	0.52
9/18/2008	35	1	0.1	4.08	<0.03	0.47	40.37	0.21
9/18/2008	35	2	0.1	2.61	<0.03	0.47	41.72	0.20
9/18/2008	35	1	4.5	3.82	0.12	0.45	41.03	0.15
9/18/2008	35	2	4.5	2.75	0.31	0.46	41.74	0.18
9/18/2008	39	1	0.1	2.29	1.40	0.19	35.11	0.42
9/18/2008	39	2	0.1	2.05	1.70	0.22	35.82	0.55
9/18/2008	39	1	4.6	4.23	1.33	0.33	47.62	0.27
9/18/2008	39	2	4.6	4.49	1.35	0.29	50.24	0.36
9/18/2008	41	1	0.1	1.17	1.46	0.27	23.12	0.21
9/18/2008	41	2	0.1	1.38	1.54	0.29	24.06	0.25
9/18/2008	41	1	4.6	1.41	1.48	0.17	34.96	0.46
9/18/2008	41	2	4.6	0.47	1.69	0.15	34.97	0.41
9/18/2008	61	1	0.1	1.62	<0.03	0.51	42.88	0.19
9/18/2008	61	2	0.1	2.99	0.16	0.52	40.32	0.20
9/18/2008	61	1	4.4	1.29	<0.03	0.54	42.55	0.16
9/18/2008	61	2	4.4	3.39	<0.03	0.54	45.23	0.16
9/18/2008	199	1	0.1	3.82	<0.03	0.50	42.82	0.24
9/18/2008	199	2	0.1	4.27	0.13	0.57	41.81	0.20
9/18/2008	199	1	4.5	6.02	<0.03	0.51	40.43	0.29
9/18/2008	199	2	4.5	3.32	1.37	0.52	40.78	0.24
9/18/2008	202	1	0.1	3.80	<0.03	0.51	34.03	0.18
9/18/2008	202	2	0.1	1.67	<0.03	0.57	36.17	0.21
9/18/2008	202	1	4.5	2.88	<0.03	0.44	35.52	0.12
9/18/2008	202	2	4.5	2.68	<0.03	0.59	38.19	0.18
9/18/2008	212	1	0.1	4.02	0.12	0.29	43.37	0.27
9/18/2008	212	2	0.1	2.78	0.83	0.23	42.35	0.23
9/18/2008	212	1	4.3	3.11	1.38	0.24	23.53	0.31
9/18/2008	212	2	4.3	1.32	1.69	0.25	23.33	0.40
9/18/2008	308	1	0.1	1.18	1.08	0.23	38.25	0.27
9/18/2008	308	2	0.1	2.10	1.09	0.22	38.60	0.18
9/18/2008	308	1	4.2	2.09	0.47	0.29	42.37	0.25
9/18/2008	308	2	4.2	3.37	0.92	0.39	27.25	0.27
9/18/2008	17781	1	0.1	4.54	0.83	0.38	51.39	0.16

DATE	Station	Rep.	Depth	[Chl] (µg/L)	[NH4] (µM)	[PO4] (µM)	[SIO4] (µM)	[NN] (µM)
9/18/2008	17781	2	0.1	3.64	1.49	0.39	46.50	0.20
9/18/2008	17781	1	4.5	2.15	1.26	0.46	60.42	0.15
9/18/2008	17781	2	4.5	5.04	1.50	0.48	52.54	0.51
9/18/2008	17787	1	0.1	3.01	1.31	0.08	42.36	0.19
9/18/2008	17787	2	0.1	1.43	1.32	0.13	43.03	0.18
9/18/2008	17787	1	3.7	3.10	1.59	0.28	51.26	0.23
9/18/2008	17787	2	3.7	5.12	9.87	0.21	49.10	0.26
9/18/2008	17793	1	0.1	1.62	0.40	0.10	45.22	0.21
9/18/2008	17793	2	0.1	2.11	5.17	0.12	47.79	0.34
9/18/2008	17793	1	3.8	2.66	<0.03	0.06	47.92	0.20
9/18/2008	17793	2	3.8	1.89	0.98	0.08	49.25	0.35
9/18/2008	18247	1	0.1	1.68	<0.03	0.24	33.21	0.26
9/18/2008	18247	2	0.1	3.01	0.30	0.21	32.13	0.28
9/18/2008	18247	1	4.3	2.32	0.29	0.24	32.23	0.29
9/18/2008	18247	2	4.3	2.92	0.73	0.19	31.89	0.25
9/24/2008	10	1	0.1	2.41	<0.03	0.44	41.53	0.35
9/24/2008	10	2	0.1	2.94	<0.03	0.35	26.27	0.14
9/24/2008	10	1	3.9	1.44	<0.03	0.44	28.01	<0.03
9/24/2008	10	2	3.9	3.03	<0.03	0.46	28.09	<0.03
9/24/2008	11	1	0.1	1.41	5.76	2.91	31.51	0.64
9/24/2008	11	2	0.1	1.41	<0.03	0.44	33.07	<0.03
9/24/2008	11	1	4.7	2.59	<0.03	0.32	27.07	0.30
9/24/2008	11	2	4.7	0.69	<0.03	0.43	40.42	1.34
9/24/2008	12	1	0.1	1.23	<0.03	0.22	35.52	<0.03
9/24/2008	12	2	0.1	1.53	<0.03	0.24	34.21	<0.03
9/24/2008	12	1	3.4	1.82	<0.03	0.21	33.52	0.47
9/24/2008	12	2	3.4	1.81	<0.03	0.22	33.79	<0.03
9/24/2008	15	1	0.1	1.08	<0.03	0.26	37.51	0.08
9/24/2008	15	2	0.1	1.81	<0.03	0.22	26.94	0.23
9/24/2008	15	1	4.2	0.89	<0.03	0.42	41.75	0.28
9/24/2008	15	2	4.2	0.82	<0.03	0.28	26.40	<0.03
9/24/2008	16	1	0.1	2.16	<0.03	0.34	33.70	0.23
9/24/2008	16	2	0.1	2.42	<0.03	0.33	36.57	0.41
9/24/2008	16	1	4.0	1.00	<0.03	0.40	44.62	0.35
9/24/2008	16	2	4.0	0.99	<0.03	0.32	31.34	0.16
9/24/2008	19	1	0.1	1.56	<0.03	0.47	35.83	0.09
9/24/2008	19	2	0.1	1.04	<0.03	0.42	31.60	0.18
9/24/2008	19	1	4.8	1.39	2.11	1.59	38.91	0.52
9/24/2008	19	2	4.8	1.60	<0.03	0.44	47.20	0.42
9/24/2008	24	1	0.1	2.04	<0.03	0.51	44.67	0.72
9/24/2008	24	2	0.1	2.04	<0.03	0.43	37.11	0.36
9/24/2008	24	1	3.7	1.97	<0.03	0.42	32.72	0.20
9/24/2008	24	2	3.7	1.51	<0.03	0.45	33.31	0.24
9/24/2008	35	1	0.1	1.74	<0.03	0.42	44.37	<0.03
9/24/2008	35	2	0.1	0.41	<0.03	0.47	46.07	0.13
9/24/2008	35	1	4.9	0.77	<0.03	0.50	39.75	<0.03
9/24/2008	35	2	4.9	1.21	<0.03	0.51	38.04	0.13
9/24/2008	39	1	0.1	0.86	<0.03	0.51	40.32	<0.03

DATE	Station	Rep.	Depth	[Chl] (µg/L)	[NH4] (µM)	[PO4] (µM)	[SIO4] (µM)	[NN] (µM)
9/24/2008	39	2	0.1	2.26	<0.03	0.48	41.41	<0.03
9/24/2008	39	1	5.0	1.88	<0.03	0.50	43.32	0.03
9/24/2008	39	2	5.0	2.41	<0.03	0.43	34.59	<0.03
9/24/2008	41	1	0.1	1.58	<0.03	0.50	40.39	0.09
9/24/2008	41	2	0.1	2.35	<0.03	0.52	41.31	0.20
9/24/2008	41	1	5.0	0.73	<0.03	0.57	42.09	<0.03
9/24/2008	41	2	5.0	0.71	<0.03	0.50	43.40	<0.03
9/24/2008	61	1	0.1	0.76	<0.03	0.45	41.66	0.11
9/24/2008	61	2	0.1	1.27	<0.03	0.51	45.79	<0.03
9/24/2008	61	1	4.9	1.03	<0.03	0.45	43.02	0.31
9/24/2008	61	2	4.9	2.22	<0.03	0.42	35.86	0.27
9/24/2008	199	1	0.1	1.77	<0.03	0.42	49.46	<0.03
9/24/2008	199	2	0.1	1.33	<0.03	0.47	49.10	<0.03
9/24/2008	199	1	4.9	1.69	<0.03	0.44	42.87	<0.03
9/24/2008	199	2	4.9	1.75	<0.03	0.48	49.38	0.06
9/24/2008	202	1	0.1	1.73	<0.03	0.43	44.53	0.21
9/24/2008	202	2	0.1	2.39	<0.03	0.43	32.78	0.16
9/24/2008	202	1	5.0	2.16	<0.03	0.41	33.28	0.06
9/24/2008	202	2	5.0	1.29	<0.03	0.46	33.34	<0.03
9/24/2008	212	1	0.1	1.85	<0.03	0.52	42.53	<0.03
9/24/2008	212	2	0.1	2.22	<0.03	0.47	41.21	<0.03
9/24/2008	212	1	4.6	2.05	<0.03	0.50	41.50	<0.03
9/24/2008	212	2	4.6	1.62	<0.03	0.47	40.21	<0.03
9/24/2008	308	1	0.1	2.18	<0.03	0.43	40.51	<0.03
9/24/2008	308	2	0.1	2.66	<0.03	0.46	39.99	<0.03
9/24/2008	308	1	4.7	1.89	<0.03	0.48	45.12	<0.03
9/24/2008	308	2	4.7	2.55	<0.03	0.43	38.95	<0.03
9/24/2008	17781	1	0.1	2.21	<0.03	0.36	33.57	<0.03
9/24/2008	17781	2	0.1	3.36	<0.03	0.31	39.53	<0.03
9/24/2008	17781	1	4.8	2.47	<0.03	0.38	46.41	<0.03
9/24/2008	17781	2	4.8	1.89	<0.03	0.36	44.73	<0.03
9/24/2008	17787	1	0.1	4.72	<0.03	0.23	36.47	<0.03
9/24/2008	17787	2	0.1	2.35	<0.03	0.27	36.79	<0.03
9/24/2008	17787	1	4.1	2.70	<0.03	0.27	34.87	0.08
9/24/2008	17787	2	4.1	2.88	<0.03	0.36	36.12	<0.03
9/24/2008	17793	1	0.1	2.53	<0.03	0.41	43.27	0.18
9/24/2008	17793	2	0.1	2.46	<0.03	0.37	42.50	<0.03
9/24/2008	17793	1	4.2	4.16	<0.03	0.40	46.11	<0.03
9/24/2008	17793	2	4.2	3.37	<0.03	0.40	43.10	<0.03
9/24/2008	18247	1	0.1	1.69	<0.03	0.47	44.26	0.50
9/24/2008	18247	2	0.1	1.06	<0.03	0.66	43.28	0.83
9/24/2008	18247	1	4.8	1.80	<0.03	0.56	43.29	0.17
9/24/2008	18247	2	4.8	1.05	<0.03	0.53	42.48	<0.03

Appendix B

Hydrographic Measurements

Date	Time	Station	Depth (m)	Temp. (°C)	Salinity (ppt)	[DO] (mg/L)	pH
5/19/2008	7:55	10	0.10	25.12	30.83	6.48	8.15
5/19/2008	7:55	10	2.50	25.13	30.83	6.47	8.15
5/19/2008	8:13	11	0.10	24.99	30.37	6.62	8.09
5/19/2008	8:13	11	3.90	24.99	30.35	6.59	8.10
5/19/2008	8:27	12	0.10	25.05	30.33	6.78	8.08
5/19/2008	8:27	12	2.80	25.09	30.31	6.69	8.10
5/19/2008	8:40	15	0.10	25.19	29.99	6.73	8.12
5/19/2008	8:40	15	3.60	25.01	29.96	6.63	8.12
5/19/2008	9:50	16	0.10	24.97	30.14	6.68	8.03
5/19/2008	9:50	16	3.40	24.95	30.12	6.65	8.05
5/19/2008	8:03	19	0.10	25.18	30.59	6.45	8.10
5/19/2008	8:03	19	4.20	25.20	30.56	6.40	8.10
5/19/2008	7:25	24	0.10	25.43	30.54	6.67	8.16
5/19/2008	7:25	24	3.00	25.45	30.52	6.67	8.16
5/19/2008	9:19	35	0.10	25.29	30.38	6.62	8.06
5/19/2008	9:19	35	4.20	25.26	30.34	6.58	8.07
5/19/2008	9:55	39	0.10	35.34	30.32	6.64	8.09
5/19/2008	9:55	39	4.40	25.19	30.28	6.36	8.09
5/19/2008	9:45	41	0.10	25.14	30.38	6.54	8.08
5/19/2008	9:45	41	4.40	24.98	30.39	6.10	8.06
5/19/2008	9:09	61	0.10	25.31	30.47	6.51	8.05
5/19/2008	9:09	61	4.20	25.29	30.44	6.42	8.05
5/19/2008	10:12	199	0.10	25.38	31.00	6.99	8.05
5/19/2008	10:12	199	4.30	25.18	30.93	6.44	8.01
5/19/2008	9:33	202	0.10	25.33	30.41	6.72	8.09
5/19/2008	9:33	202	4.20	25.23	30.40	6.48	8.08
5/19/2008	10:40	212	0.10	25.94	30.76	7.03	8.14
5/19/2008	10:40	212	2.00	25.58	30.87	6.85	8.15
5/19/2008	10:40	212	4.10	25.45	31.04	5.68	8.07
5/19/2008	10:25	308	0.10	25.67	31.08	6.84	8.10
5/19/2008	10:25	308	0.50	25.87	31.04	6.88	8.14
5/19/2008	10:25	308	1.00	25.71	31.04	6.86	8.14
5/19/2008	10:25	308	1.50	25.64	31.04	6.85	8.13
5/19/2008	10:25	308	2.00	25.53	31.06	6.75	8.12
5/19/2008	10:25	308	2.50	25.52	31.07	6.71	8.12
5/19/2008	10:25	308	3.00	25.53	31.09	6.64	8.12
5/19/2008	10:25	308	3.50	25.60	31.45	6.43	8.13
5/19/2008	10:25	308	4.00	25.72	33.08	5.49	8.20
5/19/2008	10:50	17781	0.10	26.10	30.70	6.19	8.15
5/19/2008	10:50	17781	4.30	25.45	31.04	6.58	8.12
5/19/2008	11:30	17787	0.10	26.43	30.90	6.90	8.05
5/19/2008	11:30	17787	2.00	25.73	30.98	6.77	8.08
5/19/2008	11:30	17787	3.50	25.56	31.58	5.26	8.03
5/19/2008	12:06	17793	0.10	26.09	30.37	6.69	8.05
5/19/2008	12:06	17793	3.70	25.46	30.34	6.41	8.04

Date	Time	Station	Depth (m)	Temp. (°C)	Salinity (ppt)	[DO] (mg/L)	pH
5/19/2008	12:43	18247	0.10	26.14	30.38	6.92	8.08
5/19/2008	12:43	18247	4.20	25.72	32.28	6.37	8.36
5/27/2008	7:40	10	0.10	28.28	30.87	6.20	8.07
5/27/2008	7:40	10	3.50	28.34	30.87	5.95	8.10
5/27/2008	8:00	11	0.10	28.31	30.88	6.09	8.10
5/27/2008	8:00	11	3.80	28.35	30.89	6.01	8.10
5/27/2008	8:08	12	0.10	28.30	30.86	6.10	8.11
5/27/2008	8:08	12	2.80	28.33	30.86	6.04	8.11
5/27/2008	8:22	15	0.10	28.15	30.90	6.05	8.11
5/27/2008	8:22	15	3.60	28.17	30.90	5.99	8.10
5/27/2008	8:26	16	0.10	28.33	31.14	6.10	8.11
5/27/2008	8:26	16	3.40	28.33	31.13	6.03	8.12
5/27/2008	7:47	19	0.10	28.39	30.90	6.03	8.10
5/27/2008	7:47	19	4.10	28.38	30.89	5.97	8.09
5/27/2008	7:20	24	0.10	28.35	31.02	6.02	8.09
5/27/2008	7:20	24	3.00	28.36	31.01	6.00	8.09
5/27/2008	8:55	35	0.10	28.34	31.14	6.07	8.11
5/27/2008	8:55	35	4.20	28.34	31.15	6.01	8.11
5/27/2008	9:35	39	0.10	28.59	31.57	5.86	8.16
5/27/2008	9:35	39	4.40	28.55	31.61	5.58	8.17
5/27/2008	9:20	41	0.10	28.41	31.00	6.03	8.14
5/27/2008	9:20	41	4.30	28.42	31.01	5.99	8.14
5/27/2008	8:40	61	0.10	28.31	31.16	6.04	8.08
5/27/2008	8:40	61	4.20	28.31	31.16	5.99	8.09
5/27/2008	9:50	199	0.10	28.49	31.02	6.11	8.14
5/27/2008	9:50	199	4.30	28.49	31.16	5.95	8.15
5/27/2008	9:05	202	0.10	28.09	31.35	6.18	8.10
5/27/2008	9:05	202	4.20	28.11	31.34	6.16	8.10
5/27/2008	10:20	212	0.10	28.60	31.77	5.93	8.17
5/27/2008	10:20	212	4.10	28.62	31.81	5.69	8.17
5/27/2008	10:05	308	0.10	28.61	31.65	6.00	8.15
5/27/2008	10:05	308	0.50	28.63	31.64	6.06	8.17
5/27/2008	10:05	308	1.00	28.63	31.62	6.07	8.18
5/27/2008	10:05	308	1.50	28.63	31.64	6.05	8.18
5/27/2008	10:05	308	2.00	28.62	31.68	6.03	8.18
5/27/2008	10:05	308	2.50	28.62	31.68	6.02	8.18
5/27/2008	10:05	308	3.00	28.62	31.69	6.01	8.18
5/27/2008	10:05	308	3.50	28.62	32.30	5.45	8.17
5/27/2008	10:05	308	4.00	28.66	34.90	3.37	8.08
5/27/2008	10:40	17781	0.10	28.61	31.89	6.01	8.18
5/27/2008	10:40	17781	4.30	28.60	32.03	5.87	8.18
5/27/2008	11:25	17787	0.10	28.76	32.36	5.95	8.21
5/27/2008	11:25	17787	3.50	28.23	36.87	3.52	8.07
5/27/2008	12:10	17793	0.10	28.54	31.94	6.32	8.30
5/27/2008	12:10	17793	3.70	28.55	35.92	5.71	8.46
5/27/2008	12:50	18247	0.10	28.73	31.28	6.12	8.14
5/27/2008	12:50	18247	4.20	28.68	31.31	5.84	8.18
6/18/2008	7:40	10	0.10	28.86	36.68	5.71	8.15

Date	Time	Station	Depth (m)	Temp. (°C)	Salinity (ppt)	[DO] (mg/L)	pH
6/18/2008	7:40	10	2.50	28.91	36.68	5.54	8.15
6/18/2008	8:00	11	0.10	29.30	36.43	5.78	8.18
6/18/2008	8:00	11	3.80	29.15	37.20	4.88	8.16
6/18/2008	8:15	12	0.10	28.99	36.21	5.68	8.15
6/18/2008	8:15	12	2.80	28.76	37.51	4.85	8.19
6/18/2008	8:30	15	0.10	29.10	37.04	5.73	8.20
6/18/2008	8:30	15	3.50	29.42	37.70	5.53	8.27
6/18/2008	8:40	16	0.10	29.23	35.97	5.63	8.16
6/18/2008	8:40	16	3.40	29.29	36.33	5.21	8.17
6/18/2008	7:48	19	0.10	29.08	36.83	5.56	8.14
6/18/2008	7:48	19	1.00	29.17	36.84	4.83	8.16
6/18/2008	7:48	19	2.00	29.16	36.85	5.18	8.16
6/18/2008	7:48	19	3.00	29.15	37.07	4.35	8.16
6/18/2008	7:48	19	3.50	29.11	37.86	3.47	8.11
6/18/2008	7:48	19	4.10	29.10	38.34	1.87	8.04
6/18/2008	7:20	24	0.10	28.60	38.00	5.42	8.15
6/18/2008	7:20	24	1.00	28.67	38.04	4.71	8.18
6/18/2008	7:20	24	2.00	28.51	38.62	4.29	8.15
6/18/2008	7:20	24	2.90	29.10	41.34	2.76	8.29
6/18/2008	9:10	35	0.10	29.11	35.46	6.16	8.21
6/18/2008	9:10	35	1.00	28.96	36.65	5.66	8.24
6/18/2008	9:10	35	2.00	28.87	37.07	5.62	8.24
6/18/2008	9:10	35	3.00	29.12	38.09	4.61	8.24
6/18/2008	9:10	35	4.20	28.99	39.39	3.46	8.24
6/18/2008	9:50	39	0.10	29.32	34.44	6.35	8.17
6/18/2008	9:50	39	1.00	29.36	34.45	6.24	8.18
6/18/2008	9:50	39	2.00	29.26	36.41	6.07	8.24
6/18/2008	9:50	39	3.00	28.95	39.23	5.12	8.32
6/18/2008	9:50	39	4.00	29.36	41.59	4.68	8.49
6/18/2008	9:50	39	4.40	29.39	41.57	4.74	8.48
6/18/2008	9:40	41	0.10	29.42	34.63	6.02	8.16
6/18/2008	9:40	41	4.30	29.15	39.78	4.13	8.30
6/18/2008	8:55	61	0.10	29.29	35.25	5.98	8.18
6/18/2008	8:55	61	1.00	29.29	35.24	5.93	8.18
6/18/2008	8:55	61	2.00	29.36	35.67	5.67	8.18
6/18/2008	8:55	61	3.00	28.90	37.87	5.60	8.23
6/18/2008	8:55	61	4.10	29.00	39.07	2.89	8.17
6/18/2008	10:10	199	0.10	29.52	34.04	6.06	8.15
6/18/2008	10:10	199	3.00	29.24	34.32	5.36	8.13
6/18/2008	10:10	199	4.00	29.28	37.22	1.50	8.05
6/18/2008	10:10	199	4.30	29.28	37.44	1.41	8.04
6/18/2008	9:22	202	0.10	29.46	34.85	5.95	8.16
6/18/2008	9:22	202	1.00	29.40	34.85	5.93	8.18
6/18/2008	9:22	202	2.00	29.35	34.86	5.90	8.18
6/18/2008	9:22	202	3.00	29.07	36.80	5.74	8.23
6/18/2008	9:22	202	4.00	29.21	38.24	3.36	8.19
6/18/2008	9:22	202	4.20	29.22	38.23	3.39	8.17
6/18/2008	10:38	212	0.10	29.59	33.47	6.04	8.15

Date	Time	Station	Depth (m)	Temp. (°C)	Salinity (ppt)	[DO] (mg/L)	pH
6/18/2008	10:38	212	4.00	29.51	34.47	3.62	8.02
6/18/2008	10:25	308	0.10	29.31	33.44	6.15	8.15
6/18/2008	10:25	308	3.00	29.21	36.00	4.66	8.12
6/18/2008	10:25	308	4.00	29.37	40.10	2.57	8.07
6/18/2008	10:47	17781	0.10	29.10	33.48	6.23	8.17
6/18/2008	10:47	17781	4.20	29.47	33.72	6.73	8.12
6/18/2008	11:35	17787	0.10	29.77	33.83	6.19	8.06
6/18/2008	11:35	17787	1.00	29.85	33.83	6.30	8.12
6/18/2008	11:35	17787	2.00	29.52	34.00	5.84	8.10
6/18/2008	11:35	17787	3.00	29.45	34.47	5.20	8.07
6/18/2008	11:35	17787	3.46	29.14	36.83	3.29	8.00
6/18/2008	12:10	17793	0.10	29.75	34.15	6.56	8.15
6/18/2008	12:10	17793	1.00	29.60	34.38	6.41	8.19
6/18/2008	12:10	17793	2.00	29.08	36.75	5.42	8.19
6/18/2008	12:10	17793	3.00	28.96	38.46	4.95	8.30
6/18/2008	12:10	17793	3.60	29.19	43.04	3.78	8.53
6/18/2008	12:45	18247	0.10	30.10	34.87	6.76	8.22
6/18/2008	12:45	18247	1.00	29.71	35.61	6.59	8.24
6/18/2008	12:45	18247	2.00	29.09	38.15	6.35	8.28
6/18/2008	12:45	18247	3.00	28.93	38.92	6.15	8.29
6/18/2008	12:45	18247	4.12	29.24	43.86	4.54	8.61
6/25/2008	9:42	10	0.10	29.28	37.25	5.41	8.24
6/25/2008	9:42	10	2.90	29.30	37.25	5.16	8.24
6/25/2008	9:21	11	0.10	29.34	37.04	5.46	8.25
6/25/2008	9:21	11	3.80	29.05	37.43	4.07	8.23
6/25/2008	9:13	12	0.10	29.34	37.02	5.45	8.25
6/25/2008	9:13	12	2.80	28.58	38.08	4.68	8.26
6/25/2008	9:02	15	0.10	29.32	37.15	5.39	8.25
6/25/2008	9:02	15	3.50	29.34	37.14	5.25	8.25
6/25/2008	8:55	16	0.10	29.16	36.97	5.42	8.25
6/25/2008	8:55	16	3.30	29.16	36.98	5.39	8.25
6/25/2008	9:34	19	0.10	29.35	36.17	5.30	8.22
6/25/2008	9:34	19	4.10	29.41	36.42	4.77	8.20
6/25/2008	9:50	24	0.10	29.25	37.08	5.28	8.23
6/25/2008	9:50	24	3.00	29.30	37.15	4.80	8.22
6/25/2008	8:29	35	0.10	29.24	35.72	5.31	8.19
6/25/2008	8:29	35	4.20	29.34	36.09	4.84	8.20
6/25/2008	6:55	39	0.10	29.10	35.78	5.15	8.17
6/25/2008	6:55	39	4.30	29.40	38.72	4.41	8.37
6/25/2008	8:05	41	0.10	29.30	35.17	5.30	8.18
6/25/2008	8:05	41	4.30	29.33	36.58	4.18	8.19
6/25/2008	8:40	61	0.10	29.41	35.85	5.35	8.21
6/25/2008	8:40	61	4.10	29.43	35.84	5.25	8.20
6/25/2008	7:48	199	0.10	29.28	35.20	5.76	8.21
6/25/2008	7:48	199	4.20	29.29	35.20	5.74	8.21
6/25/2008	8:15	202	0.10	29.46	35.67	5.32	8.21
6/25/2008	8:15	202	4.30	29.47	35.68	5.27	8.21
6/25/2008	7:35	212	0.10	29.27	34.11	5.60	8.20

Date	Time	Station	Depth (m)	Temp. (°C)	Salinity (ppt)	[DO] (mg/L)	pH
6/25/2008	7:35	212	4.00	29.34	34.27	5.48	8.20
6/25/2008	7:15	308	0.10	29.22	34.53	5.64	8.21
6/25/2008	7:15	308	3.00	29.38	35.31	4.57	8.18
6/25/2008	7:15	308	3.50	29.37	35.54	4.39	8.17
6/25/2008	7:15	308	3.90	29.24	39.55	2.49	8.14
6/25/2008	10:20	17781	0.10	29.33	34.64	5.85	8.08
6/25/2008	10:20	17781	4.20	29.29	34.68	5.70	8.09
6/25/2008	11:05	17787	0.10	29.18	35.29	6.08	8.15
6/25/2008	11:05	17787	3.50	28.58	39.89	3.45	8.06
6/25/2008	11:47	17793	0.10	29.38	38.10	5.75	8.28
6/25/2008	11:47	17793	3.60	28.90	40.37	3.84	8.38
6/25/2008	12:10	18247	0.10	29.53	37.43	5.75	8.22
6/25/2008	12:10	18247	4.20	29.05	42.80	4.35	8.57
7/18/2008	7:55	10	0.10	29.34	37.46	5.67	8.26
7/18/2008	7:55	10	1.00	29.36	37.44	5.56	8.26
7/18/2008	7:55	10	2.00	29.33	37.78	4.99	8.27
7/18/2008	7:55	10	3.00	29.47	41.69	1.09	8.35
7/18/2008	7:55	10	3.40	29.48	41.89	0.83	8.33
7/18/2008	8:20	11	0.10	29.37	36.90	5.50	8.23
7/18/2008	8:20	11	1.00	29.41	36.90	5.45	8.23
7/18/2008	8:20	11	2.00	29.45	36.95	5.35	8.22
7/18/2008	8:20	11	3.00	29.46	37.94	4.38	8.26
7/18/2008	8:20	11	3.80	29.48	41.39	0.81	8.28
7/18/2008	8:30	12	0.10	29.31	36.94	5.83	8.23
7/18/2008	8:30	12	2.70	29.59	38.14	5.21	8.34
7/18/2008	8:40	15	0.10	29.98	37.64	5.89	8.28
7/18/2008	8:40	15	3.60	30.15	37.93	5.84	8.35
7/18/2008	8:50	16	0.10	30.01	37.49	5.89	8.28
7/18/2008	8:50	16	3.40	29.91	37.48	5.06	8.26
7/18/2008	8:05	19	0.10	29.40	37.20	5.65	8.25
7/18/2008	8:05	19	1.00	29.46	37.22	5.52	8.26
7/18/2008	8:05	19	2.00	29.45	37.22	5.33	8.26
7/18/2008	8:05	19	3.00	29.68	39.44	2.56	8.28
7/18/2008	8:05	19	4.10	29.71	42.40	0.87	8.38
7/18/2008	7:45	24	0.10	28.97	37.72	5.65	8.19
7/18/2008	7:45	24	3.00	29.27	41.46	3.34	8.39
7/18/2008	9:10	35	0.10	29.66	38.59	5.71	8.33
7/18/2008	9:10	35	4.20	29.68	38.60	5.59	8.33
7/18/2008	9:40	39	0.10	29.26	37.01	6.07	8.21
7/18/2008	9:40	39	4.40	29.74	39.74	4.88	8.24
7/18/2008	9:30	41	0.10	29.31	36.78	6.14	8.23
7/18/2008	9:30	41	4.30	29.69	39.15	5.12	8.34
7/18/2008	9:00	61	0.10	29.50	37.79	5.95	8.29
7/18/2008	9:00	61	4.10	29.74	38.47	5.19	8.29
7/18/2008	10:10	199	0.10	29.69	36.50	5.98	8.16
7/18/2008	10:10	199	4.30	29.74	38.67	2.43	8.14
7/18/2008	9:20	202	0.10	29.58	37.02	5.98	8.25
7/18/2008	9:20	202	4.20	29.43	38.69	5.03	8.29

Date	Time	Station	Depth (m)	Temp. (°C)	Salinity (ppt)	[DO] (mg/L)	pH
7/18/2008	10:25	212	0.10	29.45	35.60	5.85	8.11
7/18/2008	10:25	212	4.10	29.36	35.77	5.02	8.08
7/18/2008	9:50	308	0.10	29.69	36.12	5.62	8.15
7/18/2008	9:50	308	3.00	29.72	38.44	3.91	8.26
7/18/2008	9:50	308	4.00	29.77	39.33	2.82	8.25
7/18/2008	10:35	17781	0.10	29.84	35.78	6.17	8.15
7/18/2008	10:35	17781	4.20	29.61	35.91	5.80	8.14
7/18/2008	11:10	17787	0.10	29.71	35.80	6.17	8.04
7/18/2008	11:10	17787	1.00	29.75	35.81	6.18	8.09
7/18/2008	11:10	17787	2.00	29.49	36.12	4.99	8.09
7/18/2008	11:10	17787	3.00	29.46	38.29	2.39	7.98
7/18/2008	11:10	17787	3.50	29.58	38.90	1.48	7.93
7/18/2008	11:50	17793	0.10	30.02	38.28	6.22	8.31
7/18/2008	11:50	17793	3.70	29.73	41.27	4.60	8.45
7/18/2008	12:15	18247	0.10	30.20	38.16	6.53	8.29
7/18/2008	12:15	18247	4.20	30.05	42.87	4.84	8.56
7/25/2008	7:42	10	0.10	27.67	35.51	5.92	8.05
7/25/2008	7:42	10	3.60	27.75	35.54	6.06	8.06
7/25/2008	8:05	11	0.10	27.75	35.61	6.04	8.07
7/25/2008	8:05	11	4.00	27.77	35.59	6.08	8.07
7/25/2008	8:15	12	0.10	27.66	35.61	5.92	8.05
7/25/2008	8:15	12	3.00	27.66	35.60	5.88	8.05
7/25/2008	8:25	15	0.10	27.54	35.52	6.11	8.04
7/25/2008	8:25	15	3.80	27.46	35.52	5.92	8.03
7/25/2008	8:37	16	0.10	27.69	35.70	6.07	8.04
7/25/2008	8:37	16	3.60	27.70	35.69	6.11	8.05
7/25/2008	7:55	19	0.10	27.71	36.21	5.82	8.09
7/25/2008	7:55	19	4.30	27.79	36.20	5.63	8.11
7/25/2008	7:25	24	0.10	27.74	35.78	5.95	8.06
7/25/2008	7:25	24	3.30	27.78	35.79	5.88	8.07
7/25/2008	9:05	35	0.10	27.70	36.10	5.89	8.10
7/25/2008	9:05	35	4.40	27.72	36.64	5.77	8.12
7/25/2008	9:50	39	0.10	27.74	36.07	6.20	8.10
7/25/2008	9:50	39	4.60	27.76	36.05	6.05	8.10
7/25/2008	9:34	41	0.10	27.81	36.37	5.90	8.10
7/25/2008	9:34	41	4.50	27.79	36.57	5.70	8.12
7/25/2008	9:58	61	0.10	27.21	36.49	6.10	8.10
7/25/2008	9:58	61	4.40	27.22	36.48	6.07	8.10
7/25/2008	10:27	199	0.10	27.71	34.62	6.29	8.11
7/25/2008	10:27	199	4.50	27.87	36.11	5.92	8.08
7/25/2008	9:20	202	0.10	27.83	35.87	6.14	8.07
7/25/2008	9:20	202	4.40	27.83	35.85	6.07	8.02
7/25/2008	10:45	212	0.10	27.56	34.27	6.11	8.09
7/25/2008	10:45	212	4.30	27.81	36.04	5.85	8.06
7/25/2008	10:10	308	0.10	27.63	31.07	6.38	8.12
7/25/2008	10:10	308	4.20	27.92	36.32	5.68	8.10
7/25/2008	12:00	17781	0.10	27.77	35.66	6.24	8.05
7/25/2008	12:00	17781	4.50	27.79	36.27	5.73	8.07

Date	Time	Station	Depth (m)	Temp. (°C)	Salinity (ppt)	[DO] (mg/L)	pH
7/25/2008	11:45	17787	0.10	28.01	35.57	6.02	8.02
7/25/2008	11:45	17787	3.60	27.88	36.15	5.48	8.05
7/25/2008	12:30	17793	0.10	27.59	34.99	6.39	7.90
7/25/2008	12:30	17793	3.80	27.51	34.99	6.30	7.90
7/25/2008	12:55	18247	0.10	28.06	35.33	6.47	8.08
7/25/2008	12:55	18247	4.30	27.77	35.50	5.93	8.07
8/1/2008	9:50	10	0.10	29.35	36.36	5.57	8.35
8/1/2008	9:50	10	2.70	29.28	36.36	5.37	8.33
8/1/2008	9:30	11	0.10	29.49	36.47	5.53	8.38
8/1/2008	9:30	11	3.90	29.49	36.51	5.37	8.39
8/1/2008	9:20	12	0.10	29.31	36.32	5.44	8.32
8/1/2008	9:20	12	2.70	29.28	36.33	5.35	8.33
8/1/2008	9:08	15	0.10	29.36	36.37	5.46	8.34
8/1/2008	9:08	15	3.40	29.33	36.35	5.33	8.33
8/1/2008	9:00	16	0.10	29.33	36.23	5.51	8.29
8/1/2008	9:00	16	3.30	29.38	36.22	5.42	8.29
8/1/2008	9:40	19	0.10	29.48	36.48	5.59	8.40
8/1/2008	9:40	19	4.10	29.47	36.50	5.51	8.41
8/1/2008	10:00	24	0.10	29.45	36.63	5.51	8.41
8/1/2008	10:00	24	3.00	29.51	36.78	5.26	8.44
8/1/2008	8:37	35	0.10	29.20	35.96	5.62	8.34
8/1/2008	8:37	35	4.10	29.31	36.50	5.09	8.40
8/1/2008	8:05	39	0.10	29.29	35.48	5.56	8.29
8/1/2008	8:05	39	4.30	29.81	37.51	5.19	8.20
8/1/2008	8:15	41	0.10	29.21	34.93	5.69	8.23
8/1/2008	8:15	41	4.20	29.50	36.61	4.71	8.42
8/1/2008	8:50	61	0.10	29.63	36.72	5.73	8.47
8/1/2008	8:50	61	4.10	29.60	36.73	5.54	8.46
8/1/2008	7:42	199	0.10	29.32	35.57	5.57	8.22
8/1/2008	7:42	199	4.10	29.34	35.58	5.54	8.22
8/1/2008	8:20	202	0.10	29.32	34.95	5.54	8.34
8/1/2008	8:20	202	4.10	29.36	35.00	5.40	8.24
8/1/2008	7:30	212	0.10	29.20	35.13	5.28	8.18
8/1/2008	7:30	212	4.00	29.27	35.15	5.19	8.18
8/1/2008	7:55	308	0.10	29.27	34.00	5.36	8.21
8/1/2008	7:55	308	3.90	29.50	35.39	5.23	8.20
8/1/2008	10:20	17781	0.10	29.35	35.45	5.59	8.14
8/1/2008	10:20	17781	4.20	29.36	35.47	5.50	8.14
8/1/2008	10:55	17787	0.10	29.59	35.08	5.38	8.11
8/1/2008	10:55	17787	3.50	29.47	35.20	4.87	8.09
8/1/2008	11:25	17793	0.10	29.85	38.00	5.48	8.52
8/1/2008	11:25	17793	3.50	29.72	38.01	5.40	8.52
8/1/2008	12:00	18247	0.10	29.88	36.83	5.66	8.40
8/1/2008	12:00	18247	4.10	29.76	37.50	4.76	8.51
8/6/2008	9:45	10	0.10	29.96	36.37	6.09	8.37
8/6/2008	9:45	10	3.40	29.74	36.43	5.26	8.31
8/6/2008	9:25	11	0.10	30.05	36.63	5.70	8.38
8/6/2008	9:25	11	3.70	30.09	36.63	5.56	8.39

Date	Time	Station	Depth (m)	Temp. (°C)	Salinity (ppt)	[DO] (mg/L)	pH
8/6/2008	9:15	12	0.10	29.62	36.15	5.78	8.30
8/6/2008	9:15	12	2.70	29.66	36.17	5.65	8.31
8/6/2008	9:00	15	0.10	29.76	36.28	5.94	8.35
8/6/2008	9:00	15	3.50	29.76	36.28	5.73	8.34
8/6/2008	8:50	16	0.10	29.78	36.22	5.66	8.31
8/6/2008	8:50	16	3.30	29.84	36.43	5.40	8.26
8/6/2008	9:35	19	0.10	29.81	36.52	5.65	8.30
8/6/2008	9:35	19	4.10	29.84	36.52	5.51	8.31
8/6/2008	9:55	24	0.10	29.68	36.74	5.43	8.31
8/6/2008	9:55	24	3.00	29.68	36.79	5.15	8.32
8/6/2008	8:25	35	0.10	29.96	35.98	5.27	8.20
8/6/2008	8:25	35	4.10	29.98	35.97	5.17	8.20
8/6/2008	8:00	39	0.10	29.92	35.82	5.06	8.20
8/6/2008	8:00	39	4.30	29.91	35.83	5.01	8.21
8/6/2008	7:50	41	0.10	29.86	35.55	5.36	8.11
8/6/2008	7:50	41	4.30	29.88	35.54	5.25	8.20
8/6/2008	8:37	61	0.10	30.00	36.25	5.36	8.25
8/6/2008	8:37	61	4.10	30.01	36.26	5.29	8.26
8/6/2008	7:35	199	0.10	29.80	35.31	5.81	8.20
8/6/2008	7:35	199	4.20	29.81	35.30	5.77	8.21
8/6/2008	8:15	202	0.10	29.97	35.79	5.54	8.20
8/6/2008	8:15	202	4.10	29.98	35.79	5.42	8.21
8/6/2008	7:10	212	0.10	29.95	35.18	5.55	8.20
8/6/2008	7:10	212	4.00	29.97	35.18	5.52	8.20
8/6/2008	7:25	308	0.10	29.99	35.22	5.67	8.20
8/6/2008	7:25	308	3.90	30.02	35.22	5.61	8.20
8/6/2008	10:30	17781	0.10	29.94	35.20	6.25	7.95
8/6/2008	10:30	17781	4.10	29.87	35.21	6.00	7.97
8/6/2008	11:05	17787	0.10	29.72	35.38	6.39	8.00
8/6/2008	11:05	17787	3.40	29.05	36.32	4.24	8.00
8/6/2008	11:40	17793	0.10	29.96	36.97	5.96	8.34
8/6/2008	11:40	17793	3.40	29.95	39.20	5.22	8.56
8/6/2008	12:10	18247	0.10	30.11	36.76	5.84	8.31
8/6/2008	12:10	18247	4.00	30.10	37.11	4.21	8.25
9/18/2008	8:15	10	0.10	24.67	36.80	6.45	8.24
9/18/2008	8:15	10	3.40	24.36	36.87	6.55	8.26
9/18/2008	8:40	11	0.10	24.92	36.80	6.49	8.25
9/18/2008	8:40	11	4.20	24.90	36.81	6.49	8.26
9/18/2008	8:50	12	0.10	24.73	36.88	6.51	8.26
9/18/2008	8:50	12	3.10	24.79	36.90	6.58	8.28
9/18/2008	9:05	15	0.10	25.20	36.64	6.41	8.26
9/18/2008	9:05	15	3.80	25.23	36.64	6.46	8.28
9/18/2008	9:15	16	0.10	25.00	36.65	6.42	8.26
9/18/2008	9:15	16	3.60	24.99	36.64	6.43	8.27
9/18/2008	8:28	19	0.10	25.14	36.62	6.47	8.23
9/18/2008	8:28	19	4.40	25.16	36.61	6.50	8.25
9/18/2008	8:00	24	0.10	24.80	36.79	6.60	8.25
9/18/2008	8:00	24	3.30	24.80	36.78	6.61	8.26

Date	Time	Station	Depth (m)	Temp. (°C)	Salinity (ppt)	[DO] (mg/L)	pH
9/18/2008	9:45	35	0.10	25.24	36.71	6.82	8.29
9/18/2008	9:45	35	4.50	25.25	36.71	6.87	8.29
9/18/2008	10:20	39	0.10	24.73	36.79	7.07	8.29
9/18/2008	10:20	39	4.60	24.75	36.77	6.77	8.28
9/18/2008	10:10	41	0.10	25.29	36.72	6.66	8.28
9/18/2008	10:10	41	4.60	25.29	36.72	6.53	8.26
9/18/2008	9:30	61	0.10	25.22	36.69	6.62	8.28
9/18/2008	9:30	61	4.40	25.24	36.69	6.60	8.28
9/18/2008	10:45	199	0.10	25.37	36.75	6.77	8.27
9/18/2008	10:45	199	4.50	25.36	36.75	6.69	8.27
9/18/2008	10:00	202	0.10	25.33	36.87	6.51	8.28
9/18/2008	10:00	202	4.50	25.34	36.85	6.47	8.29
9/18/2008	11:15	212	0.10	24.70	36.74	6.76	8.25
9/18/2008	11:15	212	4.30	24.67	36.71	6.71	8.25
9/18/2008	11:00	308	0.10	24.84	36.78	7.00	8.34
9/18/2008	11:00	308	4.20	24.84	36.80	6.86	8.25
9/18/2008	11:30	17781	0.10	25.01	36.70	7.02	8.28
9/18/2008	11:30	17781	4.50	24.95	36.69	6.82	8.25
9/18/2008	12:10	17787	0.10	24.47	36.90	7.09	8.28
9/18/2008	12:10	17787	3.70	23.55	36.71	6.39	8.25
9/18/2008	12:45	17793	0.10	24.30	37.12	7.40	8.32
9/18/2008	12:45	17793	3.80	24.24	37.12	7.37	8.36
9/18/2008	13:15	18247	0.10	25.10	36.86	7.20	8.21
9/18/2008	13:15	18247	4.30	24.85	36.85	6.82	8.22
9/24/2008	12:00	17787	0.10	26.37	39.18	6.19	8.34
9/24/2008	12:00	17787	4.00	26.37	39.16	6.00	8.34
9/24/2008	12:45	17793	0.10	26.51	39.38	6.34	8.35
9/24/2008	12:45	17793	4.10	26.50	39.38	6.22	8.35
9/24/2008	8:10	18247	0.10	26.32	39.35	6.06	8.34
9/24/2008	8:10	18247	4.60	26.33	39.35	6.00	8.34
9/24/2008	8:30	24	0.10	26.28	39.44	6.14	8.34
9/24/2008	8:30	24	3.50	26.29	39.43	6.03	8.34
9/24/2008	8:45	10	0.10	26.23	39.15	5.91	8.34
9/24/2008	8:45	10	3.70	26.31	39.23	5.64	8.33
9/24/2008	8:55	19	0.10	26.34	39.27	6.10	8.33
9/24/2008	8:55	19	4.50	26.34	39.27	6.10	8.33
9/24/2008	9:07	11	0.10	26.35	39.28	6.11	8.36
9/24/2008	9:07	11	4.30	26.34	39.27	5.98	8.35
9/24/2008	9:20	15	0.10	26.39	37.78	6.29	8.35
9/24/2008	9:20	15	4.00	26.31	37.88	6.16	8.34
9/24/2008	9:35	16	0.10	26.35	38.32	6.09	8.33
9/24/2008	9:35	16	3.80	26.34	38.32	5.93	8.33
9/24/2008	9:50	61	0.10	26.39	38.84	6.34	8.32
9/24/2008	9:50	61	4.60	26.37	38.83	6.05	8.32
9/24/2008	10:00	35	0.10	26.37	38.92	6.22	8.32
9/24/2008	10:00	35	4.70	26.37	38.95	6.16	8.32
9/24/2008	10:05	202	0.10	26.33	38.47	6.19	8.32
9/24/2008	10:05	202	4.70	26.31	38.48	6.00	8.32

Date	Time	Station	Depth (m)	Temp. (°C)	Salinity (ppt)	[DO] (mg/L)	pH
9/24/2008	10:20	41	0.10	26.38	39.20	6.16	8.31
9/24/2008	10:20	41	4.80	26.38	39.20	6.07	8.31
9/24/2008	10:30	39	0.10	26.39	39.36	6.21	8.32
9/24/2008	10:30	39	4.90	26.40	39.36	6.10	8.32
9/24/2008	10:43	199	0.10	26.34	39.29	6.22	8.33
9/24/2008	10:43	199	4.80	26.35	39.29	6.06	8.32
9/24/2008	10:55	308	0.10	26.38	39.40	6.17	8.33
9/24/2008	10:55	308	4.50	26.38	39.40	6.09	8.33
9/24/2008	11:05	212	0.10	26.38	39.30	6.20	8.33
9/24/2008	11:05	212	4.60	26.37	39.30	6.05	8.33
9/24/2008	13:15	12	0.10	26.50	38.36	6.51	8.35
9/24/2008	13:15	12	3.30	26.51	38.41	6.45	8.35
9/24/2008	11:25	17781	0.10	26.36	39.07	6.21	8.35
9/24/2008	11:25	17781	4.70	36.35	39.09	5.81	8.33

Appendix C

Hypoxic Events

Station 17787

Bottom water hypoxia at station 17787: 6/18/08-6/27/08, 7/18/08-7/26/08, and 8/1/08-8/06/08.

Date Time		Duration of Hypoxia		
Begin	End	≤3 mg/l	≤2 mg/l	≤1 mg/l
6/18/08 15:16	6/18/08 22:46	7.50	0.00	0.00
6/19/08 17:31	6/18/08 23:01	5.75	1.75	0.00
6/20/08 03:46	6/20/08 06:46	3.75	0.00	0.00
6/20/08 07:16	6/20/08 07:31	0.50	0.00	0.00
6/20/08 21:01	6/20/08 23:01	2.25	0.00	0.00
6/21/08 21:01	6/21/08 21:31	0.75	0.00	0.00
6/22/08 21:16	6/22/08 23:01	2.00	0.00	0.00
6/23/08 19:31	6/23/08 23:46	4.50	2.00	0.00
6/24/08 00:16	6/24/08 00:16	0.25	0.00	0.00
6/24/08 02:00	6/24/08 02:00	0.25	0.00	0.00
6/24/08 06:15	6/24/08 06:15	0.25	0.00	0.00
6/24/08 07:01	6/24/08 07:16	0.50	0.00	0.00
6/24/08 07:46	6/24/08 09:31	2.00	0.00	0.00
6/24/08 15:31	6/24/08 17:16	2.00	0.00	0.00
6/25/08 04:16	6/25/08 05:31	1.50	0.00	0.00
6/25/08 06:31	6/25/08 06:45	0.25	0.00	0.00
6/25/08 07:01	6/25/08 07:31	0.75	0.00	0.00
7/18/08 11:31	7/19/08 00:01	12.75	4.50	1.50
7/19/08 08:31	7/19/08 19:31	11.25	0.00	0.00
7/19/08 20:01	7/20/08 00:01	4.25	0.00	0.00
7/20/08 07:31	7/20/08 08:01	0.75	0.00	0.00
7/20/08 09:01	7/20/08 09:01	0.25	0.00	0.00
7/20/08 11:01	7/20/08 14:31	3.75	0.00	0.00
7/20/08 17:16	7/20/08 19:31	2.50	0.00	0.00
7/20/08 23:01	7/20/08 23:01	0.25	0.00	0.00
7/21/08 20:16	7/21/08 20:16	0.25	0.00	0.00
7/21/08 21:16	7/21/08 21:16	0.25	0.00	0.00
7/21/08 21:46	7/21/08 22:46	1.25	0.00	0.00
7/21/08 23:16	7/21/08 23:16	0.25	0.00	0.00
7/22/08 00:01	7/22/08 00:01	0.25	0.00	0.00
7/22/08 00:31	7/22/08 00:46	0.50	0.00	0.50
8/03/08 02:31	8/03/08 03:31	1.25	0.00	0.00
8/03/08 15:01	8/03/08 15:01	0.25	0.00	0.00
8/03/01 15:31	8/03/01 15:31	0.25	0.00	0.00
8/03/08 16:01	8/03/08 16:01	0.25	0.00	0.00
8/04/08 13:46	8/04/08 14:31	1.0	0.00	0.00
8/05/08 03:31	8/05/08 06:01	2.75	0.00	0.00
8/05/08 09:16	8/05/08 19:01	10.00	0.00	0.00
Sum		89.00	8.25	2.00
Percent of time hypoxia occurred at night		40.45	63.64	0.00

Station 17793

Bottom water hypoxia at station 17793: 6/18/08-6/27/08, 7/18/08-7/26/08, and 8/1/08-8/06/08.

Date Time		Duration of Hypoxia		
Begin	End	≤3 mg/l	≤2 mg/l	≤1 mg/l
6/18/08 13:01	6/18/08 14:31	1.75	0.00	0.00
6/18/08 15:01	6/18/08 15:16	0.50	0.00	0.00
6/18/08 17:16	6/18/08 19:16	2.25	0.00	0.00
6/18/08 19:46	6/18/08 21:16	1.75	0.00	0.00
6/18/08 21:46	6/19/08 00:01	2.50	0.25	0.00
6/19/08 11:01	6/19/08 12:16	1.50	0.00	0.00
6/19/08 14:16	6/19/08 14:31	0.50	0.00	0.00
6/19/08 16:01	6/19/08 16:01	0.25	0.00	0.00
6/19/08 16:31	6/19/08 21:46	5.50	0.00	0.00
6/20/08 10:16	6/20/08 14:01	4.00	1.00	0.00
6/20/08 16:31	6/21/08 05:31	13.25	6.50	0.00
6/21/08 06:01	6/21/08 06:16	0.50	0.25	0.00
6/21/08 12:01	6/21/08 12:01	0.25	0.00	0.00
6/21/08 13:16	6/21/08 13:31	0.50	0.00	0.00
6/21/08 16:46	6/22/08 00:46	8.25	7.25	0.00
6/22/08 10:16	6/22/08 10:16	0.25	0.00	0.00
6/22/08 11:01	6/22/08 12:16	1.50	0.00	0.00
6/22/08 16:01	6/22/08 16:31	0.75	0.00	0.00
6/22/08 18:16	6/23/08 12:31	18.50	12.25	0.00
6/23/08 15:16	6/24/08 01:16	10.25	9.75	0.00
6/24/08 11:46	6/24/08 13:31	2.00	0.25	0.00
6/24/08 15:16	6/24/08 16:01	1.00	0.00	0.00
6/25/08 08:16	6/24/08 09:46	1.75	0.00	0.00
6/25/08 10:16	6/24/08 11:16	1.25	0.00	0.00
7/18/08 18:01	7/18/08 19:01	1.25	0.00	0.00
7/18/08 21:46	7/18/08 21:46	0.25	0.00	0.00
7/18/08 22:16	7/18/08 22:16	0.25	0.00	0.00
7/21/08 19:01	7/21/08 19:01	0.25	0.00	0.00
7/21/08 19:46	7/21/08 19:46	0.25	0.00	0.00
7/21/08 23:46	7/22/08 02:46	3.25	0.00	0.00
8/04/08 21:01	8/05/08 00:30	3.75	0.00	0.00
8/05/08 01:31	8/05/08 02:00	0.75	0.00	0.00
8/05/08 02:46	8/05/08 02:46	0.25	0.00	0.00
8/05/08 03:16	8/05/08 08:31	5.50	0.00	0.00
8/05/08 13:31	8/05/08 14:01	0.75	0.00	0.00
8/05/08 14:31	8/05/08 15:01	0.75	0.00	0.00
8/05/08 15:31	8/05/08 16:46	1.50	0.00	0.00
Sum		99.25	37.50	0.00
Percent of time hypoxia occurred at night		53.27	76.00	N.D.

Station 18247

Bottom water hypoxia at station 18247: 6/18/08-6/27/08 and 8/1/08-8/06/08.

Date Time		Duration of Hypoxia		
Begin	End	≤3 mg/l	≤2 mg/l	≤1 mg/l
6/18/08 18:46	6/19/08 06:31	12.00	6.25	0.75
6/19/08 07:46	6/19/08 11:31	4.00	1.00	0.00
6/19/08 15:01	6/19/08 17:31	2.75	0.75	0.00
6/19/08 18:01	6/19/08 18:31	0.75	0.00	0.00
6/19/08 19:01	6/19/08 19:01	0.25	0.00	0.00
6/19/08 21:01	6/20/08 00:46	4.00	0.00	0.00
6/20/08 01:31	6/20/08 01:31	0.25	0.00	0.00
6/20/08 02:01	6/20/08 04:16	2.50	1.25	0.00
6/20/08 05:16	6/20/08 10:46	5.75	3.75	0.00
6/20/08 15:16	6/21/08 10:16	19.25	9.75	0.00
6/21/08 18:16	6/21/08 18:16	0.25	0.00	0.00
6/21/08 18:46	6/22/08 10:31	15.75	14.25	0.00
6/22/08 17:46	6/22/08 17:46	0.25	0.00	0.00
6/22/08 18:31	6/23/08 11:16	17.00	15.75	9.50
6/23/08 15:31	6/24/08 06:31	15.25	14.25	3.00
6/24/08 07:31	6/24/08 07:31	0.25	0.00	0.00
6/25/08 07:31	6/25/08 07:46	0.50	0.00	0.00
8/03/08 09:01	8/03/08 09:46	1.00	0.00	0.00
8/04/08 04:46	8/04/08 04:46	0.25	0.00	0.00
8/04/08 05:16	8/04/08 07:16	2.25	0.00	0.00
8/04/08 08:31	8/04/08 08:31	0.25	0.00	0.00
8/04/08 09:31	8/04/08 11:01	1.75	0.00	0.00
8/05/08 03:46	8/05/08 03:46	0.25	0.00	0.00
8/05/08 04:16	8/05/08 18:46	14.75	6.25	0.00
8/05/08 19:16	8/06/08 05:16	10.25	2.00	0.00
8/06/08 09:46	8/06/08 11:01	1.50	0.25	0.00
8/06/08 11:31	8/06/08 11:46	0.50	0.00	0.00
Sum		133.50	75.50	13.25
Percent of time hypoxia occurred at night		47.94	61.25	98.11

Appendix D

Continuous Measurements

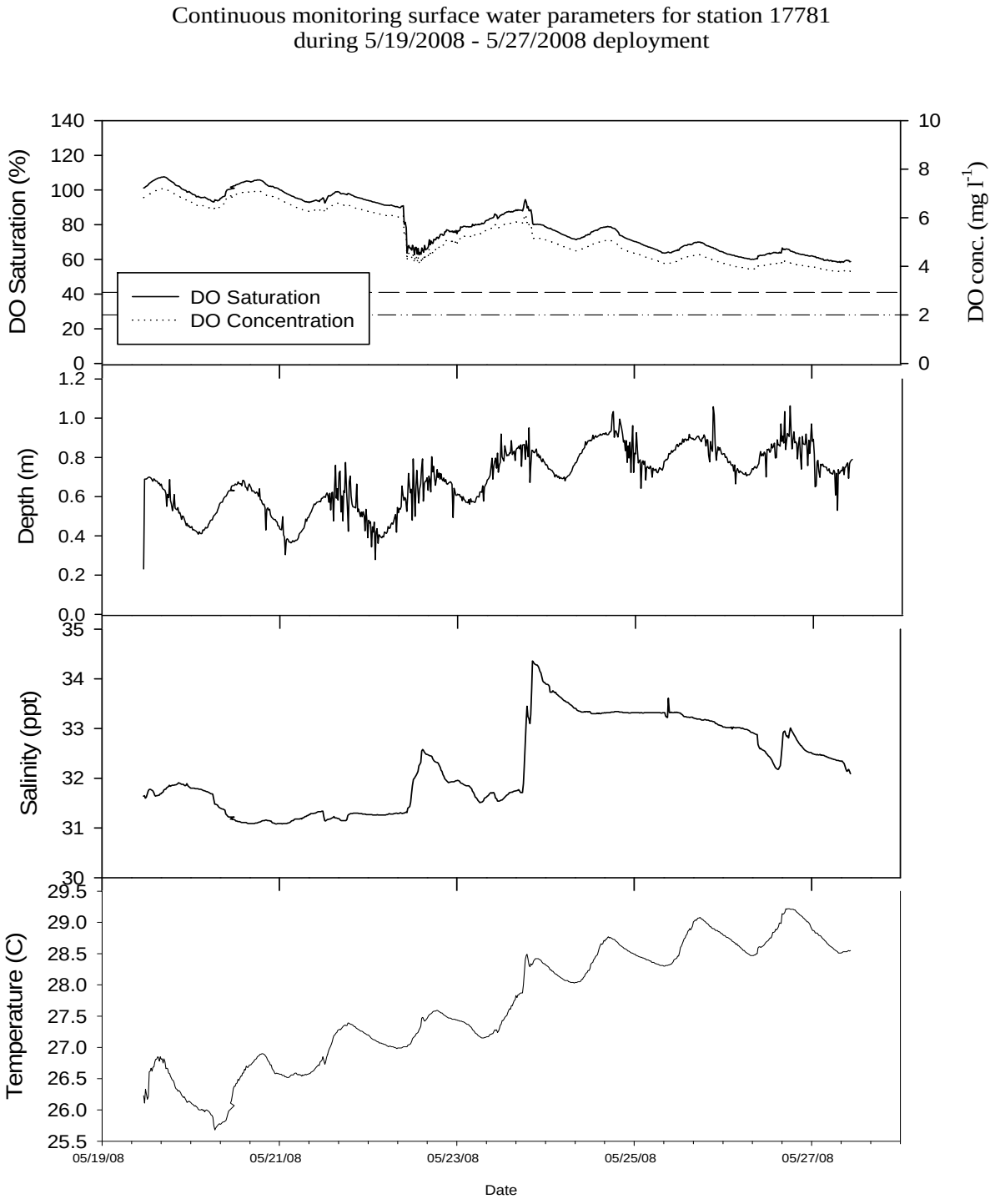

Figure D. 1 Continuous surface monitoring at station 17781 during 5/19/08 - 5/27/08 deployment.

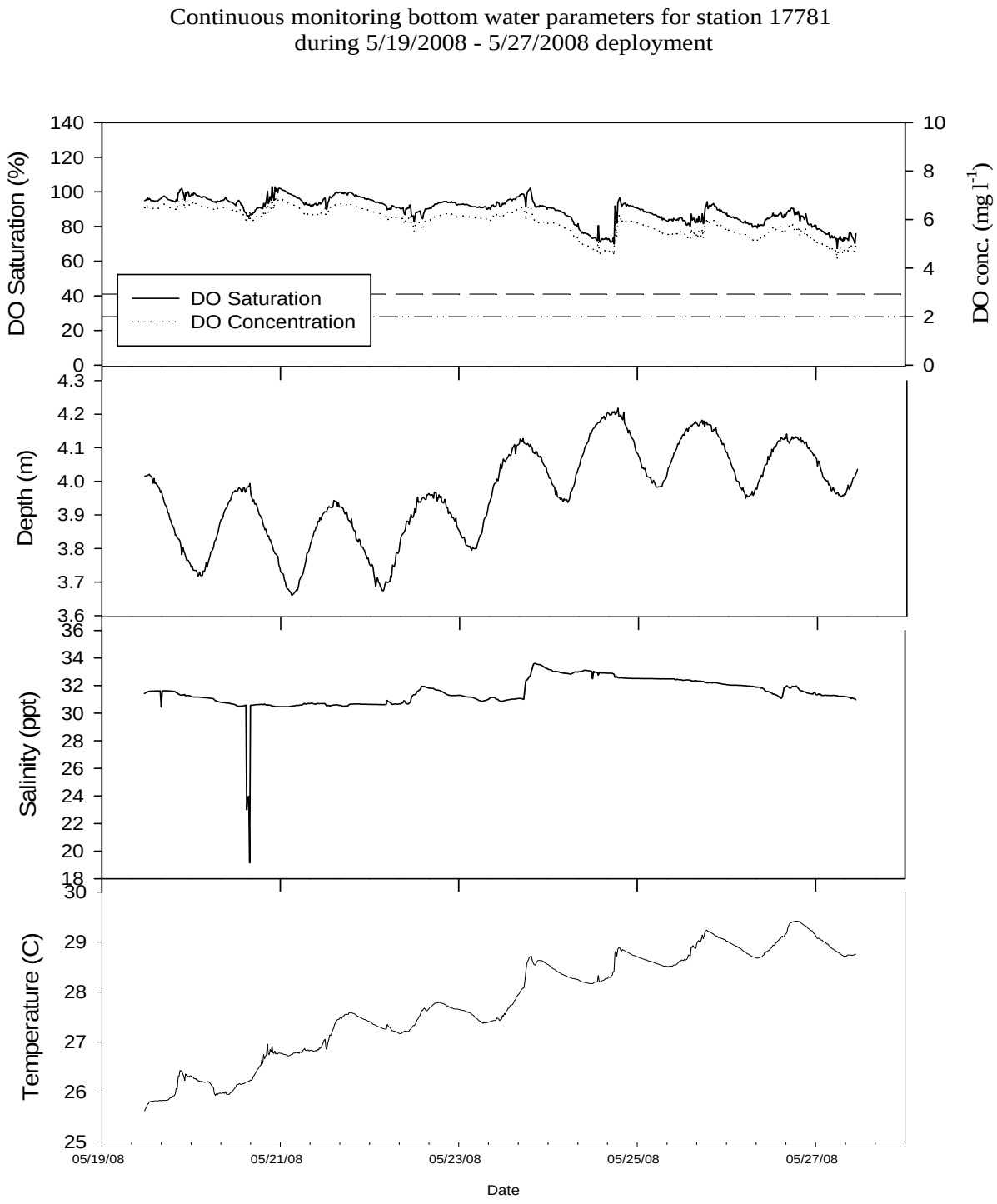

Figure D. 2 Continuous bottom monitoring at station 17781 during 5/19/08 - 5/27/08 deployment.

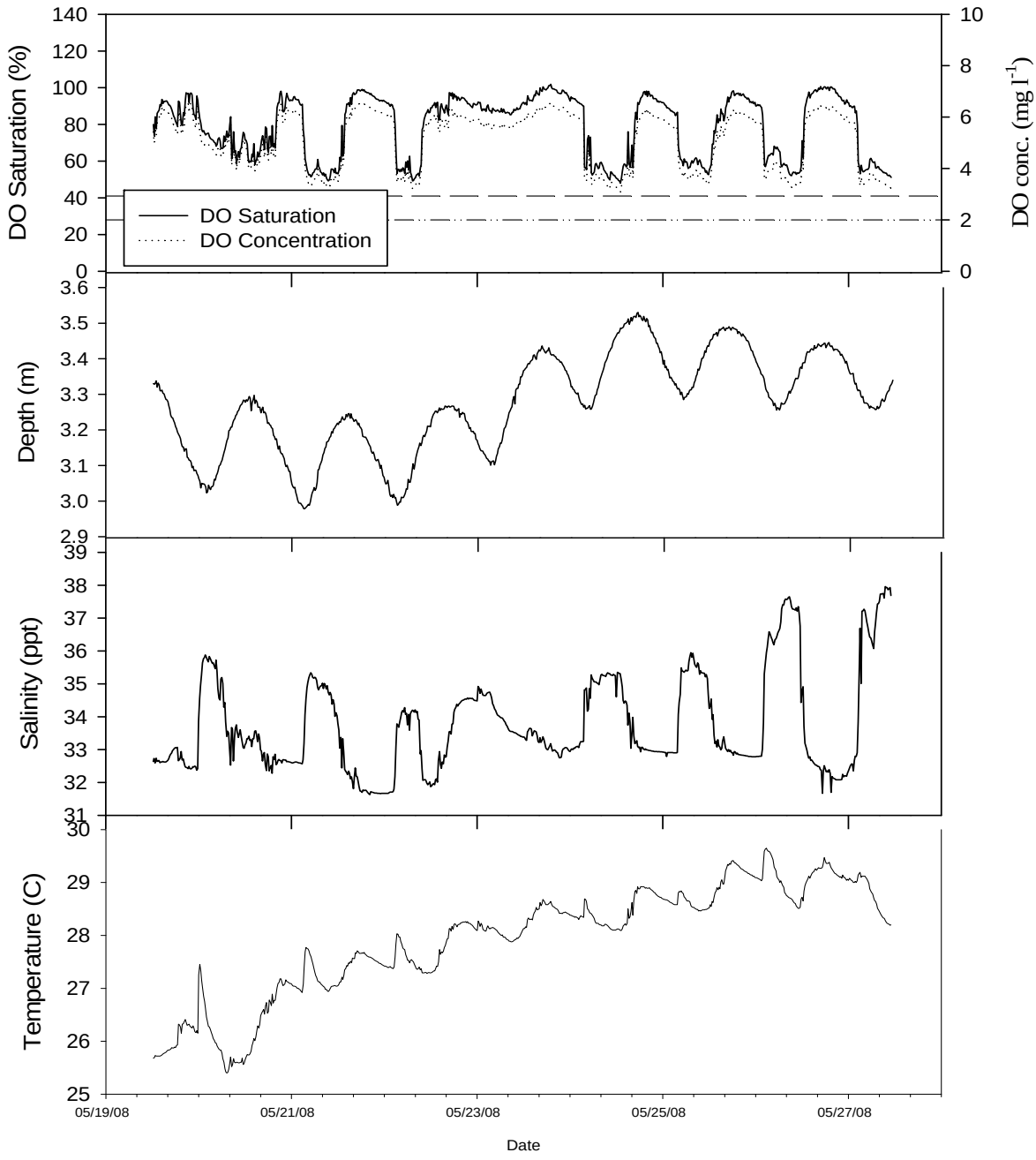

Figure D. 3 Continuous bottom monitoring at station 17787 during 5/19/08 - 5/27/08 deployment.

Continuous monitoring surface water parameters for station 17793
during 5/19/2008 - 5/27/2008 deployment

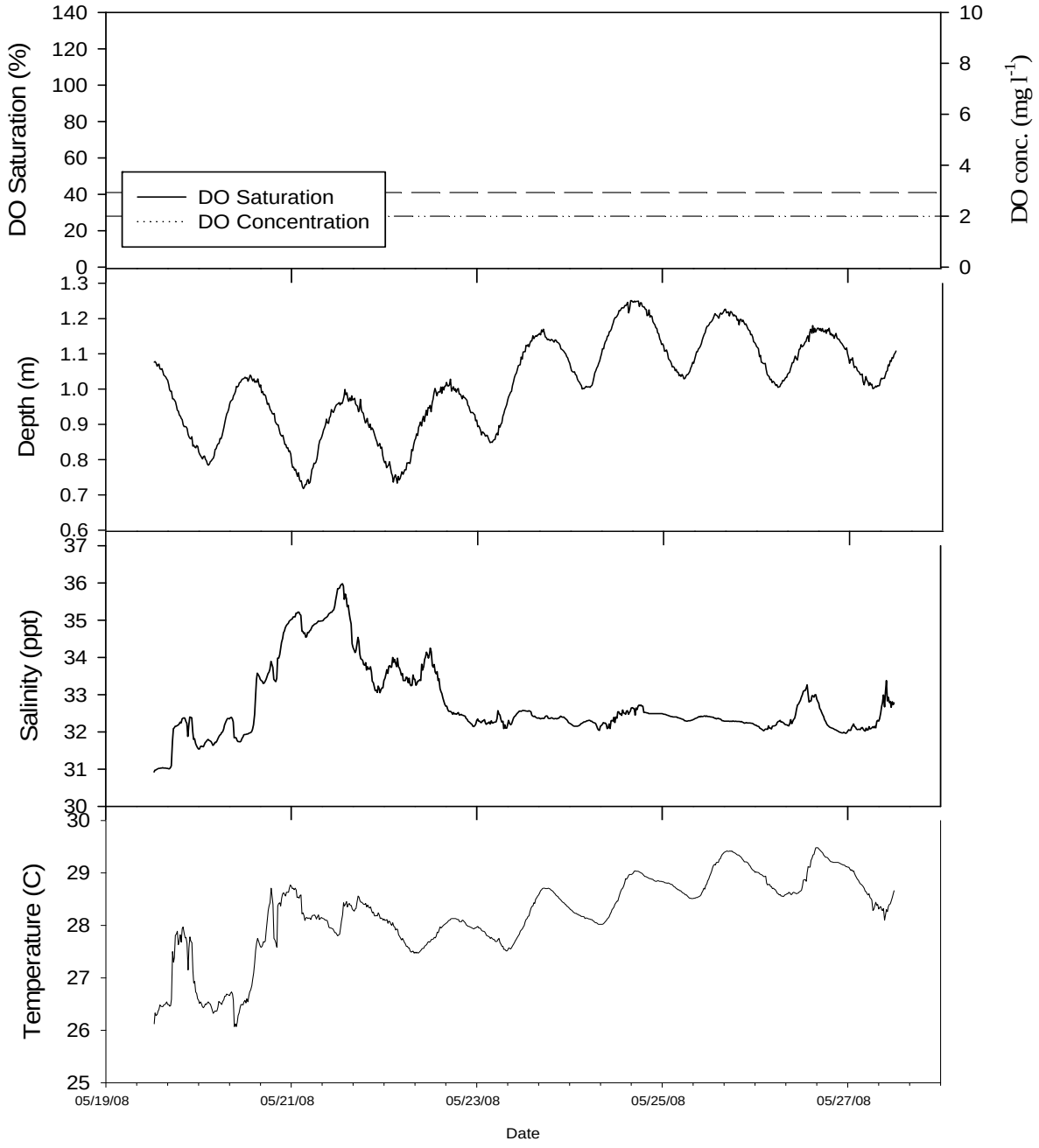

Figure D. 4 Continuous surface monitoring at station 17793 during 5/19/08 - 5/27/08 deployment.

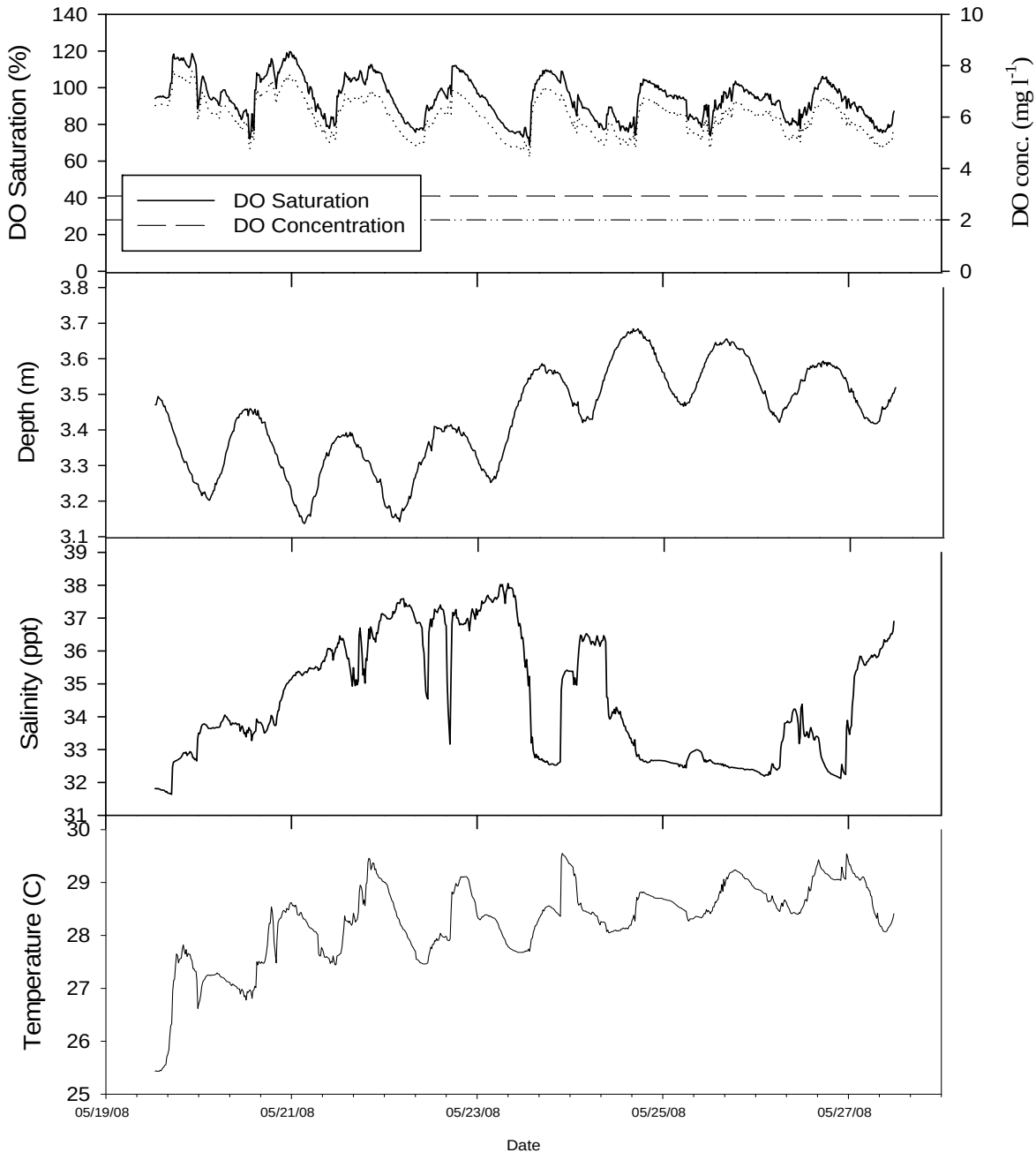

Figure D. 5 Continuous bottom monitoring at station 17793 during 5/19/08 - 5/27/08 deployment.

Continuous monitoring surface water parameters for station 18247
during 5/19/2008 - 5/27/2008 deployment

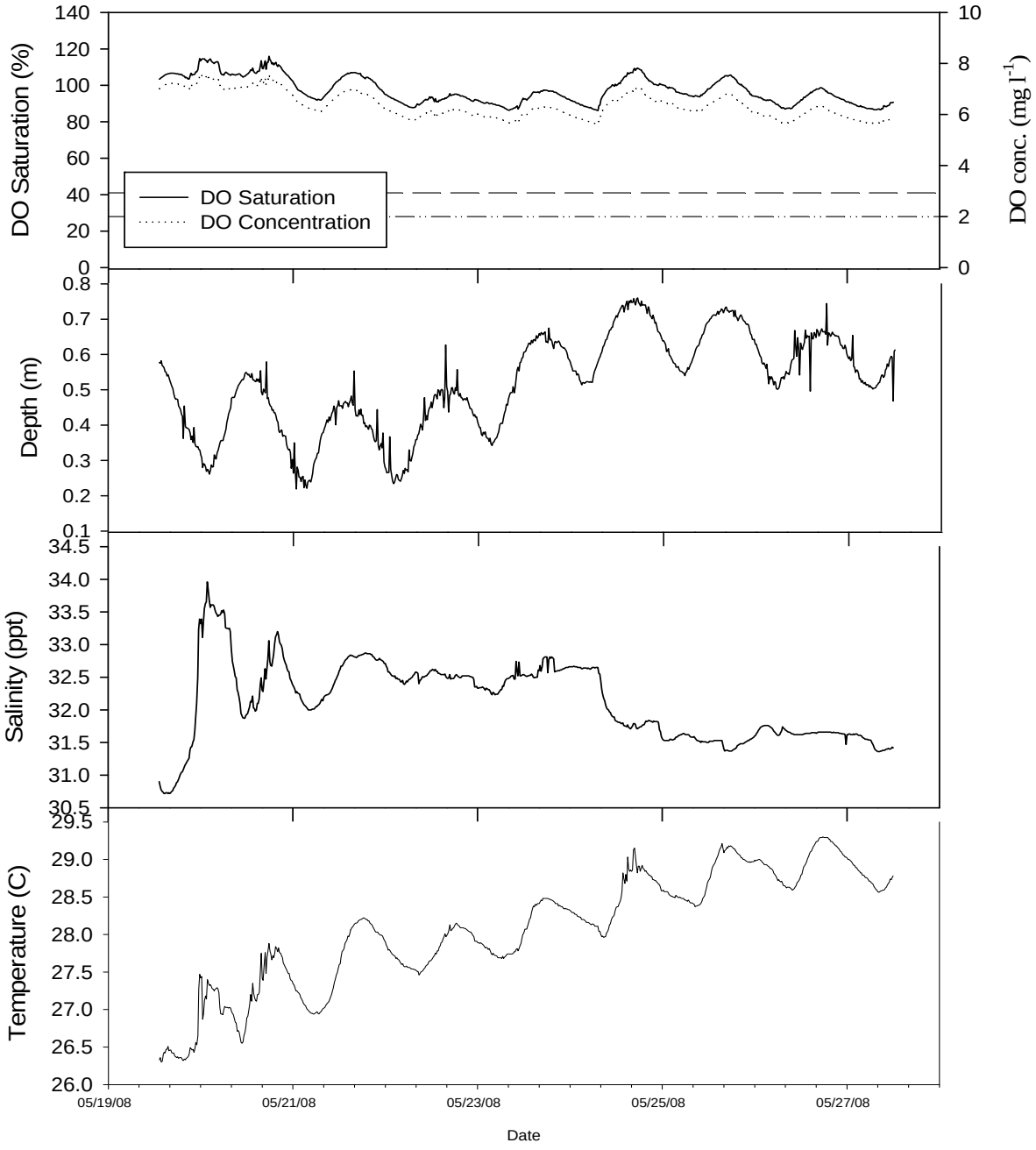

Figure D. 6 Continuous surface monitoring at station 18247 during 5/19/08 - 5/27/08 deployment.

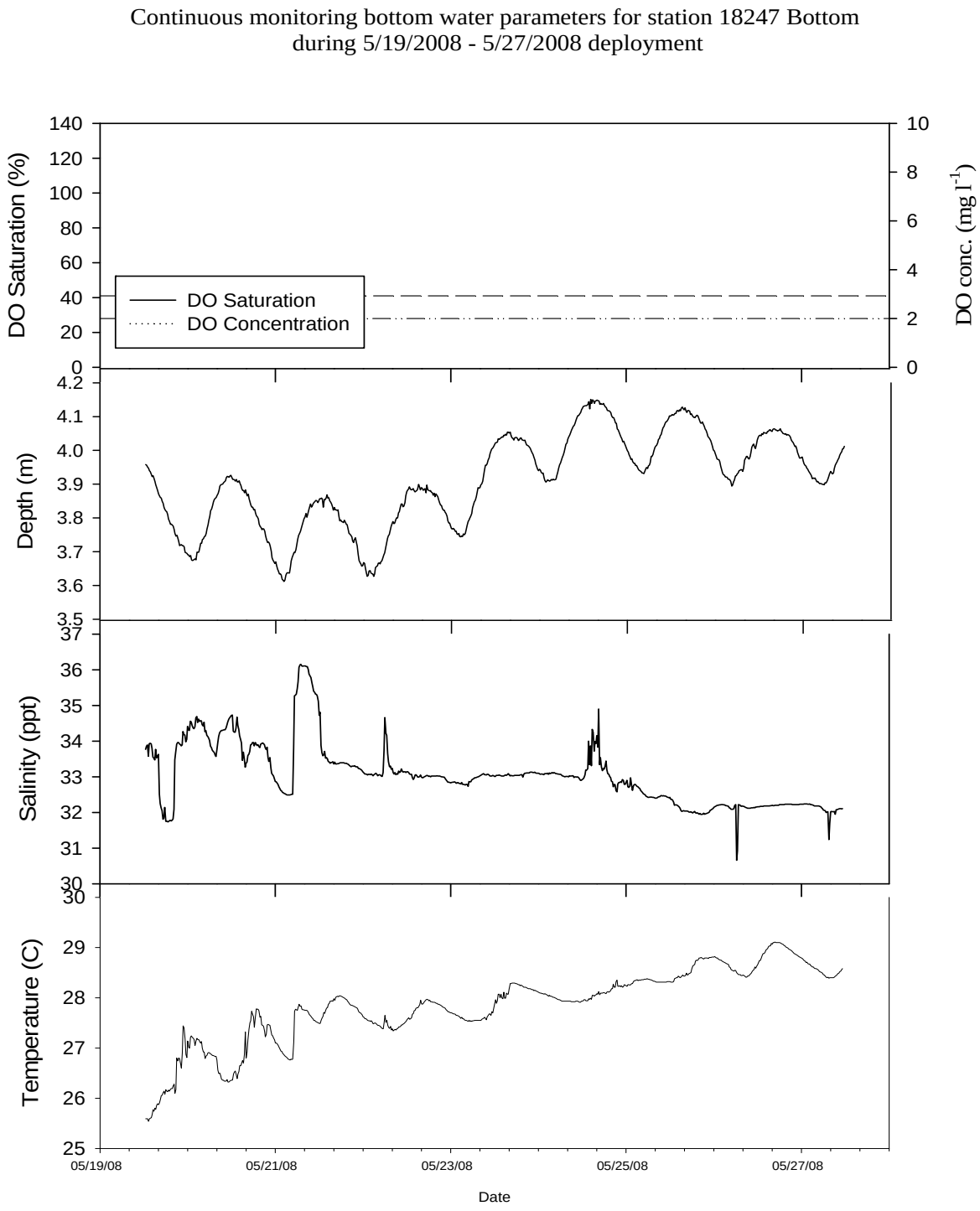

Figure D. 7 Continuous bottom monitoring at station 18247 during 5/19/08 - 5/27/08 deployment.

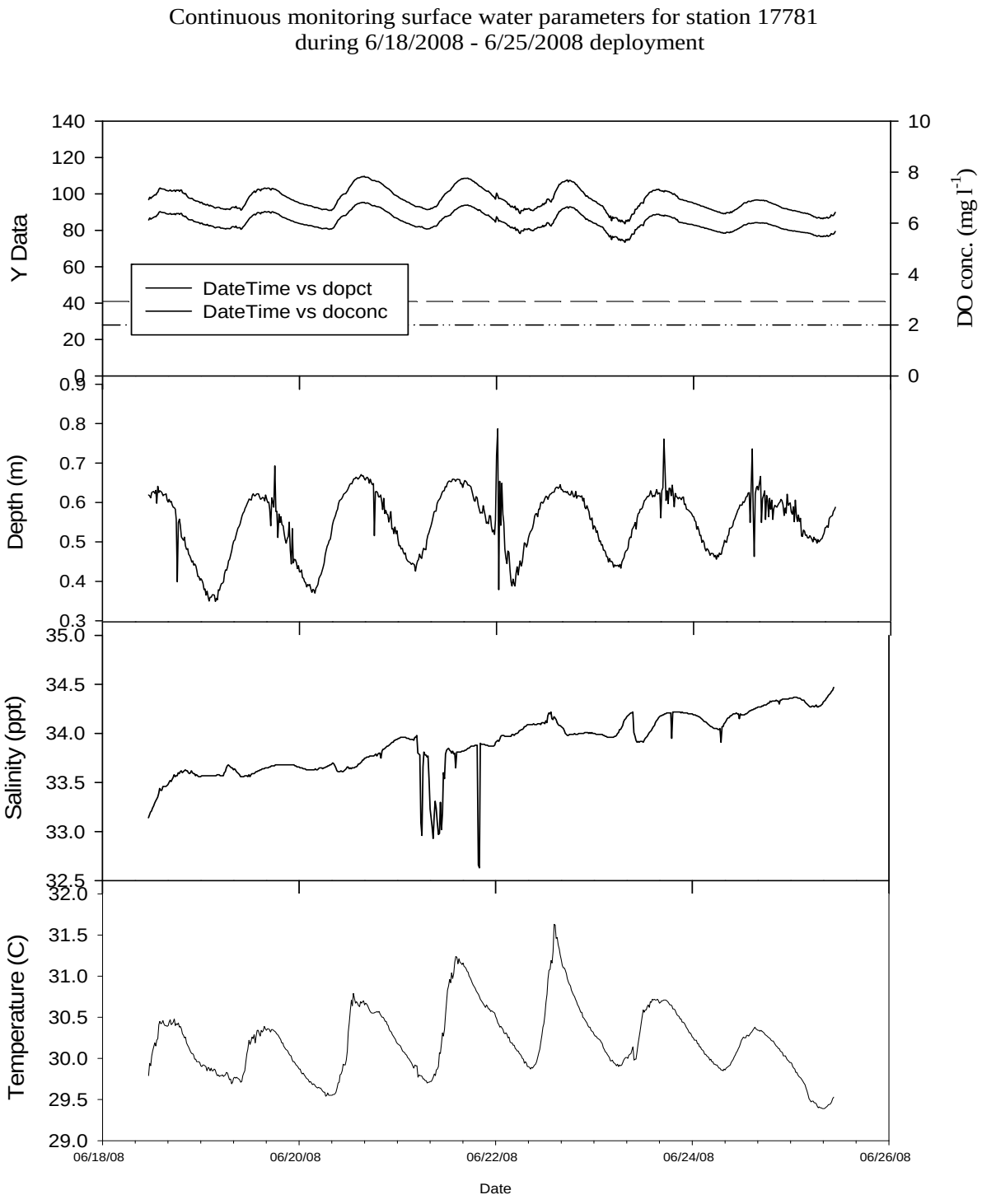

Figure D. 8 Continuous surface monitoring at station 17781 during 6/18/08 - 6/25/08 deployment

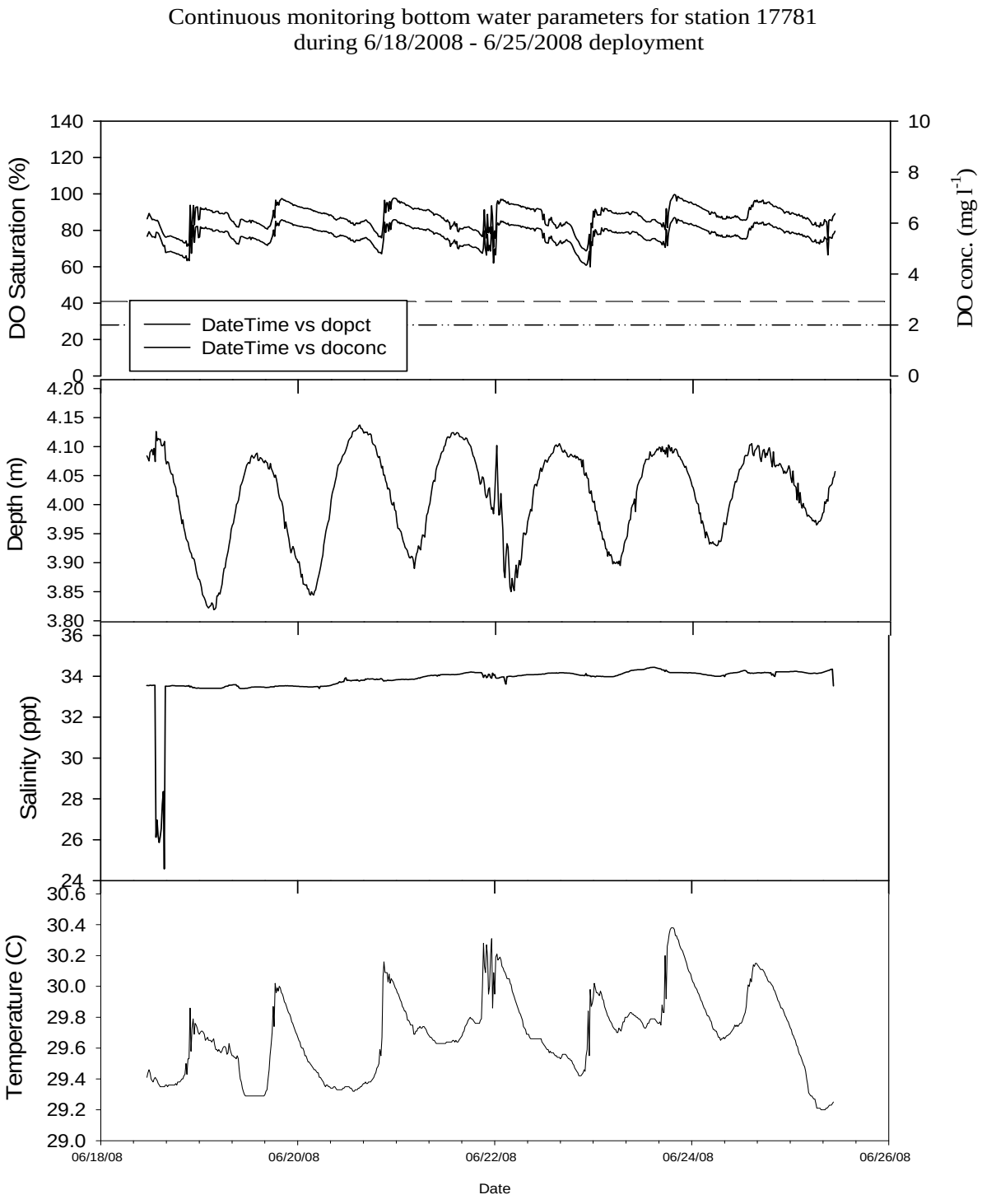

Figure D. 9 Continuous bottom monitoring at station 17781 during 6/18/08 - 6/25/08 deployment.

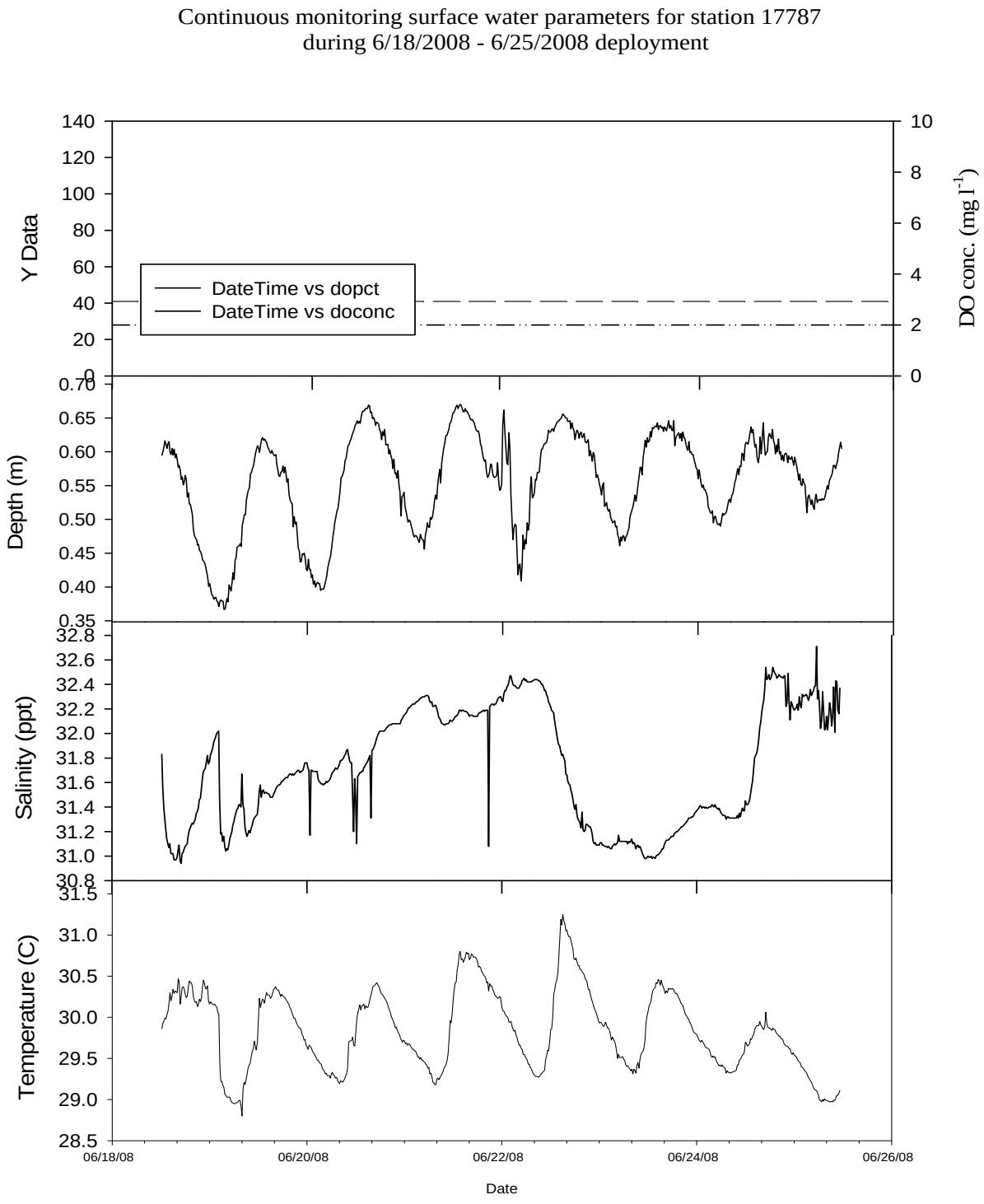

Figure D. 10 Continuous surface monitoring at station 17787 during 6/18/08 - 6/25/08 deployment.

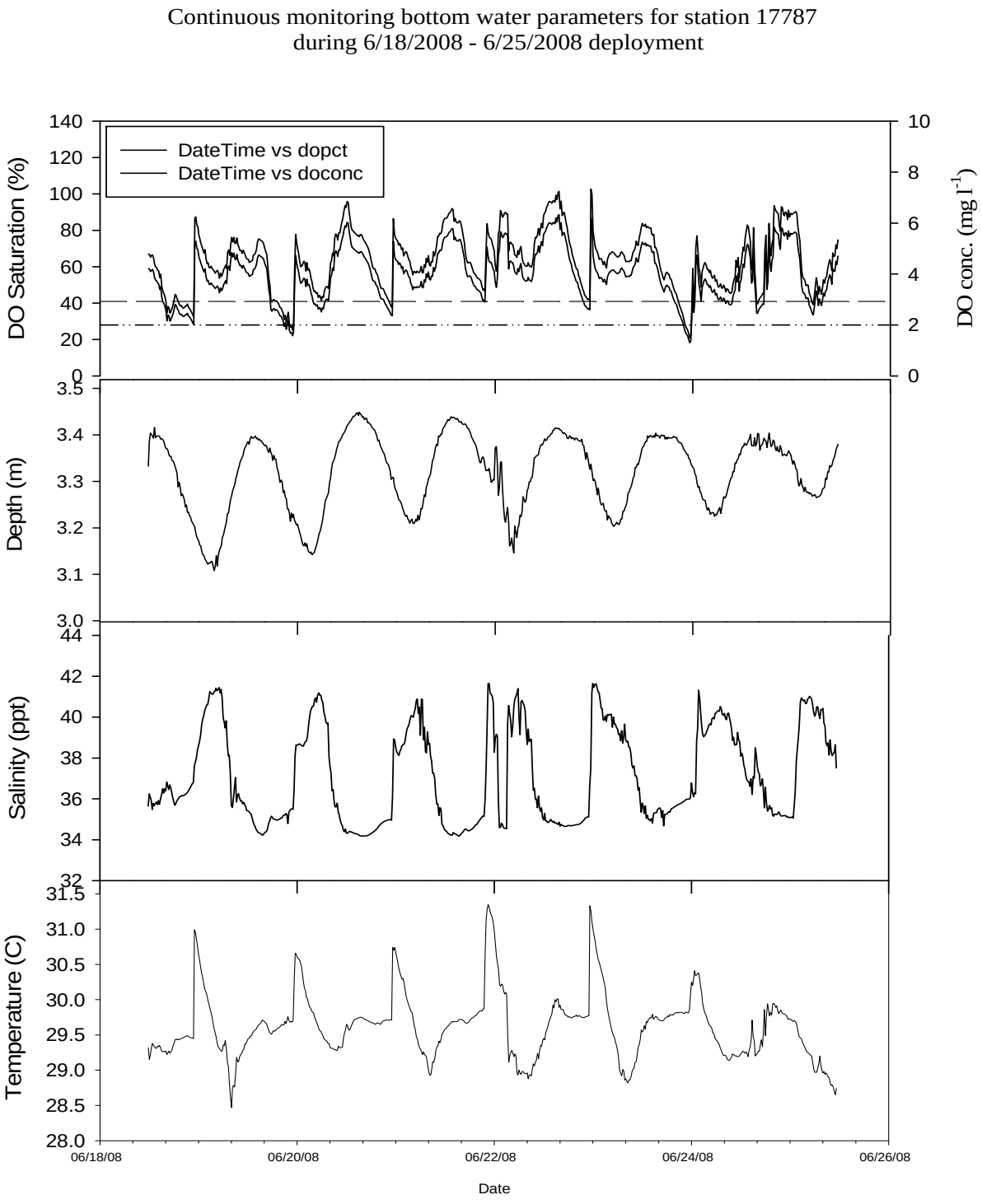

Figure D. 11 Continuous bottom monitoring at station 17787 during 6/18/08 - 6/25/08 deployment.

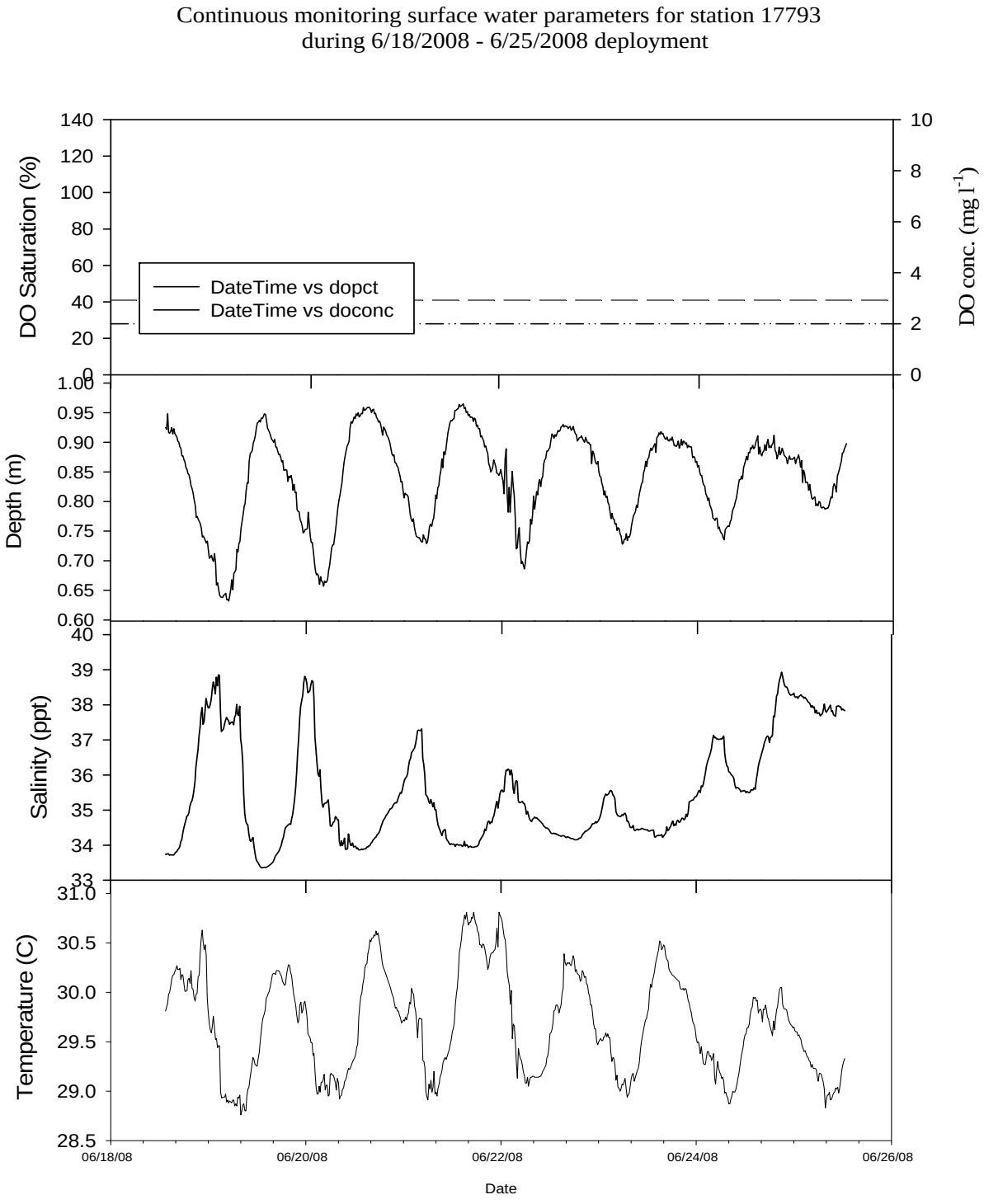

Figure D. 12 Continuous surface monitoring at station 17793 during 6/18/08 - 6/25/08 deployment.

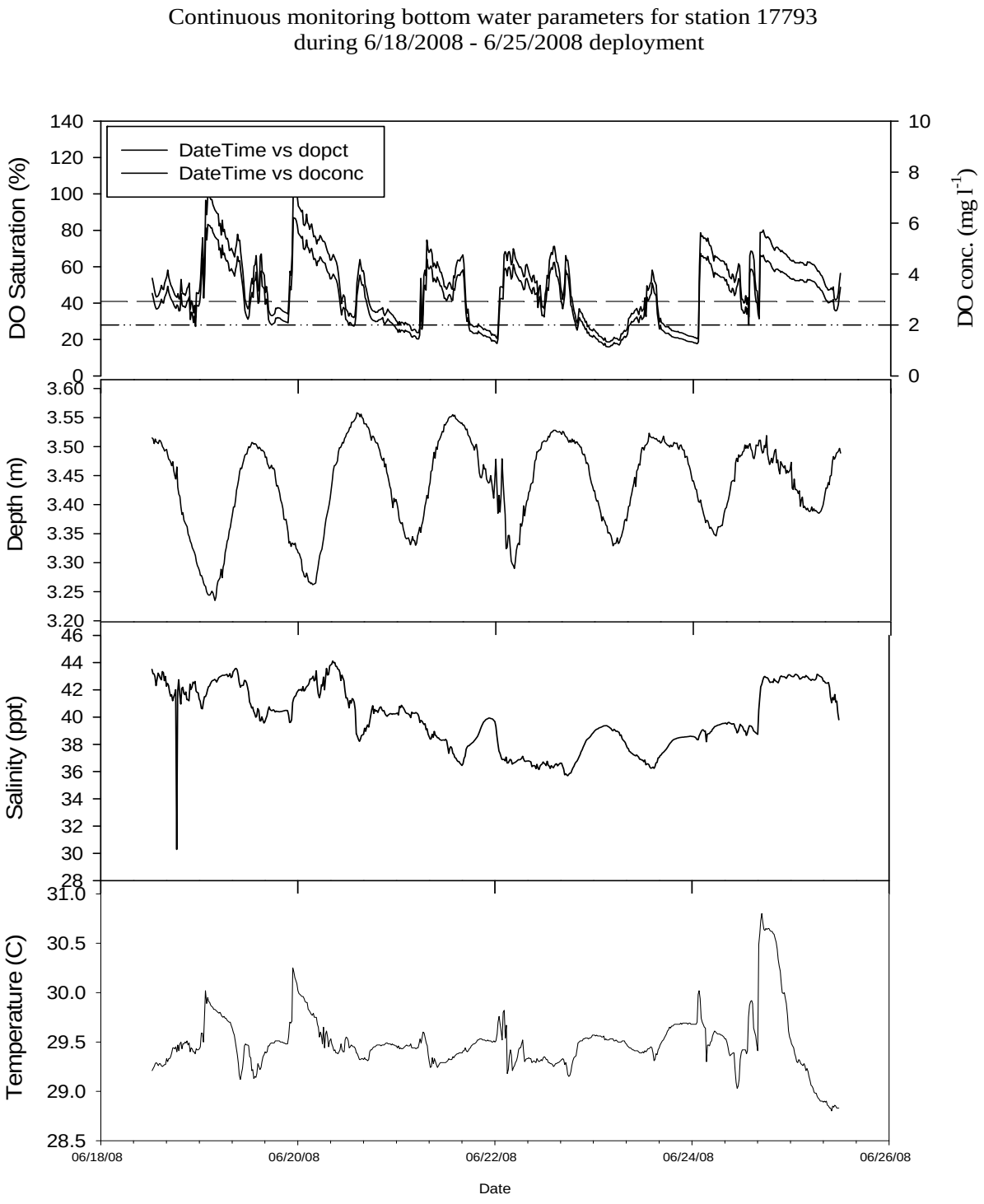

Figure D. 13 Continuous bottom monitoring at station 17793 during 6/18/08 - 6/25/08 deployment.

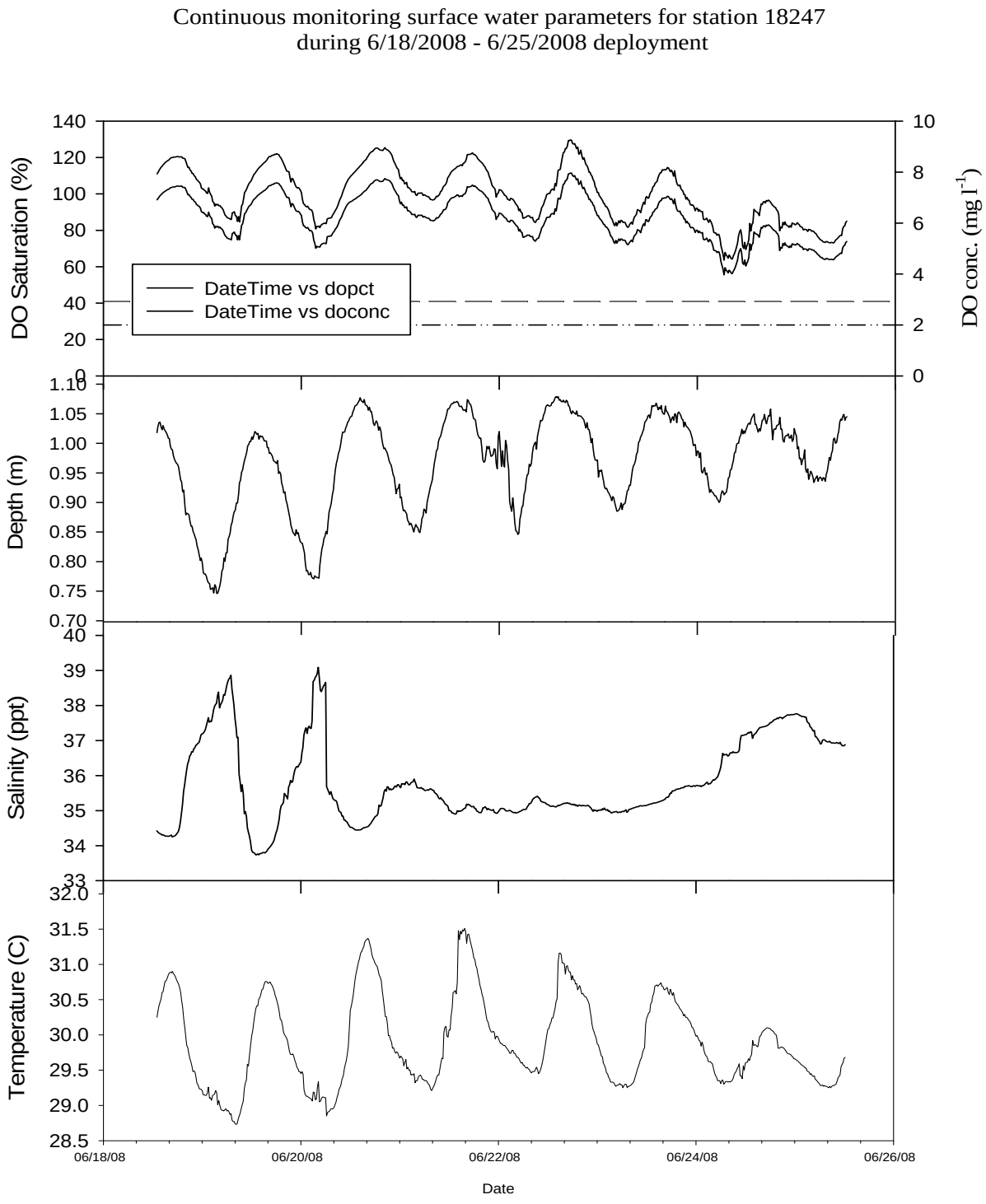

Figure D. 14 Continuous surface monitoring at station 18247 during 6/18/08 - 6/25/08 deployment.

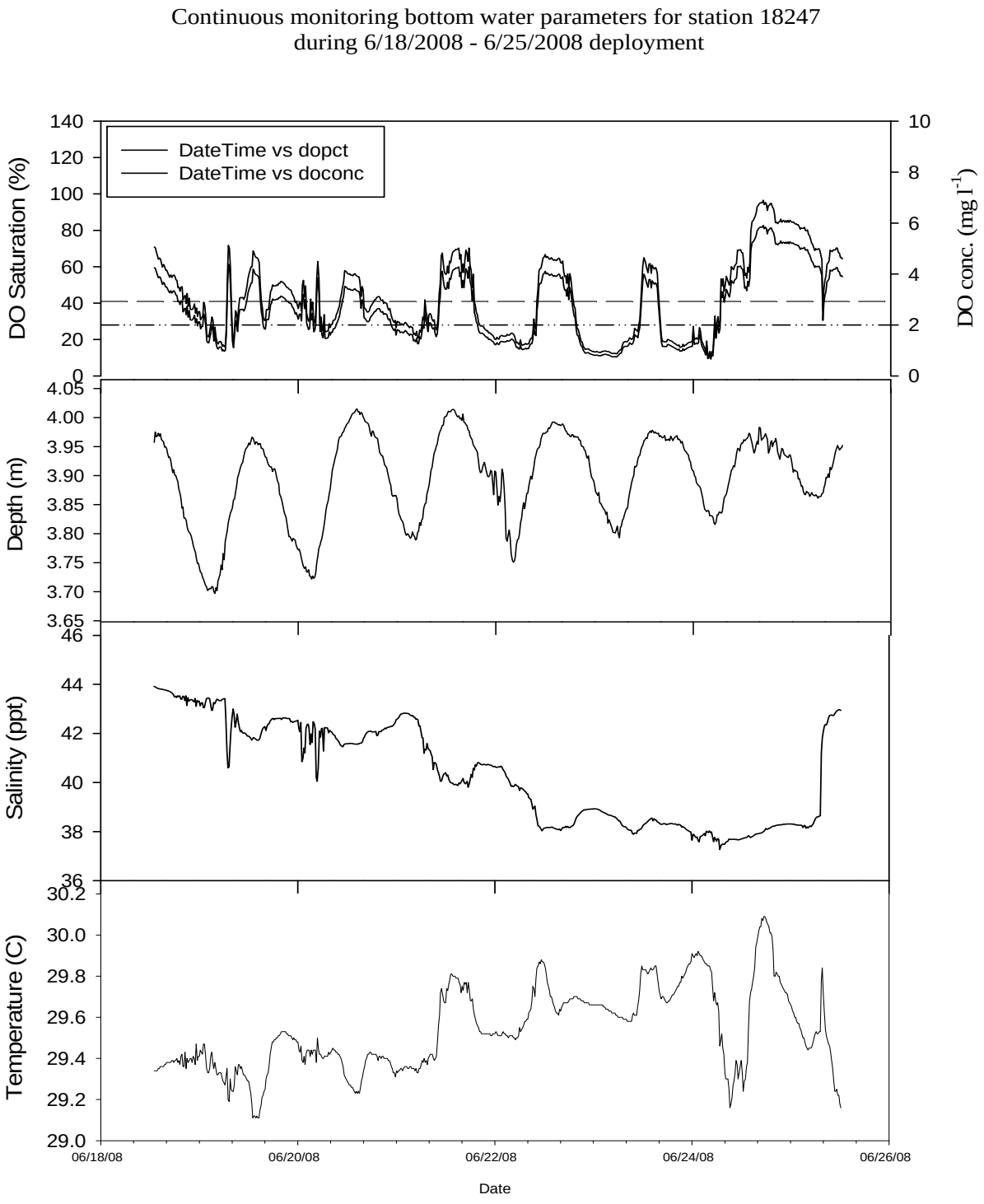

Figure D. 15 Continuous bottom monitoring at station 18247 during 6/18/08 - 6/25/08 deployment.

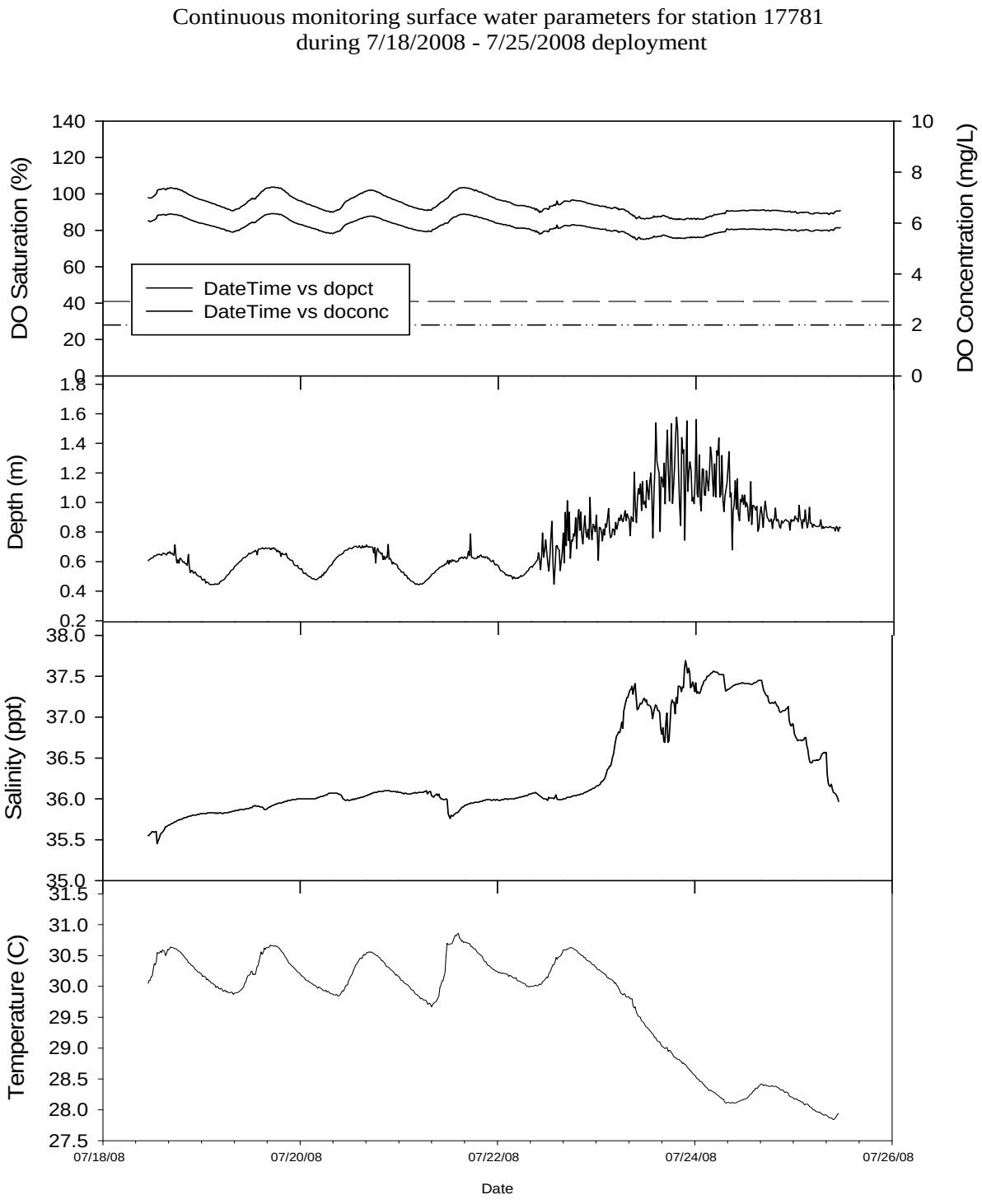

Figure D. 16 Continuous surface monitoring at station 17781 during 7/18/08 - 7/25/08 deployment.

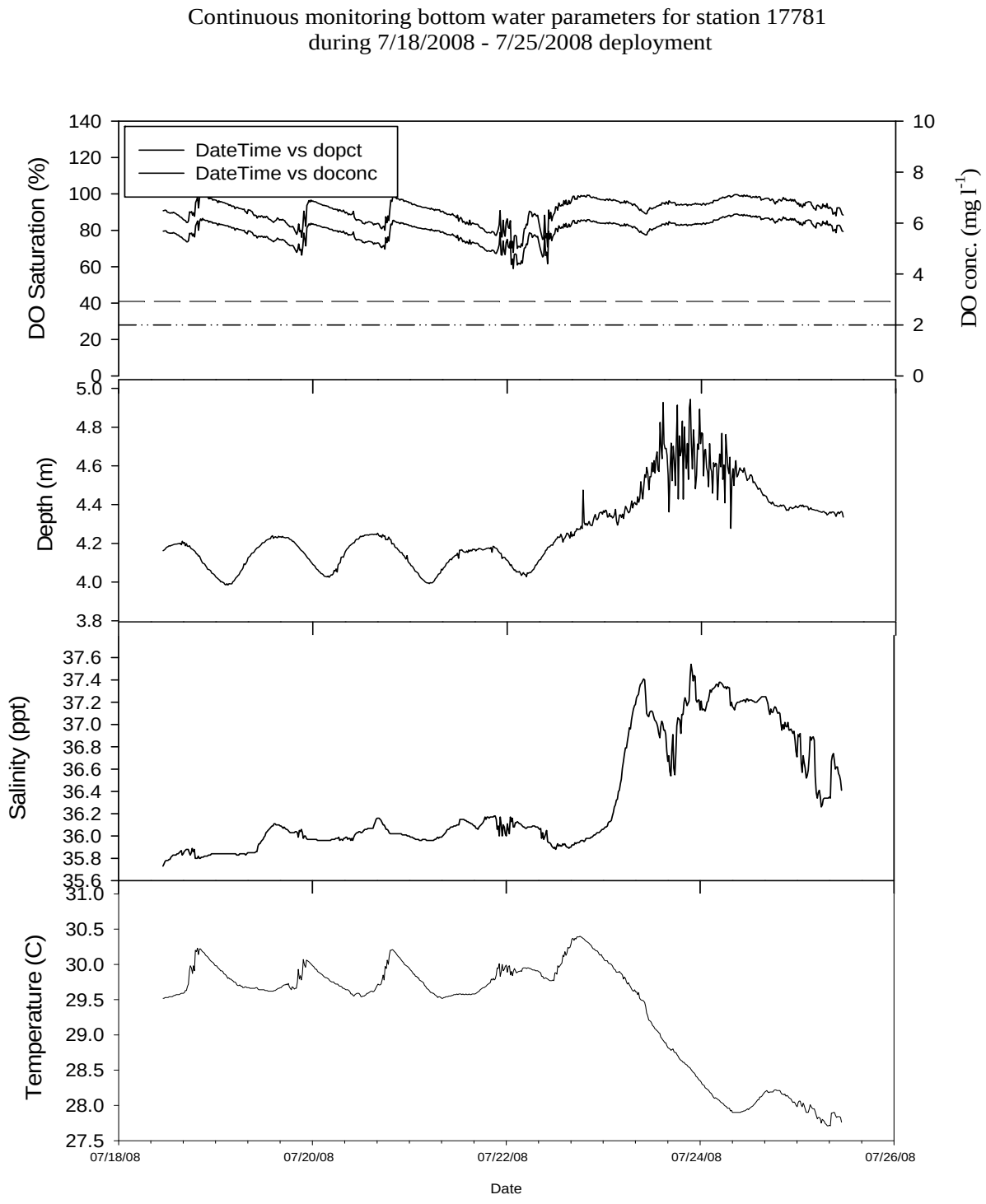

Figure D. 17 Continuous bottom monitoring at station 17781 during 7/18/08 - 7/25/08 deployment.

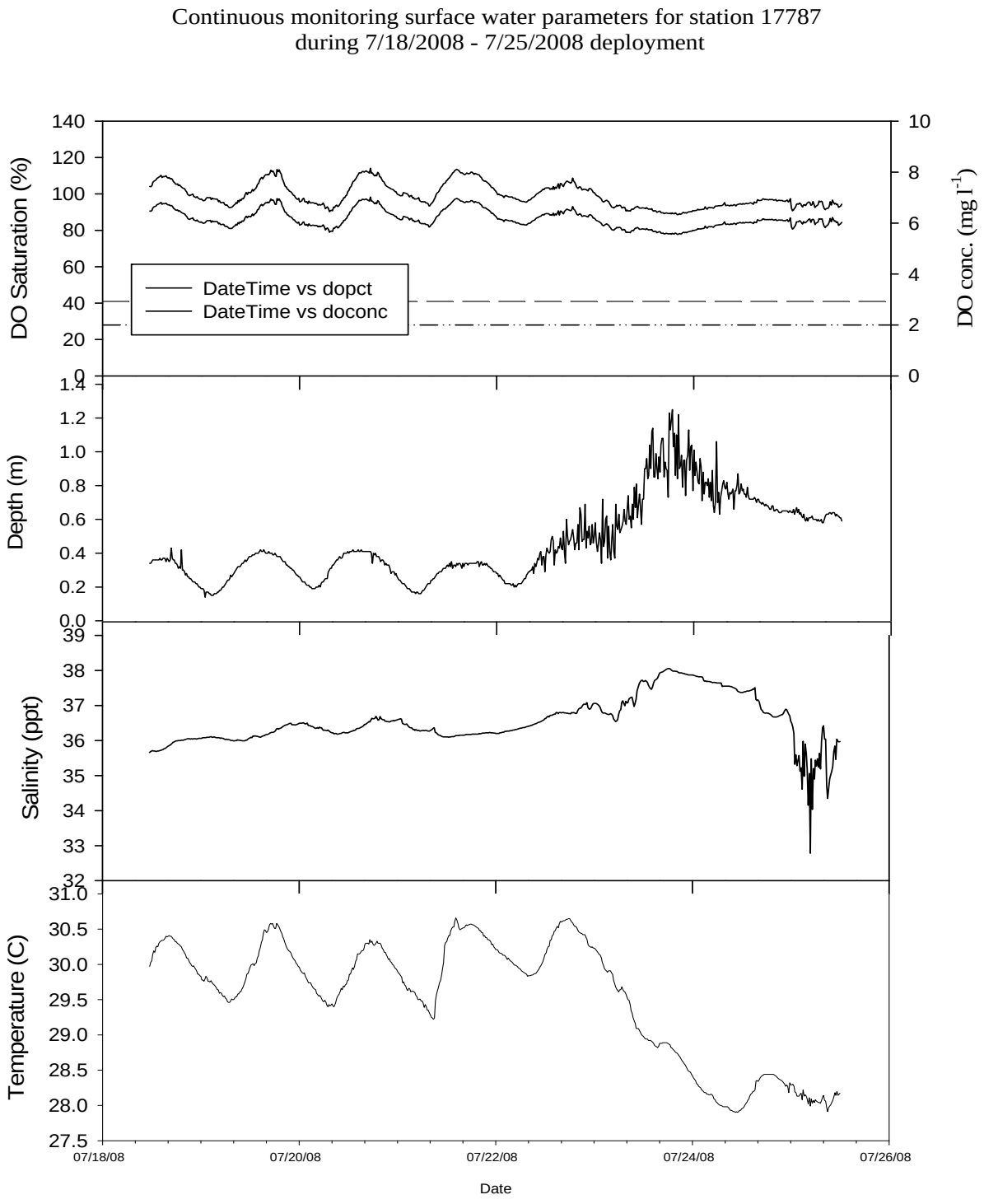

Figure D. 18 Continuous surface monitoring at station 17787 during 7/18/08 - 7/25/08 deployment.

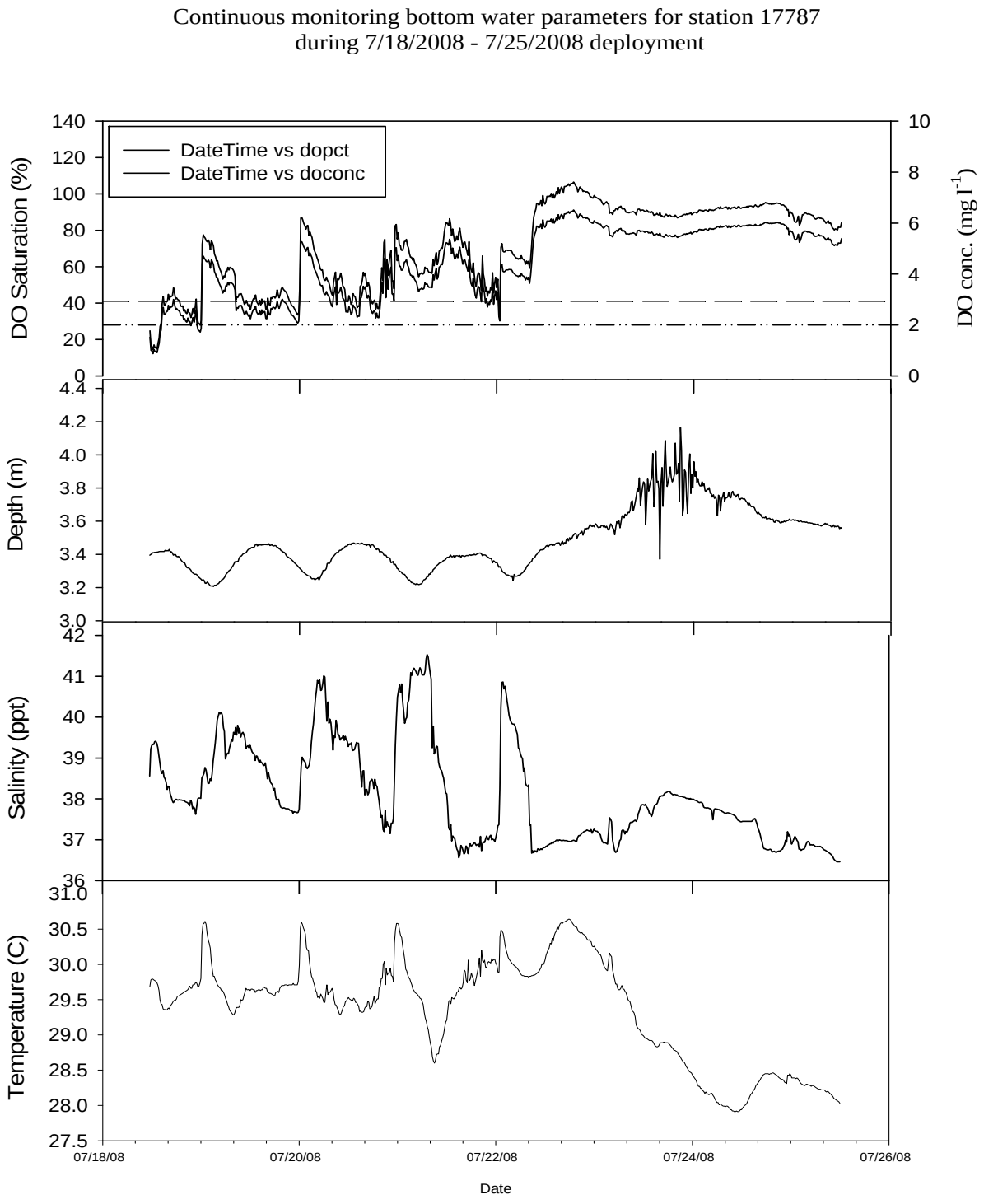

Figure D. 19 Continuous bottom monitoring at station 17787 during 7/18/08 - 7/25/08 deployment.

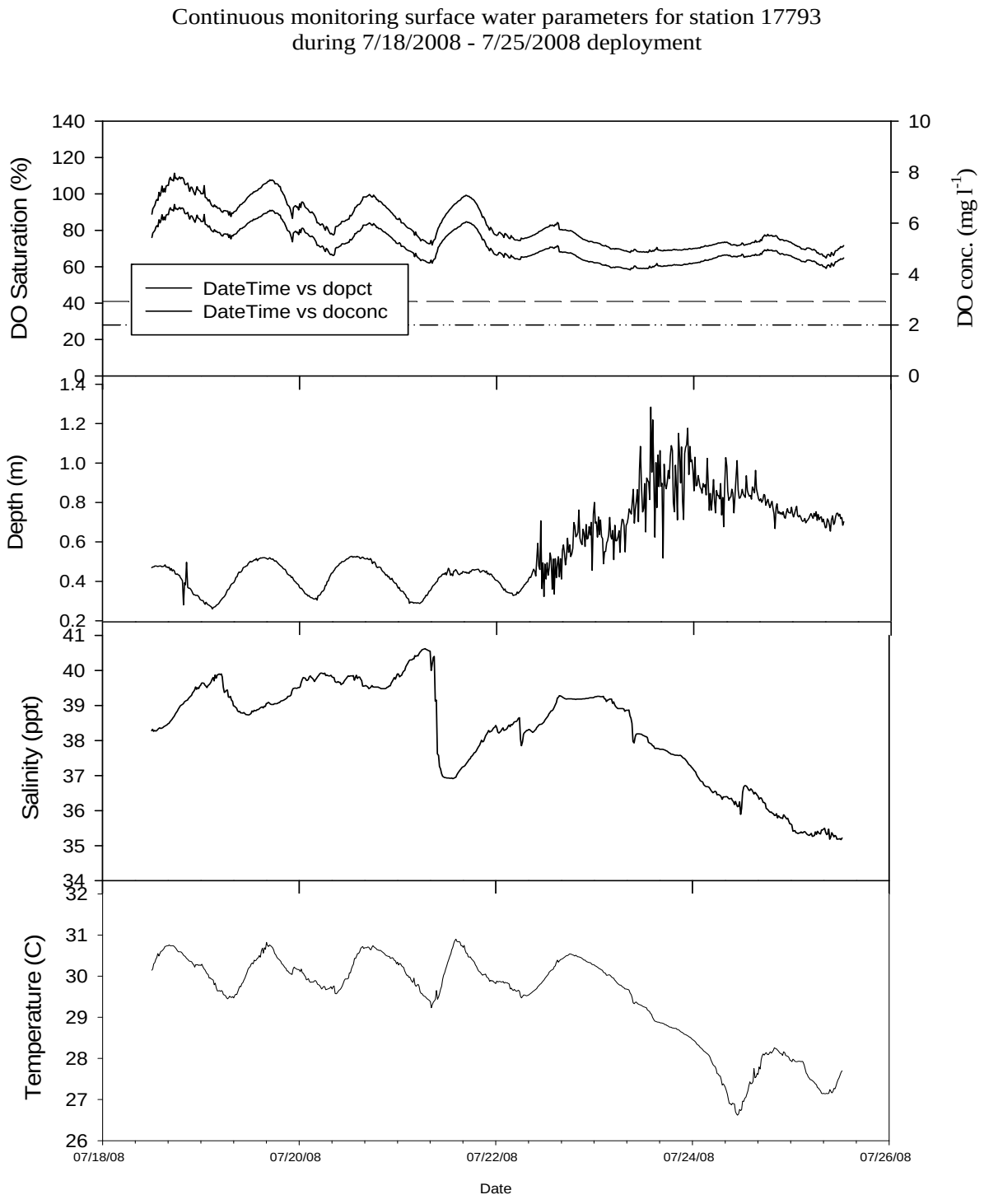

Figure D. 20 Continuous surface monitoring at station 17793 during 7/18/08 - 7/25/08 deployment.

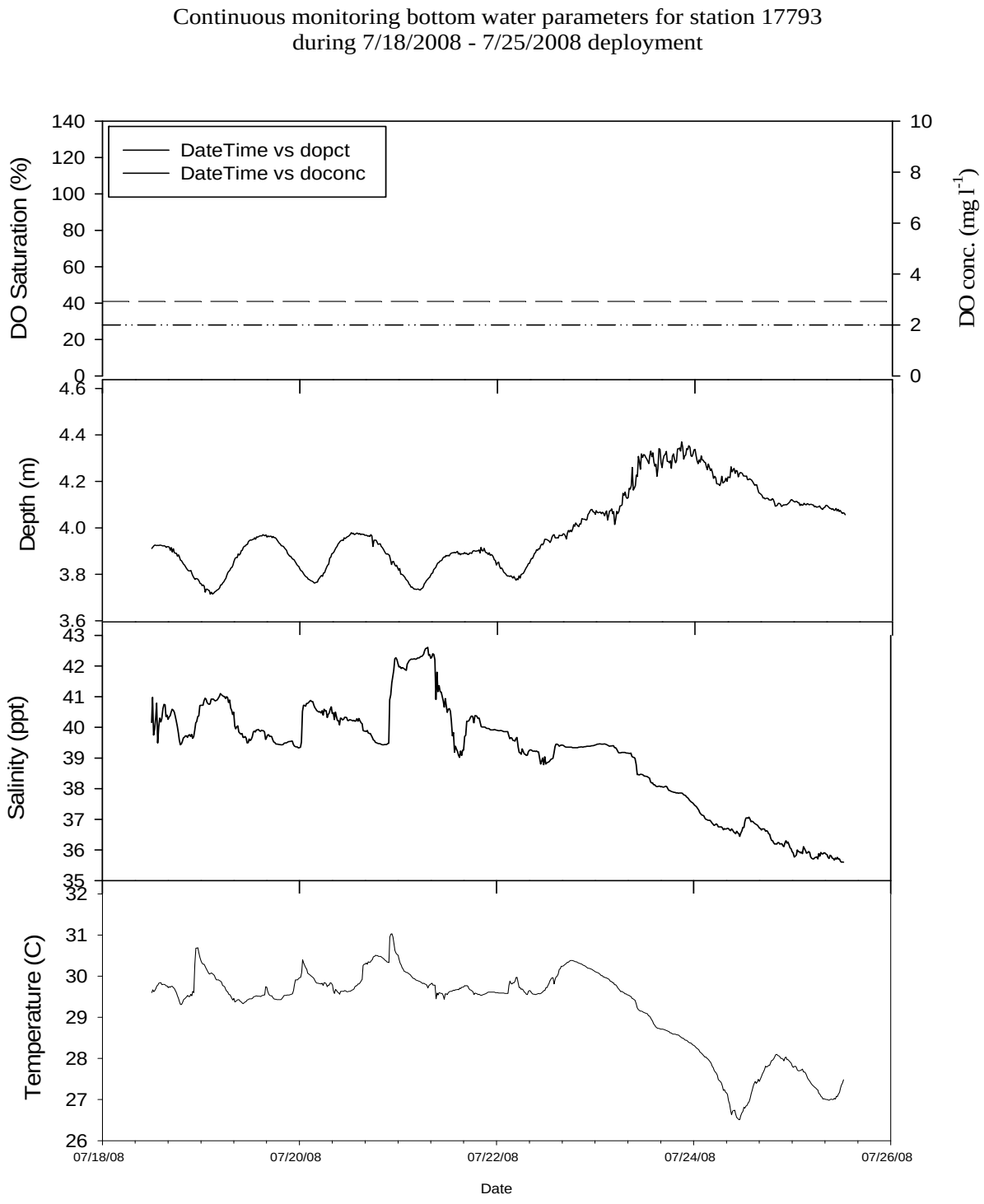

Figure D. 21 Continuous bottom monitoring at station 17793 during 7/18/08 - 7/25/08 deployment.

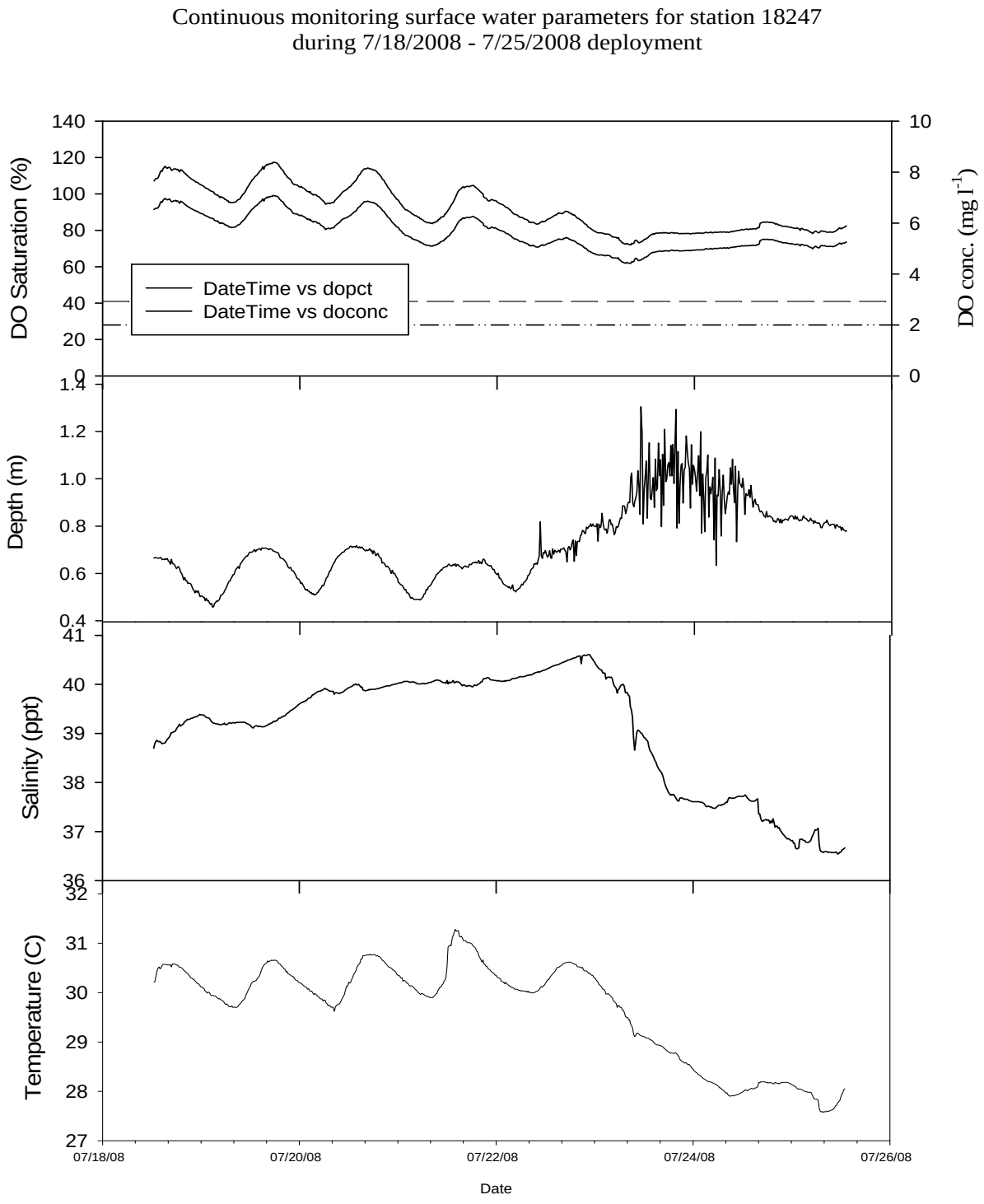

Figure D. 22 Continuous surface monitoring at station 18247 during 7/18/08 - 7/25/08 deployment.

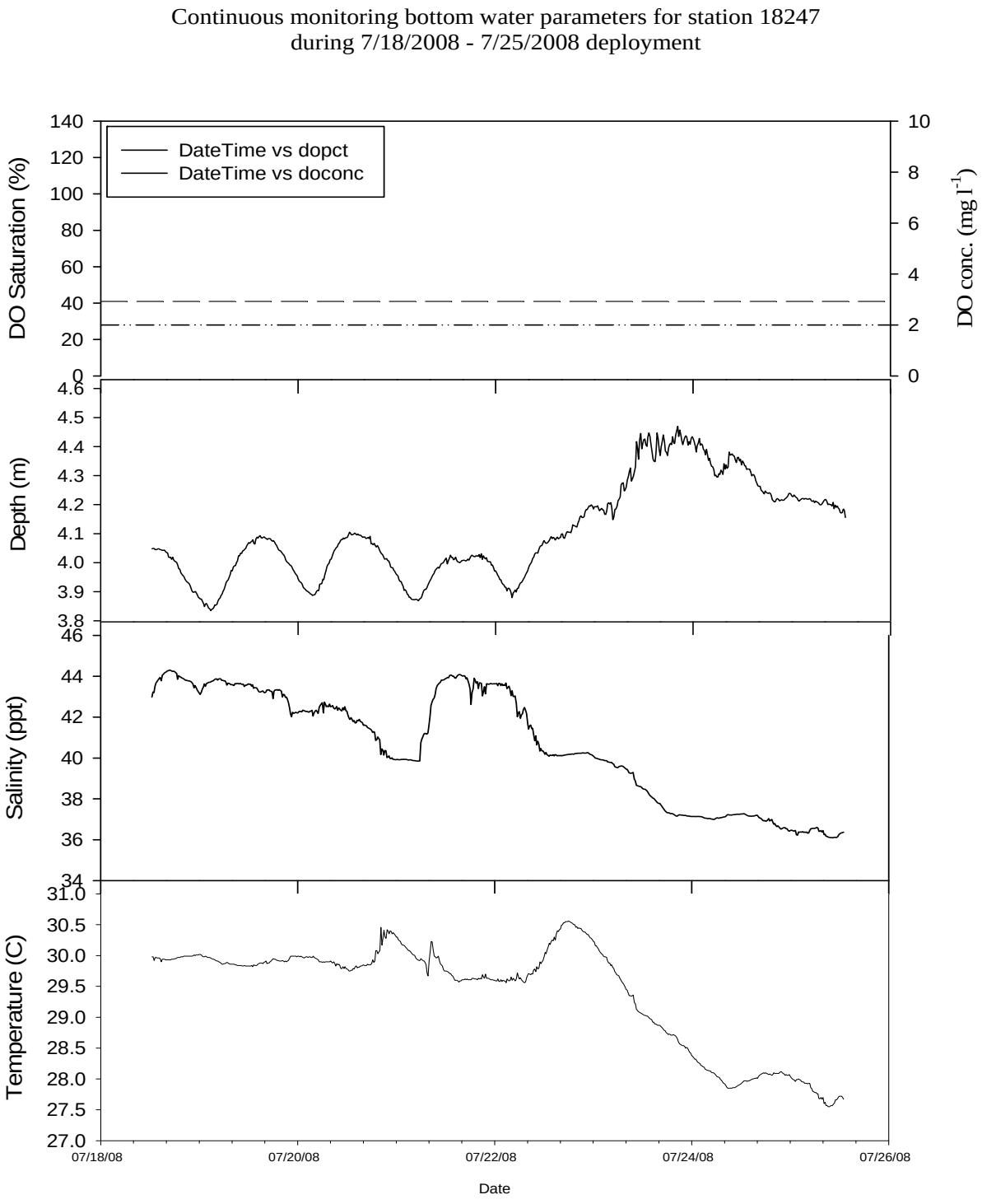

Figure D. 23 Continuous bottom monitoring at station 18247 during 7/18/08 - 7/25/08 deployment.

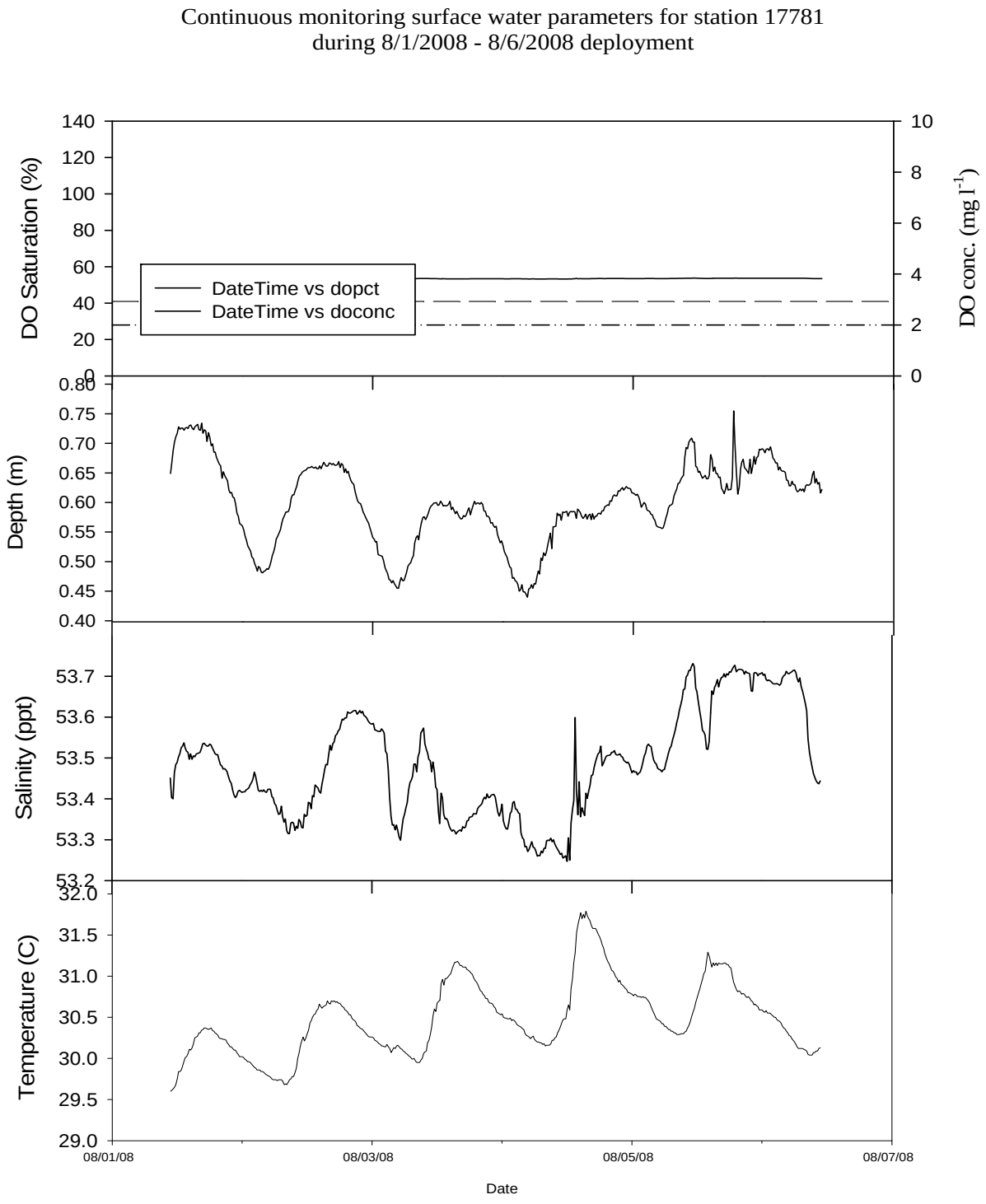

Figure D. 24 Continuous surface monitoring at station 17781 during 8/1/08 - 8/6/08 deployment.

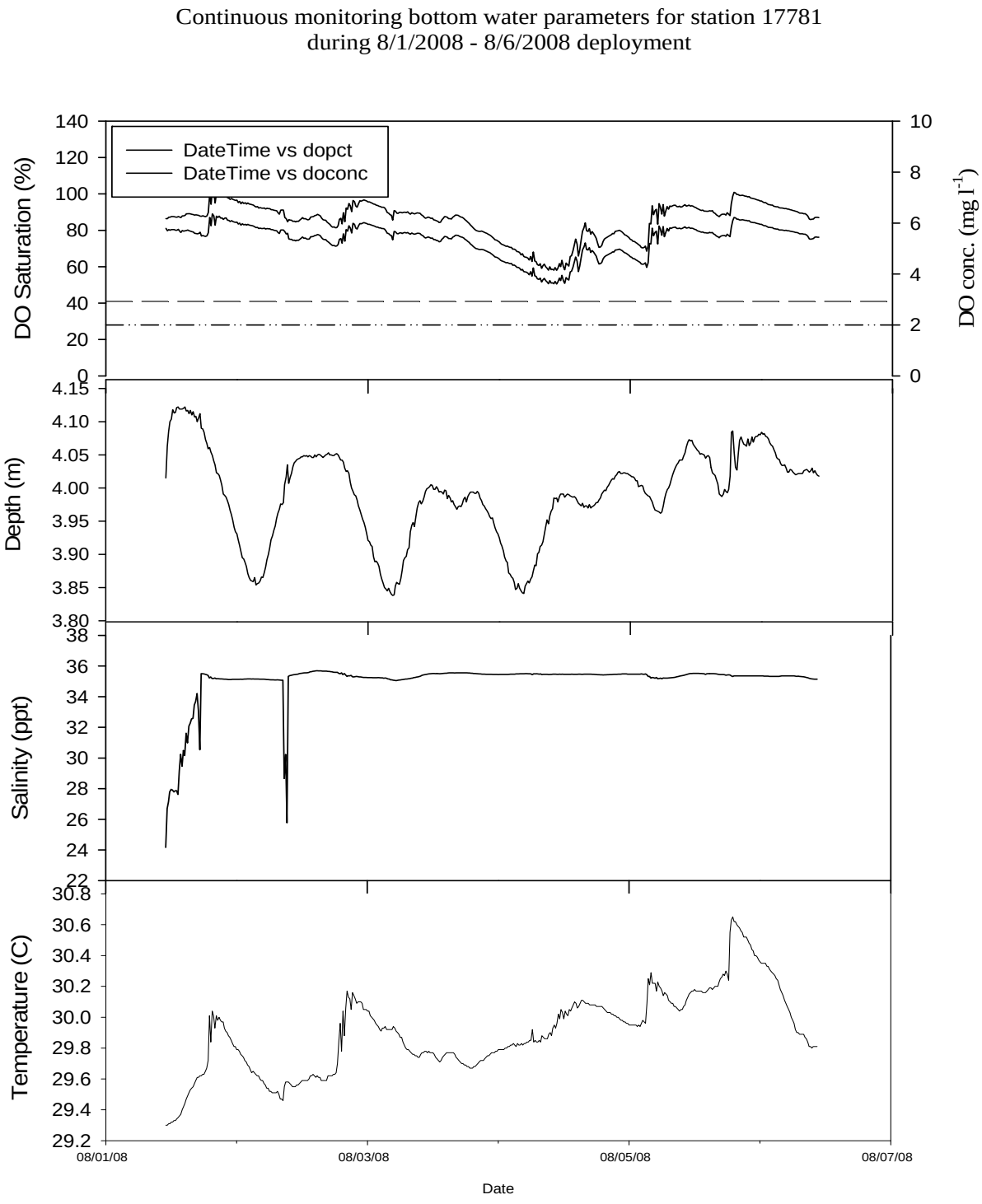

Figure D. 25 Continuous bottom monitoring at station 17781 during 8/1/08 - 8/6/08 deployment.

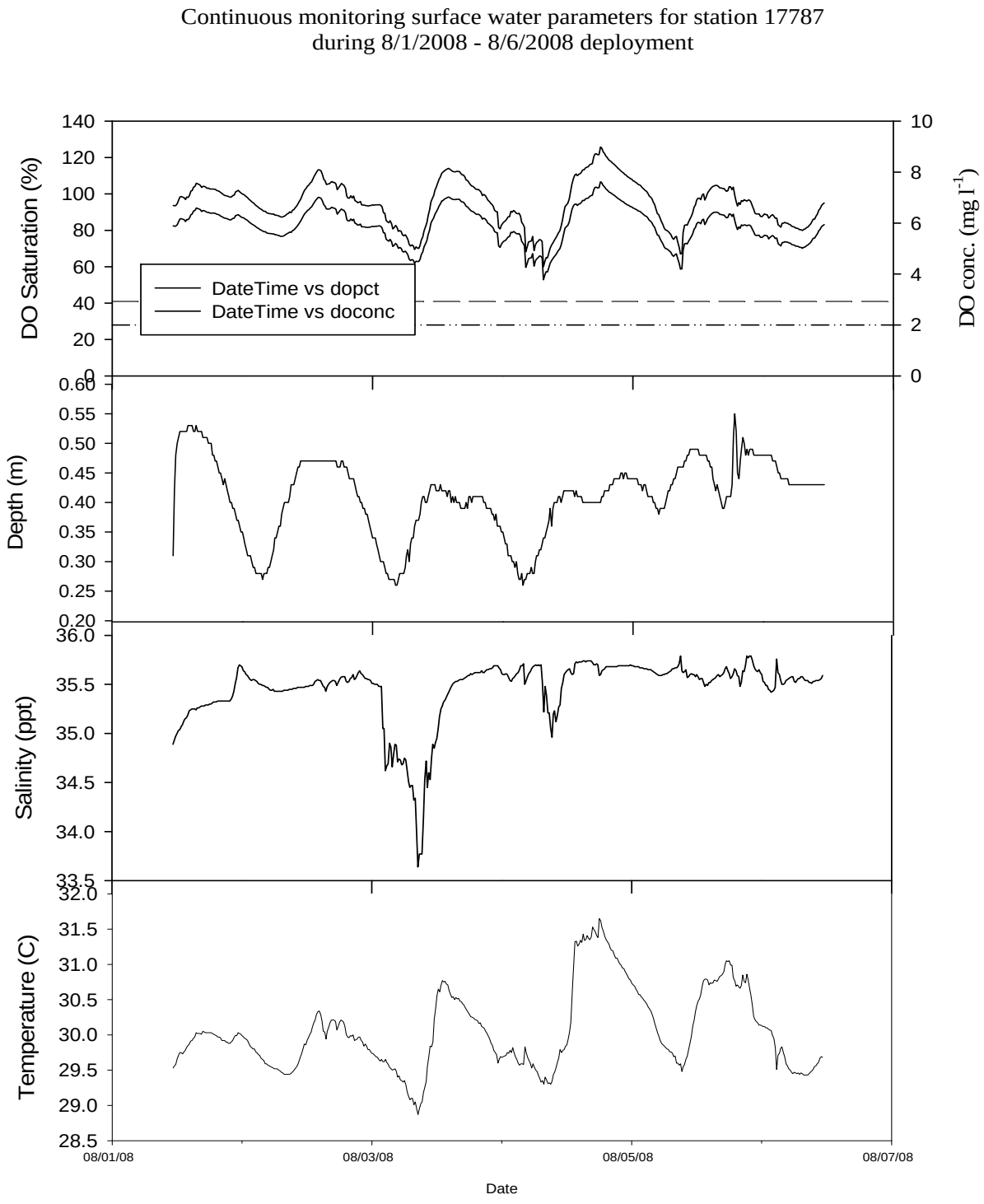

Figure D. 26 Continuous surface monitoring at station 17787 during 8/1/08 - 8/6/08 deployment.

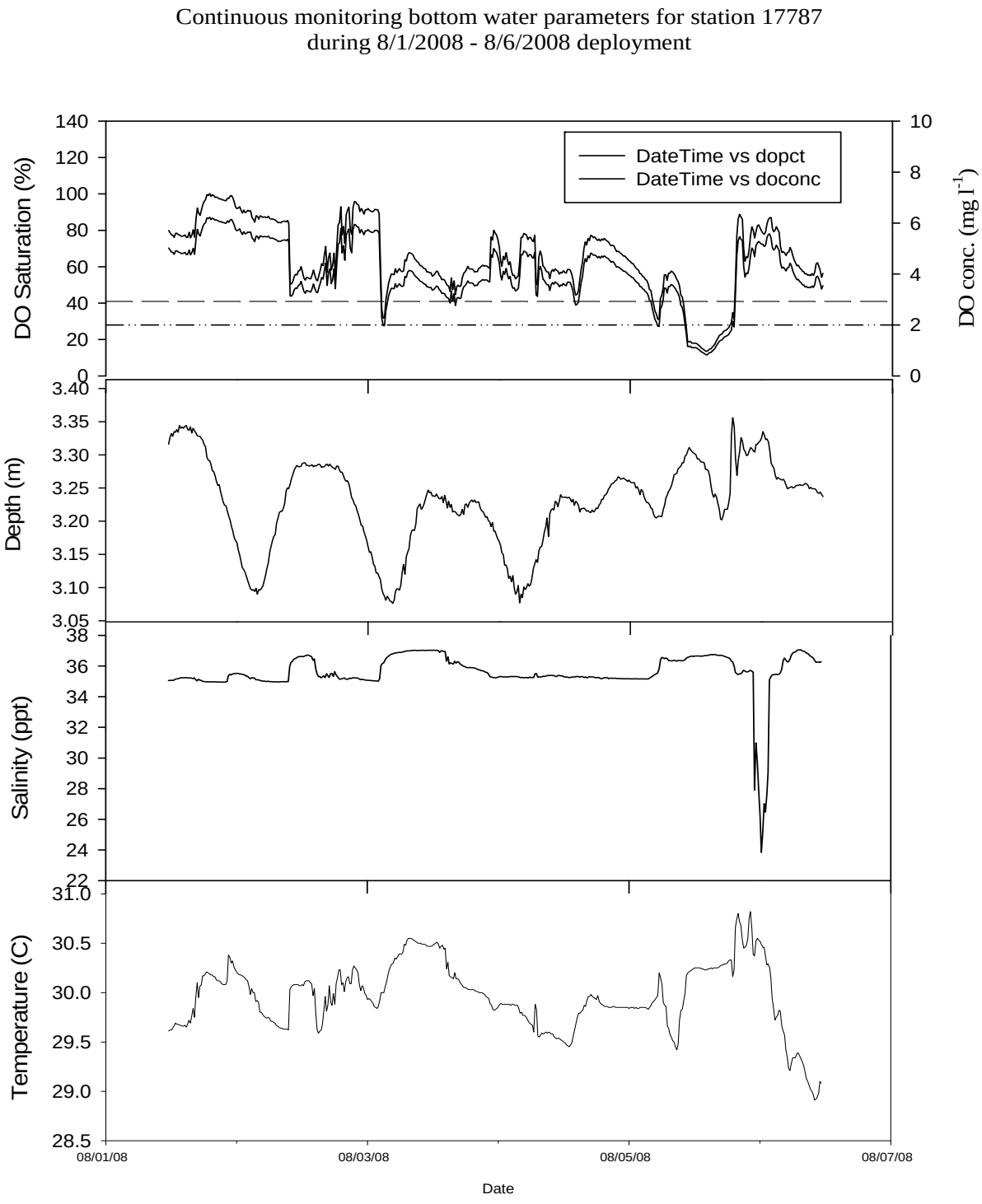

Figure D. 27 Continuous bottom monitoring at station 17787 during 8/1/08 - 8/6/08 deployment.

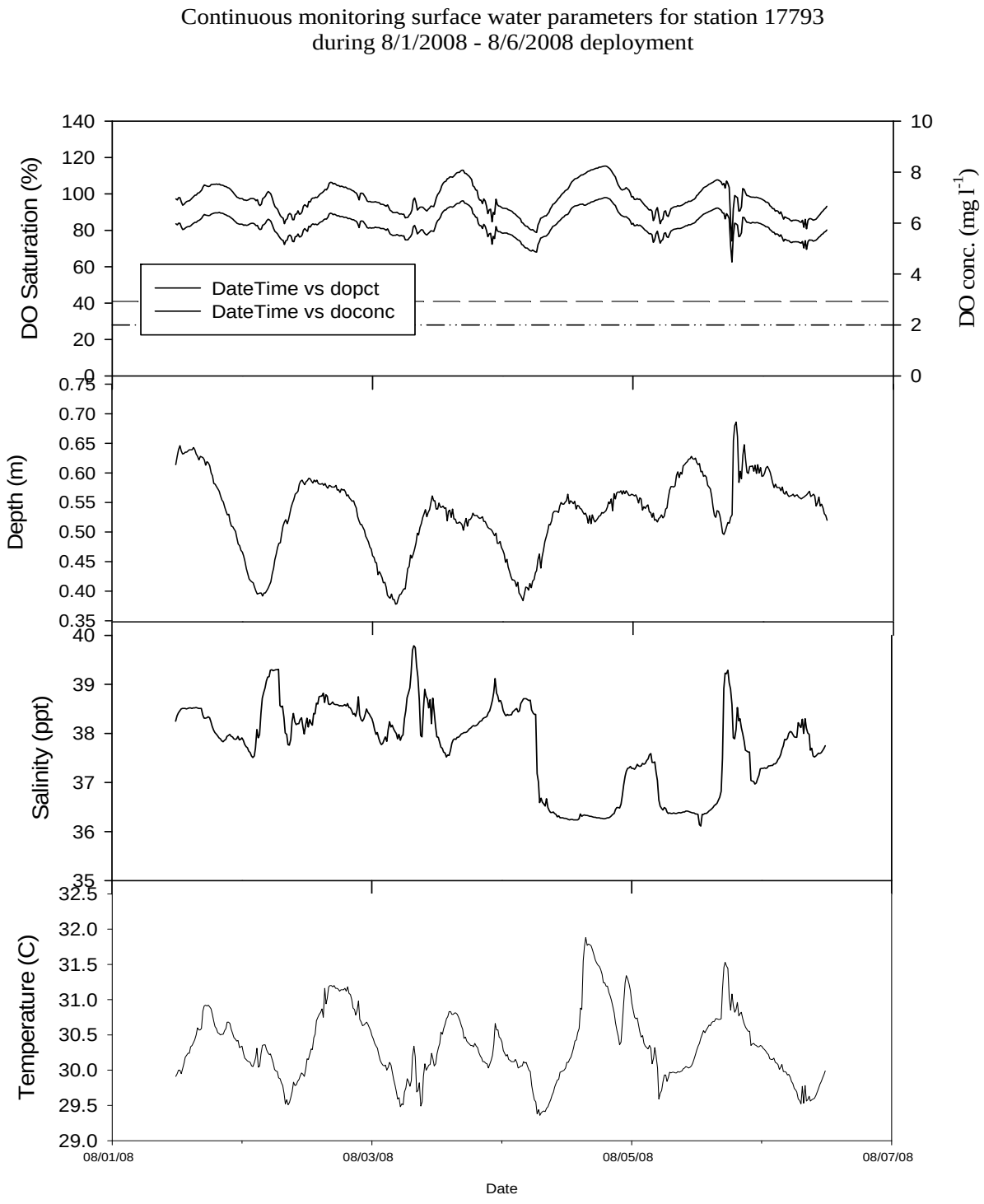

Figure D. 28 Continuous surface monitoring at station 17793 during 8/1/08 - 8/6/08 deployment

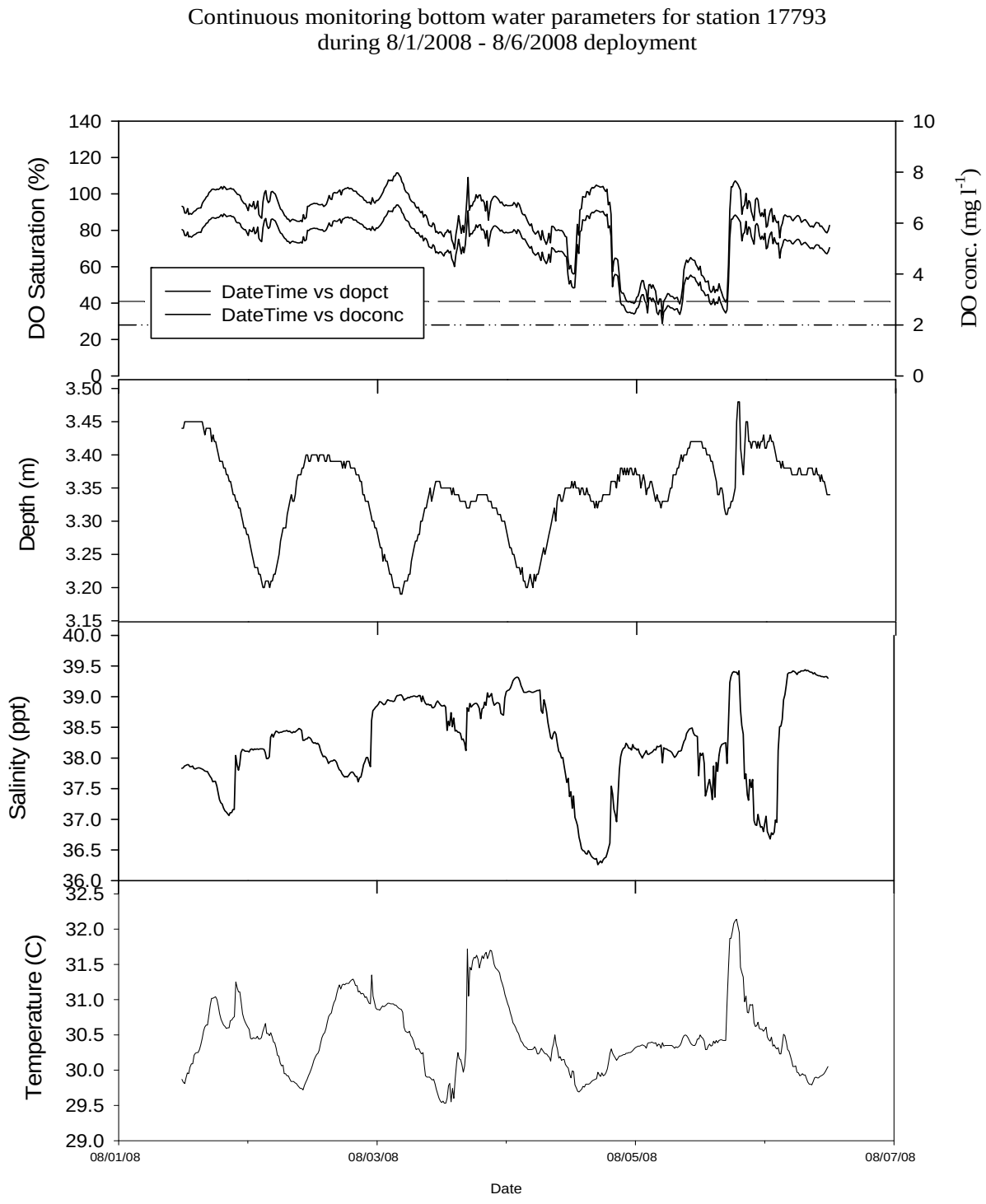

Figure D. 29 Continuous bottom monitoring at station 17793 during 8/1/08 - 8/6/08 deployment

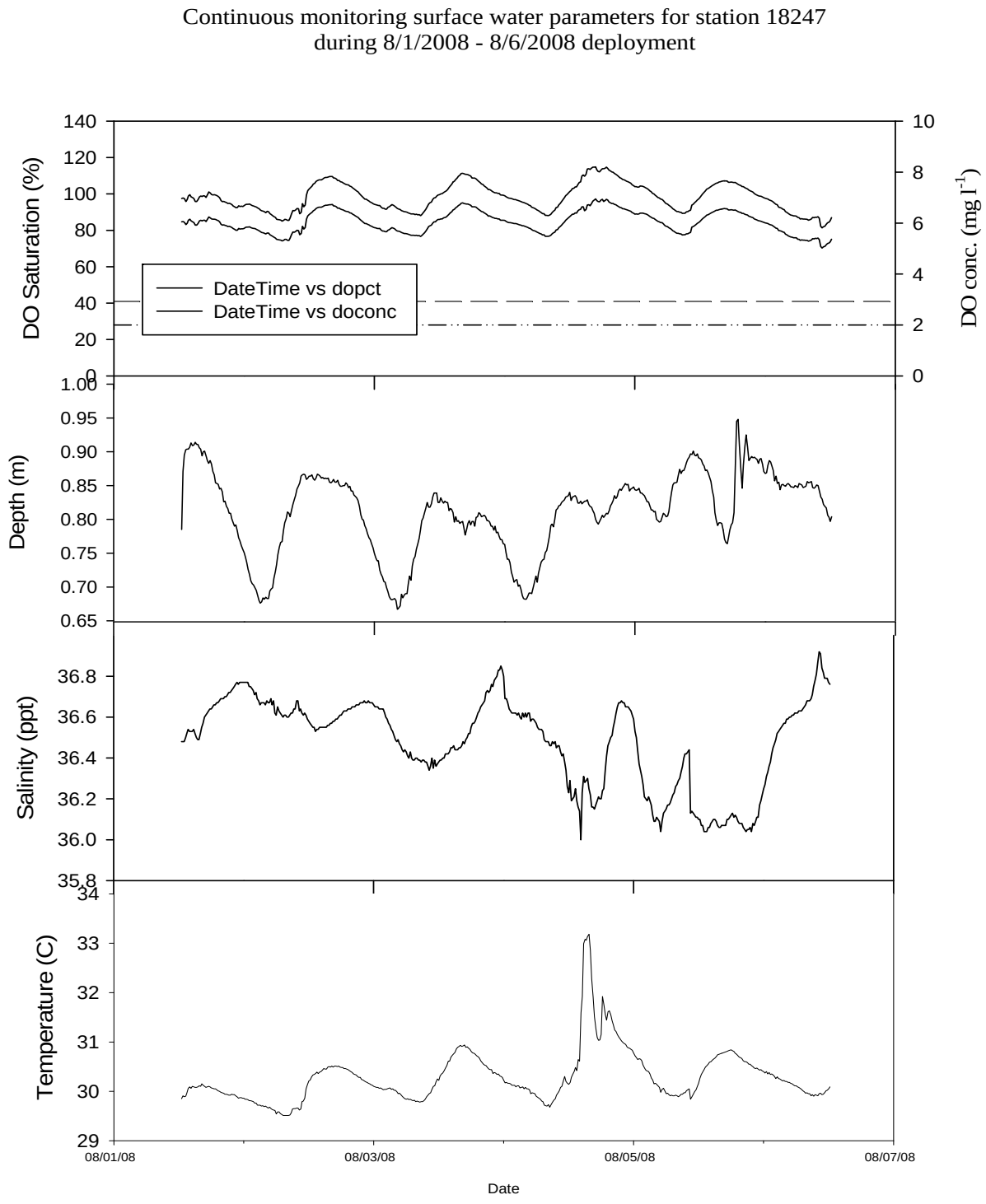

Figure D. 30 Continuous surface monitoring at station 18247 during 8/1/08 - 8/6/08 deployment

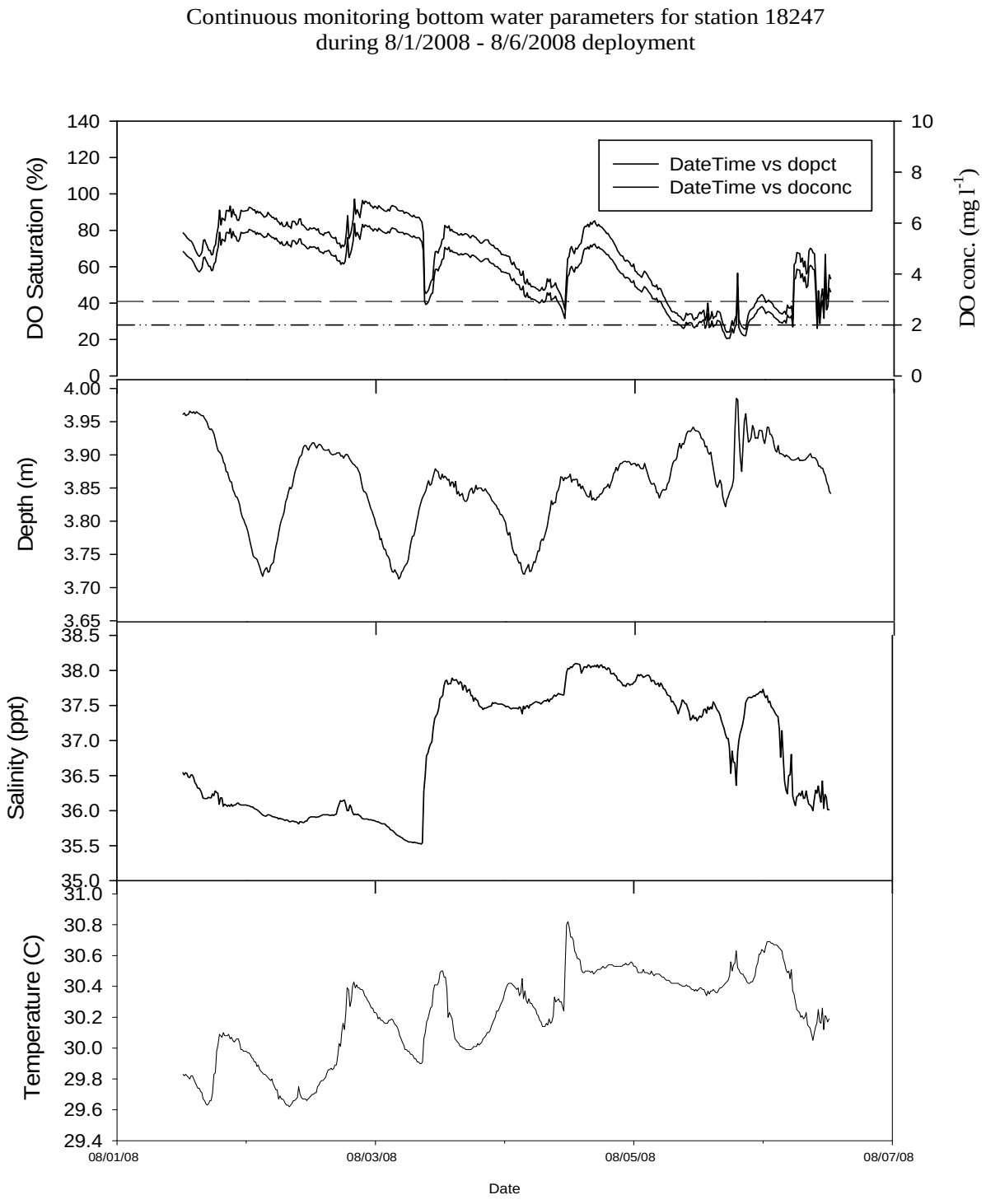

Figure D. 31 Continuous bottom monitoring at station 18247 during 8/1/08 - 8/6/08 deployment

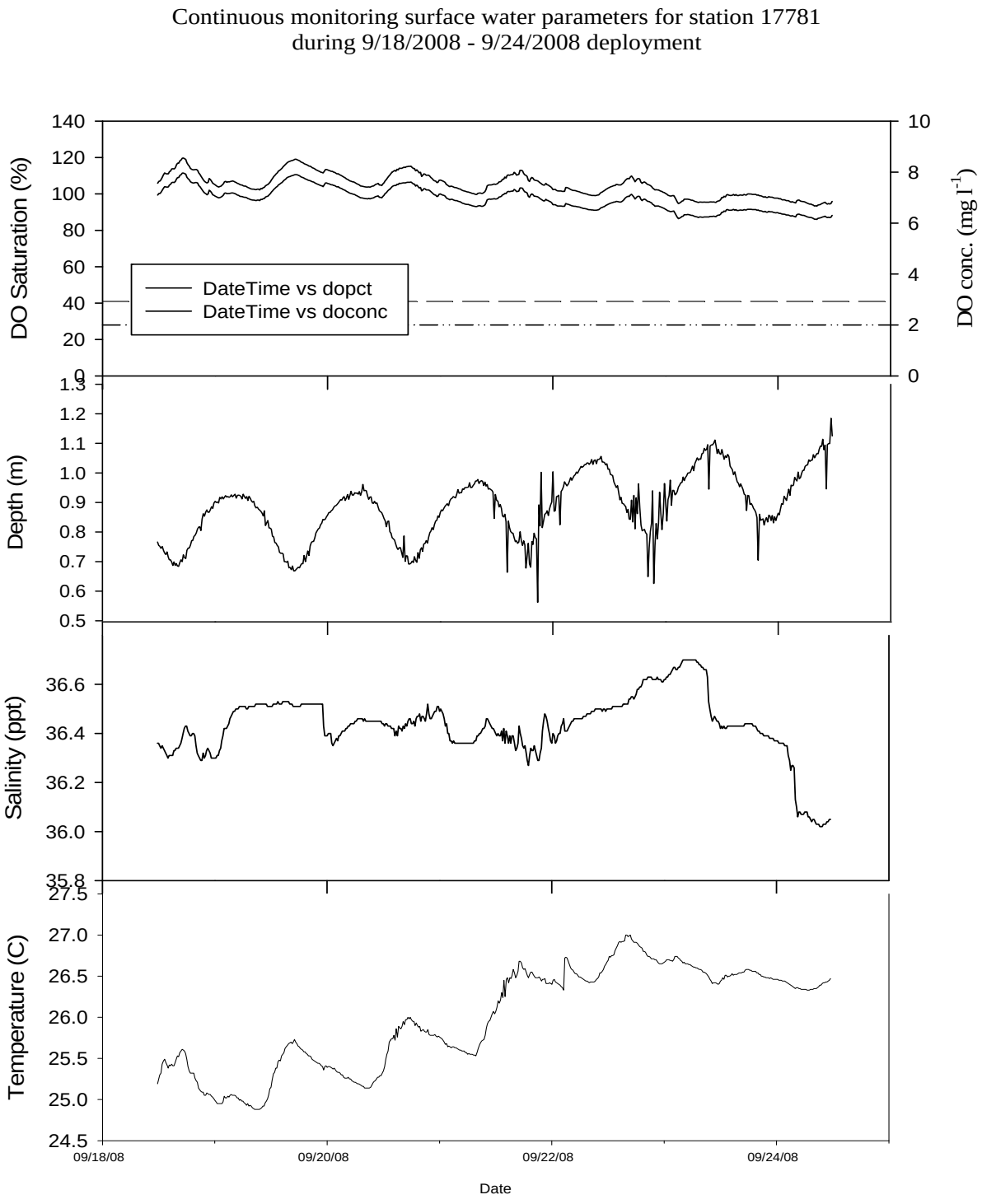

Figure D. 32 Continuous surface monitoring at station 17781 during 9/18/08 - 9/24/08 deployment.

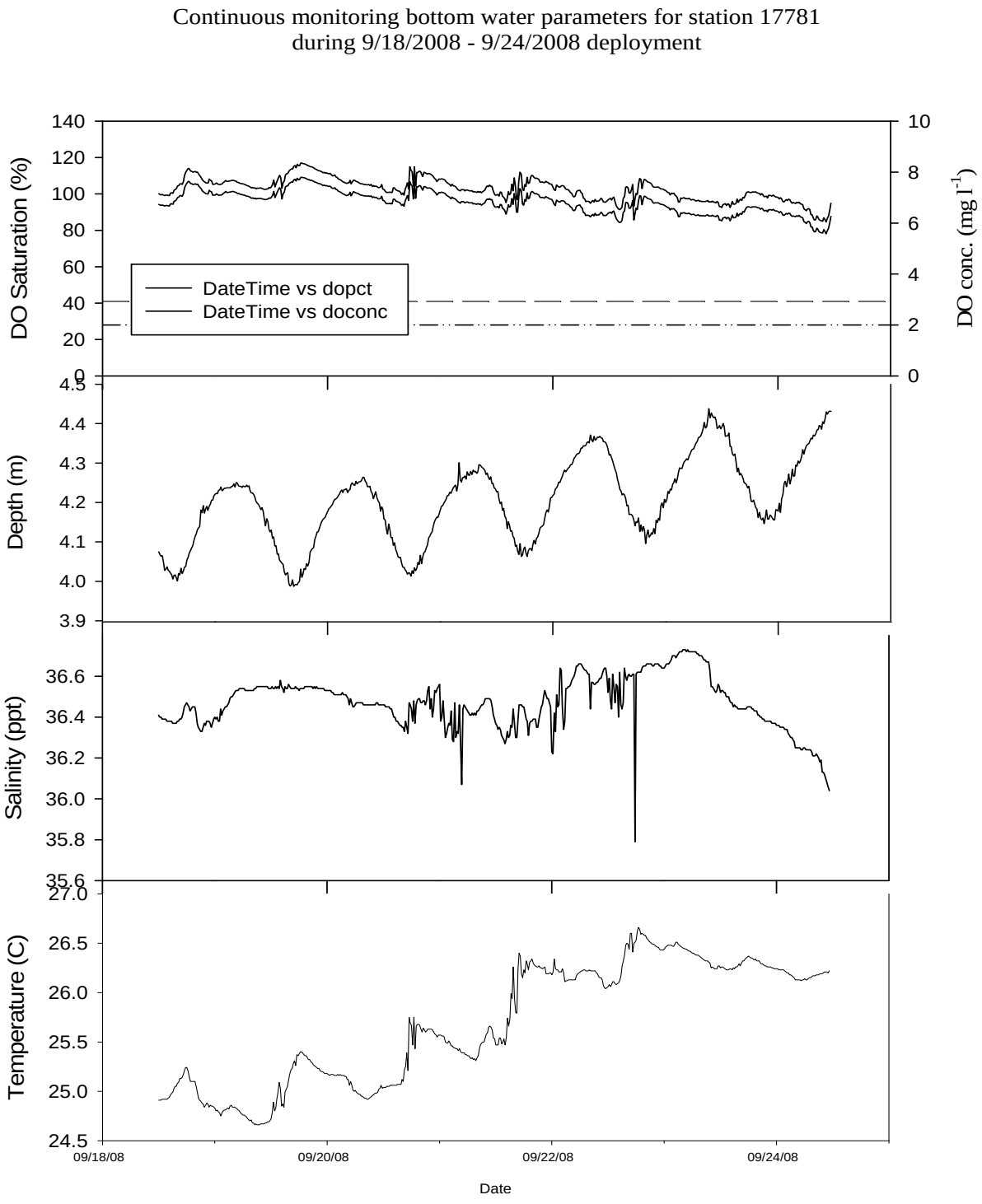

Figure D. 33 Continuous bottom monitoring at station 17781 during 9/18/08 - 9/24/08 deployment.

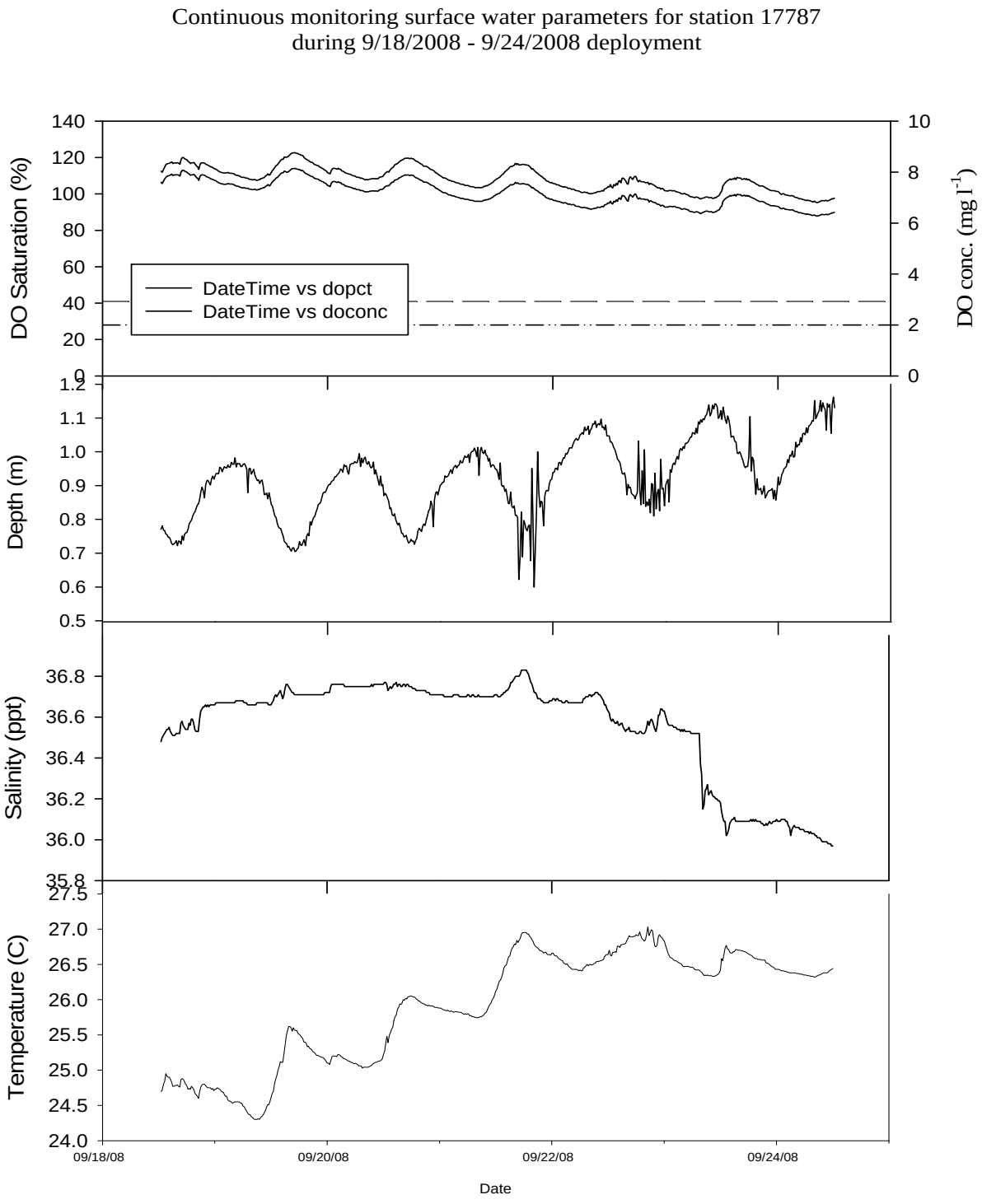

Figure D. 34 Continuous surface monitoring at station 17787 during 9/18/08 - 9/24/08 deployment.

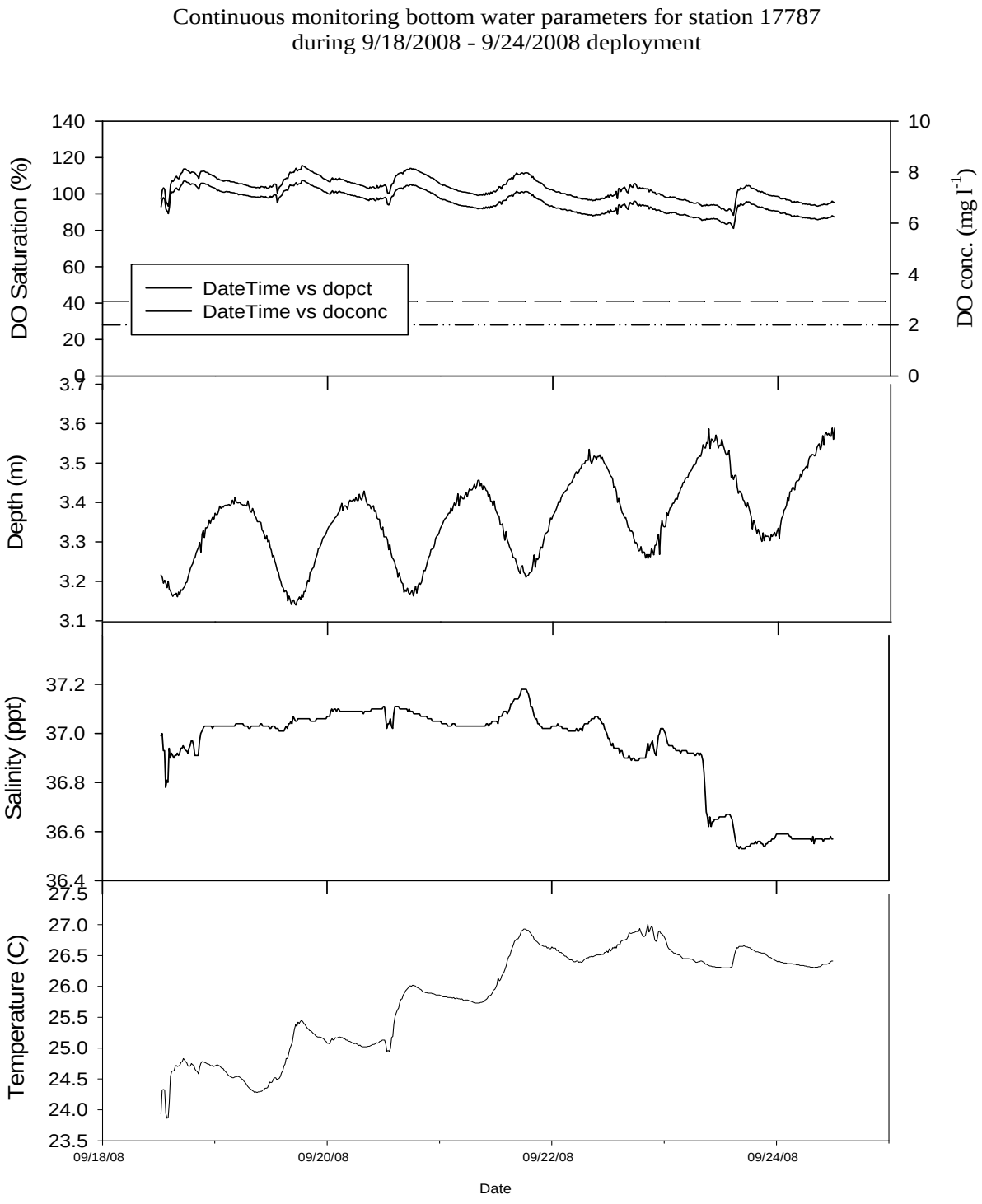

Figure D. 35 Continuous bottom monitoring at station 17787 during 9/18/08 - 9/24/08 deployment.

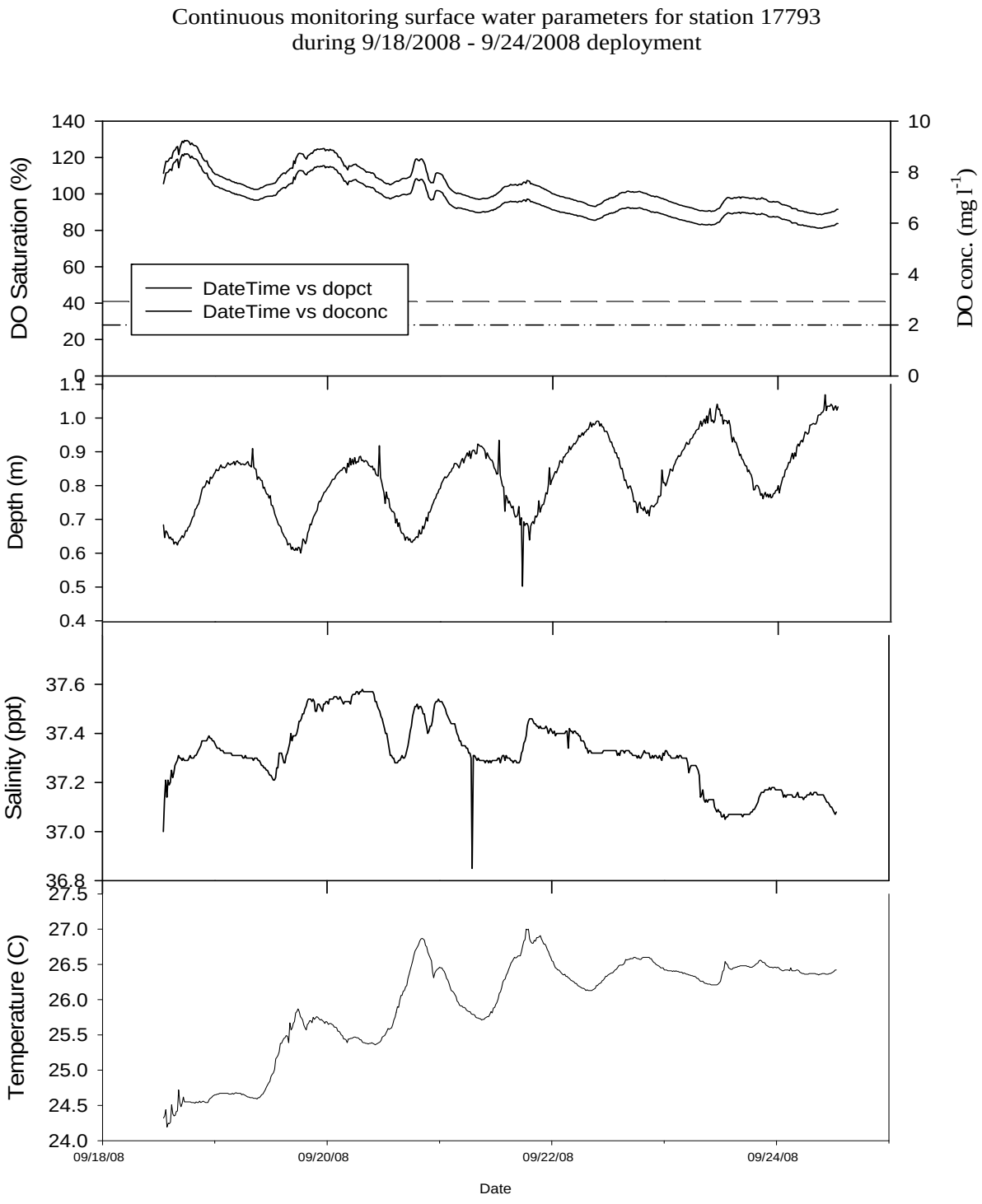

Figure D. 36 Continuous surface monitoring at station 17793 during 9/18/08 - 9/24/08 deployment.

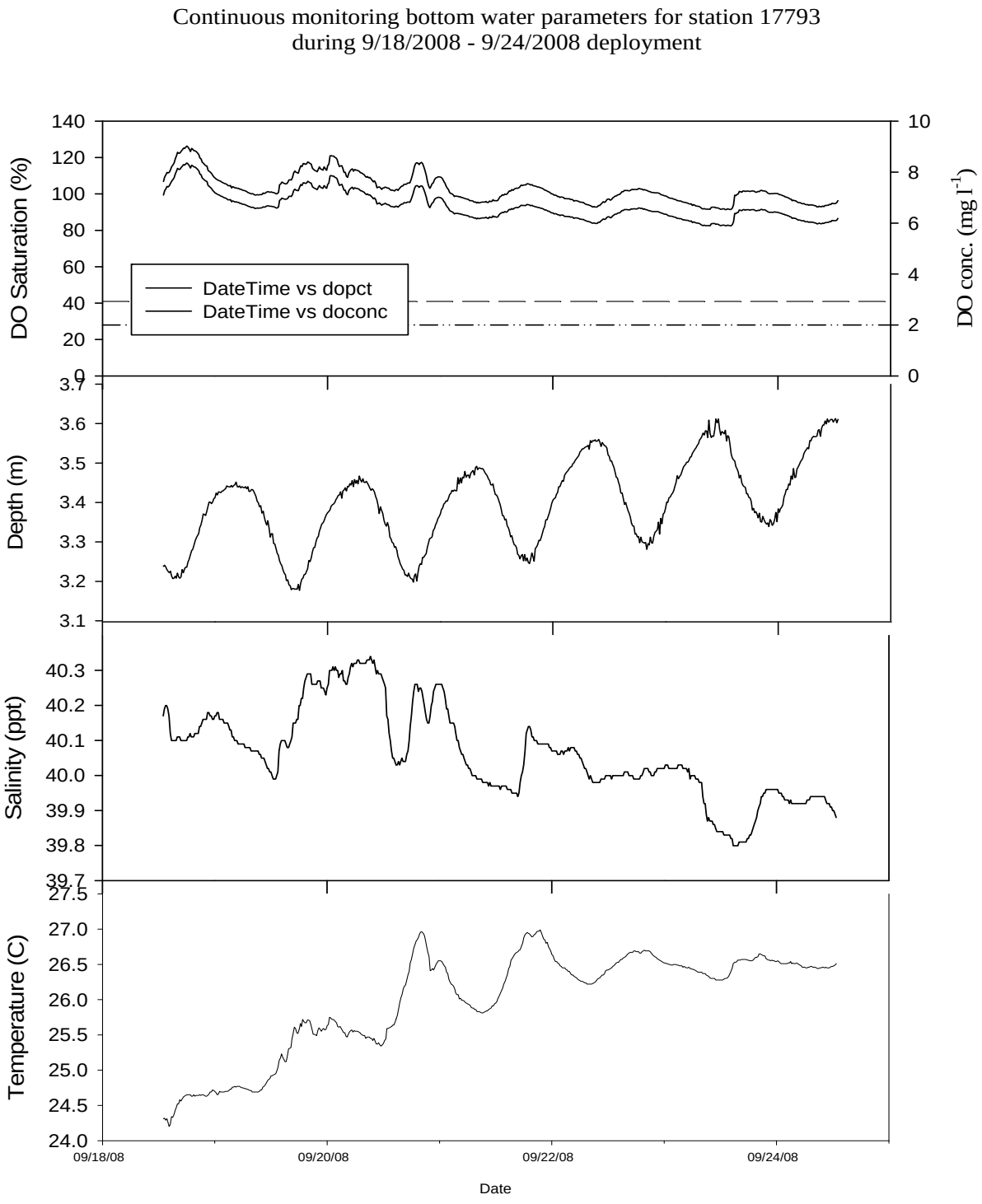

Figure D. 37 Continuous bottom monitoring at station 17793 during 9/18/08 - 9/24/08 deployment.

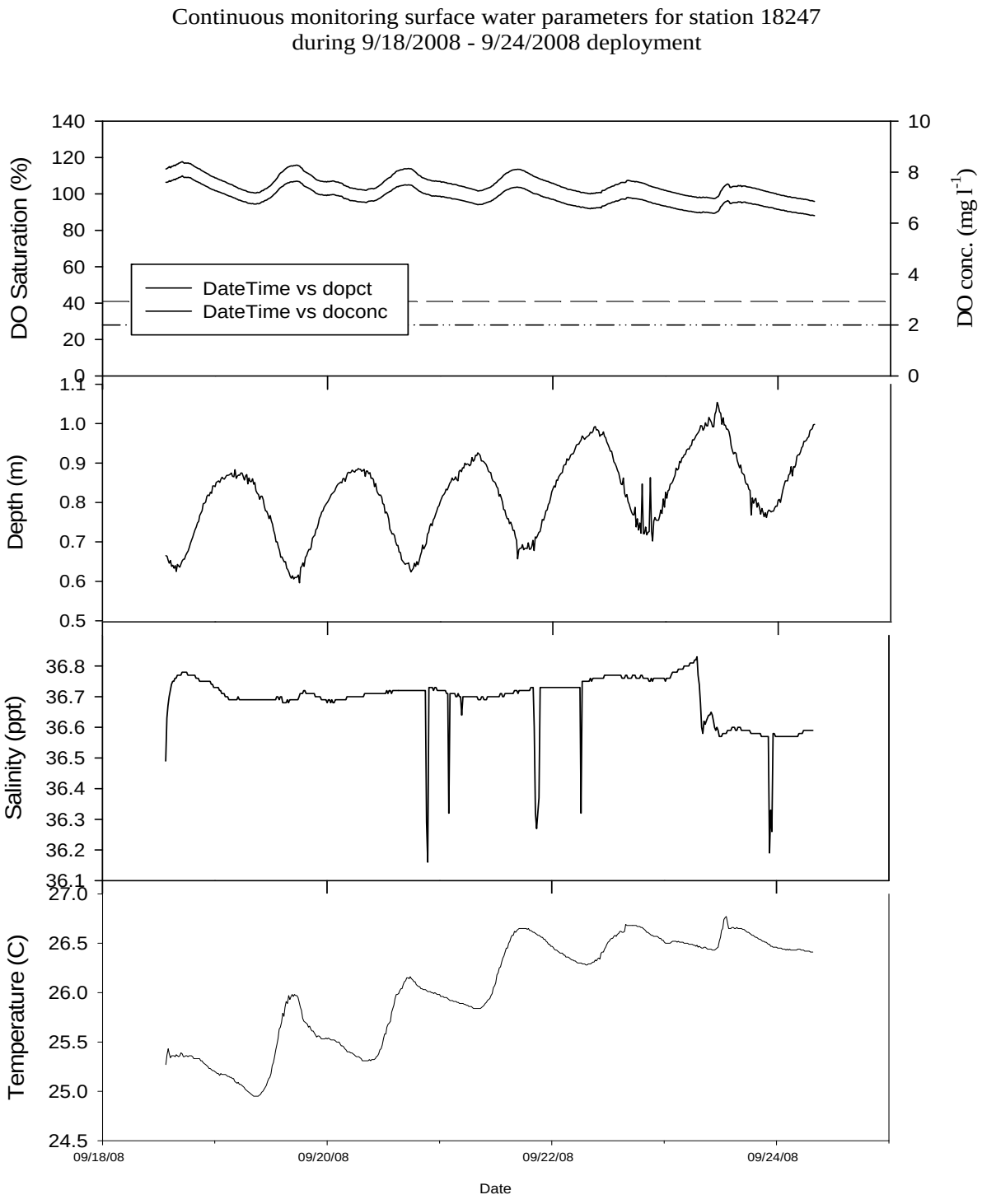

Figure D. 38 Continuous surface monitoring at station 18247 during 9/18/08 - 9/24/08 deployment.

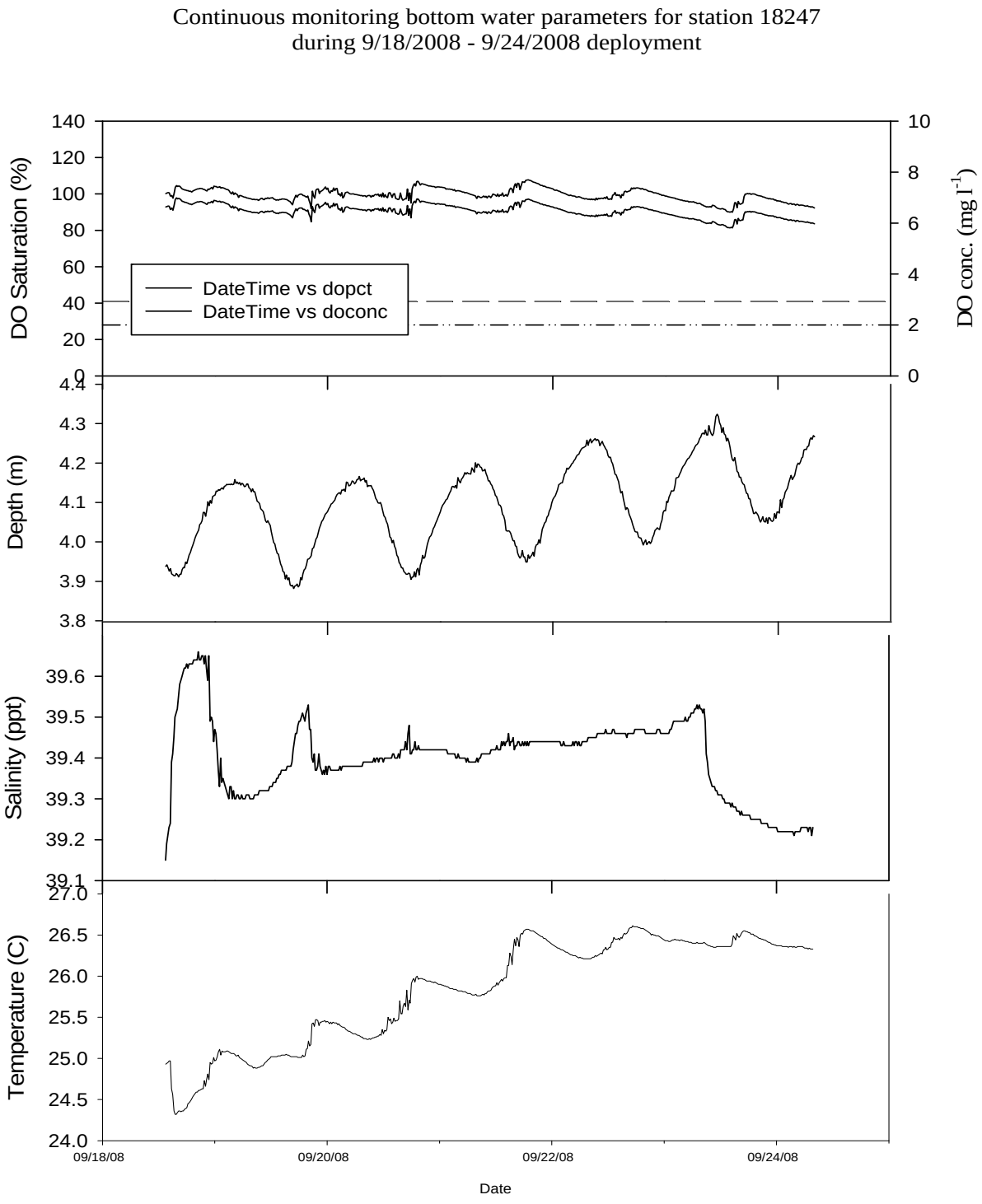

Figure D. 39 Continuous bottom monitoring at station 18247 during 9/18/08 - 9/24/08 deployment.

Appendix E

Study Station Coordinates

Station	Latitude	Longitude
10	27.71325	-97.18012
11	27.72873	-97.17373
12	27.74362	-97.16695
15	27.77310	-97.16552
16	27.76205	-97.18070
19	27.72267	-97.18978
24	27.69552	-97.20298
35	27.73167	-97.22695
39	27.71862	-97.25222
41	27.73167	-97.25777
61	27.73713	-97.20745
199	27.74556	-97.28806
202	27.74556	-97.23722
212	27.72861	-97.32489
308	27.72674	-97.29847
17781	27.73972	-97.33472
17787	27.71445	-97.29916
17793	27.70083	-97.24333
18247	27.70883	-97.22500