Kachemak Bay Research Reserve (KAC) NERR Water Quality Metadata
January - December 2008
Latest update: 12/5/2014

I. Data Set and Research Descriptors

1) Principal Investigators & Contact Persons

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2) Entry verification

Deployment data are uploaded from the YSI data logger to a Personal Computer (IBM compatible). Files are exported from EcoWatch in a comma-delimited format (.CDF) and uploaded to the CDMO where they undergo automated primary QAQC; automated depth/level corrections for changes in barometric pressure (cDepth or cLevel parameters); and become part of the CDMO's online provisional database. All pre- and post-deployment data are removed from the file prior to upload. During primary QAQC, data are flagged if they are missing or out of sensor range. The edited file is then returned to the Reserve for secondary QAQC where it is opened in Microsoft Excel and processed using the CDMO's NERRQAQC Excel macro. The macro inserts station codes, creates metadata worksheets for flagged data and summary statistics, and graphs the data for review. It allows the user to apply QAQC flags and codes to the data, remove any overlapping deployment data, append files, and export the resulting data file for upload to the CDMO. Upload after secondary QAQC results in ingestion into the database as provisional plus data, recalculation of cDepth or cLevel parameters, and finally tertiary QAQC by the CDMO and assimilation into the CDMO's authoritative online database. Where deployment overlap occurs between files, the data produced by the newly calibrated sonde is generally accepted as being the most accurate. For more information on QAQC flags and codes, see Sections 11 and 12.
Joel Markis was responsible for these tasks.

3) Research objectives

The YSI electronic data loggers are programmed to measure the water temperature, specific conductivity, dissolved oxygen, depth, pH, and turbidity conditions at 15-minute intervals. In Kachemak Bay, there are two permanent water quality monitoring stations (Homer and Seldovia), each having two data sondes. One site is located on the northeast side of the Bay at the end of the Homer Spit, and the other on the southwest side of the Bay in Seldovia. At each site, one data logger is suspended 1-meter below the surface ("Surface"), and one data logger is suspended 1-meter from the bottom ("Deep"). The

deep site is in the same location as the previous Homer Dolphin site. The Seldovia Deep site is at the previous Seldovia site. At both locations the surface sondes are horizontally within a couple meters of the deep sondes.

The circulation in Kachemak Bay is driven primarily by the 8-meter tidal flux. Regional circulation is characterized by generally cyclonic ocean currents in the Gulf of Alaska flowing onto the shelf off of Cook Inlet. Nutrient rich bottom water is upwelled and mixed with surface water. These enriched waters may enter into Kachemak Bay, the inflow tending to stay along the southern shore flowing past the Seldovia instruments, while water flowing out of the bay stays along the Inner Bay and north shore, flowing past the Homer instruments. These trapped coastal flows separate the bay into two distinct ecosystems, and the instruments are positioned to reflect this distinction. Within each system there is vertical stratification of the water. The vertical placement of the sondes is designed to help elucidate the differences in circulation of the surface and deep waters.

As the inflowing water proceeds up the bay, fresh water runoff from the surrounding ice fields and watersheds dilute the salinity and increase the sediment load in the path of the Homer instruments. The in-flowing water, in the path of the Seldovia instruments, initially supports a marine system, while the northern out-flowing water of the Homer instruments is more estuarine. The Kachemak Bay water quality instruments capture this difference with deployments along the north and south shores. These data will be used to supplement studies on primary productivity, larval distribution, settlement, recruitment, growth rates, community dynamics, and biodiversity in the bay.

4) Research methods

A Sutron Sat-Link2 transmitter was installed at the Homer Dolphin Deep (NESDIS ID # 3B00077A WQ) station on 12/13/05 and at the Seldovia Deep (NESDIS ID # 3B040240 WQ) site on 07/31/2007, and these transmitters send data to the NOAA GOES satellite. The transmissions are scheduled hourly and contain four (4) data sets reflecting fifteen minute data sampling intervals. Upon receipt by the CDMO, the data undergoes the same automated primary QAQC process detailed in Section 2 above. The "real-time" telemetry data become part of the provisional dataset until undergoing secondary and tertiary QAQC and assimilation in the CDMO's authoritative online database. Provisional and authoritative data are available at http://cdmo.baruch.sc.edu.

Both telemetered instruments are normally housed in ABS pipe mounted vertically on the ferry docks of Homer and Seldovia. The pipes are positioned to ensure that the sensors are approximately 1 meter above the bottom. However, because of ongoing issues with the Seldovia deployment apparatus, the Deep site was relocated to one meter above the bottom on the Surface site's deployment cable for the entire year.

Calibration and deployment were performed monthly using methods outlined in the YSI Operating and Service Manual. After cleaning the data loggers, the dissolved oxygen (DO) membrane is replaced and allowed to season in water-saturated air for at least 12 hours before the DO sensor is calibrated. The pH, conductivity, depth, and turbidity sensors are calibrated using the following standards purchased from YSI (except depth): pH 7 and 10, conductivity standards of 50 mS/cm, respectively, and depth of 0. Turbidity standard of 123 NTU is purchased from YSI.

A 1-point calibration curve using deionized water is used to calibrate the chlorophyll probe. The chlorophyll probe estimates the phytoplankton content in water by detecting the fluorescence from the chlorophyll, however, it is important to remember that any compounds which are present in the water sample (either in chemical or biological form), and fluoresce under the optical constraints of the sensor, will contribute to the readings. The KBRR also takes grab samples each month and uses a Turner Fluorometer 10-AU to analyze for chlorophyll content (see corresponding nutrient metadata report for more details). For the 2008 grab samples, the highest chlorophyll value was 9.5 µg/L in Homer, and 5.5 µg/L in Seldovia. From 2003-2009, the highest value encountered in a grab sample was 25 µg/L. The chlorophyll data from the sonde are reported as raw values and have not been adjusted. Values were flagged from 50-99 µg/L as being suspect and values above 100 µg/L were rejected.

5) Site location and character

Kachemak Bay is located approximately 200 kilometers south of Anchorage on the western shore of the Kenai Peninsula. Kachemak Bay, at 59.6º N and 151.5º W, is a temperate regional fjord with hydrographic conditions unique among the NERR system estuaries. The tidal range of 8-meters is among the largest in the world, and salinity ranges from near zero at stream mouths to 33.0 PSU at the entrance to the inner Bay. The bay is 35 kilometers wide at its mouth and approximately 57 kilometers long. The head of Kachemak Bay is located to the northeast at the Fox River Flats, and the mouth lies to the southwest, along a line between Anchor Point and Point Pogibshi. The 6-kilometer long Homer Spit that extends into the Bay from the northern shoreline splits Kachemak Bay into inner and outer bays. The Kachemak Bay NERR encompasses both the inner and outer bays. Water flows between the inner and outer Bays through a narrow opening formed between the Spit and the southern shoreline. The Bay has an average depth of 45-meters, and a maximum of 200-meters. Fresh water introduced primarily by the Fox, Bradley, and Martin Rivers and Sheep Creek at the head of the Bay, flows along the northwest shore of the inner Bay.

The Homer YSI data logger site is located on the north side of Kachemak Bay at 59.60203ºN and 151.40877ºW. The “deep” sonde is deployed at a depth 1 meter from the bottom, in water fluctuating between 7.5 and 16.8 meters. The “surface” data sonde is deployed at a nominal depth of 1 meter. The bottom habitat is predominantly sand. Pollutants in the area are from the excessive boat traffic at the entrance of the Homer harbor, and a nearby fish waste outfall line. Throughout the year, salinity has ranged from 20.5 to 32.0 ppt, as the instrument's location in the stratified water column is dependent on tide height, with a tidal range of 8.1 meters. It is predominately an estuarine environment during summer months when glacial runoff is highest, and during the winter months it reverts to a more marine-like system with glacial runoff at a minimum.

The Seldovia YSI data logger site is located on the south side of Kachemak Bay at 59.44091ºN, 151.72089ºW, approximately 24 kilometers southwest of the Homer site. As with the Homer site, the data loggers are situated on the ferry terminal dock, with one instrument 1 meter below the surface, and one 1 meter above the bottom, in water fluctuating between 4.3 and 13.3 meters. The access to Seldovia is limited to boat or air, as the site is located off the highway system. The bottom habitat is predominantly sand.

Pollutants in the area are minimal. Throughout the year, salinity has ranged from 25.0 to 33.9 ppt at this site with a tidal range of 8.0 meters.

6) Data collection period-

Monitoring at Homer Deep, Seldovia Deep, and Seldovia surface was continuous throughout 2008, although a data gap exists at Homer Deep from 5/14/08-5/21/08 due to sonde failure. The Homer Surface site was sampled continuously from 04/03/08 – 12/09/08, and was removed during the winter months when ice formed on the surface waters at this site. There is a data gap on 6/13/08 due to a shortage of working sondes. Deployment and retrieval dates and times for 2008 are listed below:

Station	Start Date	Start Time	End Date	End Time	Sonde ID	Comments
Homer Deep	12/6/2007	11:30	1/4/2008	10:00	Kozloff	
Homer Deep	1/4/2008	10:30	2/4/2008	10:30	Nansen	
Homer Deep	2/4/2008	11:00	2/12/2008	15:00	Neptune	Communication error
Homer Deep	2/12/2008	17:15	3/3/2008	11:00	Vitus	Replaces Neptune
Homer Deep	3/3/2008	11:30	4/3/2008	13:00	Neptune	
Homer Deep	4/3/2008	13:15	5/12/2008	11:00	Cortez	Support broke, fell to bottom on 4/26/08. Fixed on 5/7/08
Homer Deep	5/12/2008	11:30	5/14/2008	3:15	Vitus	Probe failure
Homer Deep	5/21/2008	10:00	6/11/2008	9:45	Nansen	Replaces Vitus
Homer Deep	6/11/2008	12:15	7/11/2008	5:45	Amundsen	
Homer Deep	7/11/2008	8:30	8/12/2008	9:00	Nansen	
Homer Deep	8/12/2008	9:30	9/8/2008	9:00	Cortez	
Homer Deep	9/8/2008	9:15	10/7/2008	8:45	Nansen	
Homer Deep	10/7/2008	9:00	11/10/2008	8:30	Cortez	
Homer Deep	11/10/2008	9:00	12/9/2008	11:00	Kozloff	
Homer Deep	12/9/2008	11:30	1/7/2009	12:45	Cortez	
Homer Surface	12/6/2007					Not deployed (ice)
Homer Surface	1/4/2008					Not deployed (ice)
Homer Surface	1/12/2008					Not deployed (ice)
Homer Surface	3/3/2008					Not deployed (ice)
Homer Surface	4/3/2008	14:15	5/12/2008	11:00	Calypso	
Homer Surface	5/12/2008	11:15	6/11/2008	9:15	Neptune	
Homer Surface	6/11/2008	10:00	6/12/2008	16:00	Zeus	Sonde shortage, removed and redeployed in Seldovia
Homer Surface	6/14/2008	11:45	7/11/2008	7:30	Calypso	Replace Zeus
Homer Surface	7/11/2008	8:15	8/12/2008	8:45	Zeus	
Homer Surface	8/12/2008	9:30	9/8/2008	8:45	Nautilus	
Homer Surface	9/8/2008	9:15	10/7/2008	8:30	Carson	
Homer Surface	10/7/2008	9:00	11/10/2008	8:15	Nautilus	
Homer Surface	11/10/2008	8:45	12/9/2008	10:30	Carson	Lost buoy, 11/15/08 fell to bottom
Homer Surface	12/9/2008					Not deployed (ice)

Station	Start Date	Start Time	End Date	End Time	Sonde	Comments
Seldovia Deep	12/7/2007	12:30	1/3/2008	11:30	Nansen	
Seldovia Deep	1/3/2008	12:00	2/7/2008	14:00	Vitus	
Seldovia Deep	2/7/2008	15:15	3/6/2008	11:45	Nansen	
Seldovia Deep	3/6/2008	12:15	3/31/2008	7:45	Vitus	
Seldovia Deep	3/31/2008	8:15	5/15/2008	9:45	Nansen	Sonde out of water during very low tides on 5/5/08 & 5/6/08
Seldovia Deep	5/15/2008	12:00	6/13/2008	9:45	Cortez	
Seldovia Deep	6/13//2008	10:30	7/10/2008	8:00	Nansen	
Seldovia Deep	7/10/2008	8:30	8/11/2008	9:00	Cortez	
Seldovia Deep	8/11/2008	9:30	9/9/2008	10:15	Amundsen	
Seldovia Deep	9/9/2008	10:45	10/8/2008	10:45	Kozloff	
Seldovia Deep	10/8/2008	11:15	11/11/2008	12:15	Amundsen	
Seldovia Deep	11/11/2008	12:45	12/8/2008	11:00	Cortez	
Seldovia Deep	12/8/2008	11:30	1/8/2009	11:45	Amundsen	
Seldovia Surface	12/7/2007	12:30	1/3/2008	11:30	Zeus	
Seldovia Surface	1/3/2008	12:00	2/7/2008	14:00	Cortez	
Seldovia Surface	2/7/2008	15:00	3/6/2008	11:45	Amundsen	
Seldovia Surface	3/6/2008	12:15	3/31/2008	7:45	Cortez	
Seldovia Surface	3/31/2008	8:15	5/15/2008	9:45	Amundsen	
Seldovia Surface	5/15/2008	10:15	6/13/2008	9:45	Calypso	
Seldovia Surface	6/13/2008	10:30	7/10/2008	8:15	Zeus	
Seldovia Surface	7/10/2008	8:30	8/11/2008	9:00	Kozloff	
Seldovia Surface	8/11/2008	9:30	9/9/2008	10:15	Calypso	
Seldovia Surface	9/9/2008	10:45	10/8/2008	10:45	Vitus	
Seldovia Surface	10/8/2008	11:15	11/11/2008	12:15	Calypso	
Seldovia Surface	11/11/2008	12:45	12/8/2008	11:00	Vitus	
Seldovia Surface	12/8/08	11:30	1/8/09	11:30	Nautilus	

7) Distribution

NOAA retains the right to analyze, synthesize and publish summaries of the NERRS System-wide Monitoring Program data. The NERRS retains the right to be fully credited for having collected and process the data. Following academic courtesy standards, the NERR site where the data were collected should be contacted and fully acknowledged in any subsequent publications in which any part of the data are used. The data set enclosed within this package/transmission is only as good as the quality assurance and quality control procedures outlined by the enclosed metadata reporting statement. The user bears all responsibility for its subsequent use/misuse in any further analyses or comparisons. The Federal government does not assume liability to the Recipient or third persons, nor will the Federal government reimburse or indemnify the Recipient for its liability due to any losses resulting in any way from the use of this data.

Requested citation format:
National Estuarine Research Reserve System (NERRS). 2012. System-wide Monitoring Program. Data accessed from the NOAA NERRS Centralized Data Management Office website: http://cdmo.baruch.sc.edu/; *accessed* 12 October 2012.

NERR water quality data and metadata can be obtained from the Research Coordinator at the individual NERR site (please see Principal Investigators and Contact Persons), from the Data Manager at the Centralized Data Management Office (please see personnel directory under the general information link on the CDMO home page) and online at the CDMO home page http://cdmo.baruch.sc.edu/. Data are available in comma delimited format.

8) Associated researchers and projects

The USGS, in conjunction with KBBR and the City of Homer, is conducting a sediment transport monitoring program at Munson Point in Homer. This study uses an ARGUS camera array that collects hourly images of the beach area each day. To better understand the forces associated with the sediment transport, a wave gauge is moored in 3 m MLLW of water. More information about this project can be found at http://zuma.nwra.com/homer/.

The data are being combined with hydrographic survey data to examine water exchange between Kachemak Bay and Lower Cook Inlet. The sonde data provides the temporal context while the survey data provides the spatial information.

In addition, these data complement the other concurrent System-Wide Monitoring Program modules such as meteorological and nutrient data collection.

II. Physical Structure Descriptors

9) Sensor Specifications

The Kachemak Bay NERR deployed ten 6600EDS in 2008. All sondes were deployed with Temperature/Conductivity, pH, and turbidity probes. Sondes deployed at Homer Dolphin Deep and Seldovia Deep included chlorophyll-a probes and rapid-pulse DO probes, whereas the surface sondes would alternate between rapid-pulse DO probes, or ROX probes.

YSI 6600EDS data sonde:

Parameter	Units	Sensor Type	Model	Range	Accuracy	Resolution
Temperature	Celsius (C)	Thermistor	6560	-5 to 50 °C	+/-0.15 °C	0.01 °C
Conductivity	milli-Siemens per cm (mS/cm)	4-electrode cell with autoranging	6560	0 to 100 mS/cm	+/-0.5% of reading + 0.001 mS/cm	0.001 mS/cm to 0.1 mS/cm (range dependent)
Salinity	parts per thousand (ppt)	Calculated from conductivity and temperature		0 to 70 ppt	+/- 1.0% of reading or 0.1 ppt, whichever is greater	0.01 ppt
Dissolved Oxygen %	percent air saturation (%)	Rapid Pulse – Clark type, polarographic	6562	0 to 500 % air saturation	0-200 % air saturation, +/- 2 % of the reading or 2 % air saturation, whichever is greater; 200-500 % air saturation, +/- 6 % of the reading	0.1 % air saturation
Dissolved Oxygen mg/L	milligrams per Liter (mg/L); Calculated from % air saturation, temp and salinity	Rapid Pulse – Clark type, polarographic	6562	0 to 50 mg/L	0 to 20 mg/L, +/- 2 % of the reading or 0.2 mg/L, whichever is greater; 20 to 50 mg/L, +/- 6 % of the reading	0.01 mg/L
Dissolved Oxygen %	% Saturation	Optical probe w/ mechanical cleaning	6150 ROX	0 to 500% air saturation	0-200% air saturation: +/- 1% of the reading or 1% air saturation, whichever is greater; 200-500% air saturation: +/- 15% or reading	0.1% air saturation
Dissolved Oxygen mg/L	milligrams/Liter (mg/L)	Optical probe w/ mechanical cleaning	6150 ROX	0 to 50 mg/L	0-20 mg/L: +/-0.1 mg/l or 1% of the reading, whichever is greater; 20 to 50 mg/L: +/- 15% of the reading	0.01 mg/L
Depth	feet or meters (m)	Stainless steel strain gauge		0 to 656 ft (200 m)	+/- 1 ft (0.3 m)	0.001 ft (0.001 m)
pH	units	Glass combination electrode	6561 and 6561FG	0 to 14 units	+/- 0.2 units	0.01 units
Turbidity	nephelometric turbidity units (NTU)	Optical, 90 ° scatter, with mechanical cleaning	6136	0 to 1000 NTU	+/- 2 % reading or 0.3 NTU (whichever is greater)	0.1 NTU
Chlorophyll Fluorescence	micrograms/Liter	Optical probe w/ mechanical cleaning	6025	0 to 400 µg/Liter	Dependent on methodology	0.1 µg/L chl a, 0.1% FS

The reliability of the dissolved oxygen (DO) data after 96 hours post-deployment for non-EDS (Extended Deployment System) data sondes may be problematic due to fouling which forms on the DO probe membrane during some deployments. Many reserves have upgraded to YSI 6600 EDS data sondes, which increase DO accuracy and longevity by reducing the environmental effects of fouling. The user is therefore advised to consult the metadata and to exercise caution when utilizing the DO data beyond the initial 96-hour time period. However, this potential drift is not always problematic for some uses of the data (i.e., periodicity analysis). It should be noted that the amount of fouling is site specific and that not all data are affected. The Research Coordinator at the specific NERR site should be contacted concerning the reliability of the DO data because of the site and seasonal variation in the fouling of the DO sensor. In 2008, KBNERR upgraded to all EDS sondes.

Dissolved Oxygen Qualifier (Rapid Pulse / Clark type sensor):
The reliability of dissolved oxygen (DO) data collected with the rapid pulse / Clark type sensor after 96 hours post-deployment for non-EDS (Extended Deployment System) data sondes may be problematic due to fouling which forms on the DO probe membrane during some deployments (Wenner et al. 2001). Some Reserves utilize the YSI 6600 EDS data sondes, which increase DO accuracy and longevity by reducing the environmental effects of fouling. Optical DO probes have further improved data reliability. The user is therefore advised to consult the metadata for sensor type information and to exercise caution when utilizing rapid pulse / Clark type sensor DO data beyond the initial 96-hour time period. Potential drift is not always problematic for some uses of the data, i.e. periodicity analysis. It should also be noted that the amount of fouling is very site specific and that not all data are affected. If there are concerns about fouling impacts on DO data beyond any information documented in the metadata and/or QAQC flags/codes, please contact the Research Coordinator at the specific NERR site regarding site and seasonal variation in fouling of the DO sensor.

Depth Qualifier:
The NERR System-Wide Monitoring Program utilizes YSI data sondes that can be equipped with either vented or non-vented depth/level sensors. Readings for both vented and non-vented sensors are automatically compensated for water density change due to variations in temperature and salinity; but for all non-vented depth measurements, changes in atmospheric pressure between calibrations appear as changes in water depth. The error is equal to approximately 1.03 cm for every 1 millibar change in atmospheric pressure, and is eliminated for vented sensors because they are vented to the atmosphere throughout the deployment time interval.

Beginning in 2006, NERR SWMP standard calibration protocol calls for all non-vented depth sensors to read 0 meters at a (local) barometric pressure of 1013.25 mb (760 mm/hg). To achieve this, each site calibrates their depth sensor with a depth offset number, which is calculated using the actual atmospheric pressure at the time of calibration and the equation provided in the SWMP calibration sheet or digital calibration log. This offset procedure standardizes each depth calibration for the entire NERR System. If accurate atmospheric pressure data are available, non-vented sensor depth measurements at any NERR can be corrected.

In 2010, the CDMO began automatically correcting depth/level data for changes in barometric pressure as measured by the Reserve's associated meteorological station

during data ingestion. These corrected depth/level data are reported as cDepth and cLevel, and are assigned QAQC flags and codes based on QAQC protocols. Please see sections 11 and 12 for QAQC flag and code definitions.

Salinity Units Qualifier:

In 2013, EXO sondes were approved for SWMP use and began to be utilized by Reserves. While the 6600 series sondes report salinity in parts per thousand (ppt) units, the EXO sondes report practical salinity units (psu). These units are essentially the same and for SWMP purposes are understood to be equivalent, however psu is considered the more appropriate designation. Moving forward the NERR System will assign psu salinity units for all data regardless of sonde type.

Turbidity Qualifier:

In 2013, EXO sondes were approved for SWMP use and began to be utilized by Reserves. While the 6600 series sondes report turbidity in nephelometric turbidity units (NTU), the EXO sondes use formazin nephelometric units (FNU). These units are essentially the same but indicate a difference in sensor methodology, for SWMP purposes they will be considered equivalent. Moving forward, the NERR System will use FNU/NTU as the designated units for all turbidity data regardless of sonde type. If turbidity units and sensor methodology are of concern, please see the Sensor Specifications portion of the metadata.

Chlorophyll Fluorescence Disclaimer:

YSI chlorophyll sensors (6025 or 599102-01) are designed to serve as a proxy for chlorophyll concentrations in the field for monitoring applications and complement traditional lab extraction methods; therefore, there are accuracy limitations associated with the data that are detailed in the YSI manual including interference from other fluorescent species, differences in calibration method, and effects of cell structure, particle size, organism type, temperature, and light on sensor measurements.

10) Coded variable definitions

File name definitions: Reserve/deployment site/file definition/year
(ex: kacsswq2007 = Kachemak Bay/Seldovia Surface/WaterQuality/2007).

Sampling station	Sampling site code	Station code
Homer Surface	HS	kachswq
Homer Deep	HD	kachdwq
Seldovia Surface	SS	kacsswq
Seldovia Deep	SD	kacsdwq

11) QAQC flag definitions

QAQC flags provide documentation of the data and are applied to individual data points by insertion into the parameter's associated flag column (header preceded by an F_). During primary automated QAQC (performed by the CDMO), -5, -4, and -2 flags are applied automatically to indicate data that is missing and above or below sensor range. All remaining data are then flagged 0, passing initial QAQC checks. During secondary and tertiary QAQC 1, -3, and 5 flags may be used to note data as suspect, rejected due to QAQC, or corrected.

-5 Outside High Sensor Range
-4 Outside Low Sensor Range
-3 Data Rejected due to QAQC
-2 Missing Data
-1 Optional SWMP Supported Parameter
0 Data Passed Initial QAQC Checks
1 Suspect Data
2 *Open - reserved for later flag*
3 Calculated data: non-vented depth/level sensor correction for changes in barometric pressure
4 Historical Data: Pre-Auto QAQC
5 Corrected Data

12) QAQC code definitions

QAQC codes are used in conjunction with QAQC flags to provide further documentation of the data and are also applied by insertion into the associated flag column. There are three (3) different code categories, general, sensor, and comment. General errors document general problems with the deployment or YSI datasonde, sensor errors are sensor specific, and comment codes are used to further document conditions or a problem with the data. Only one general or sensor error and one comment code can be applied to a particular data point, but some comment codes (marked with an * below) can be applied to the entire record in the F_Record column.

General Errors

GIC	No instrument deployed due to ice
GIM	Instrument malfunction
GIT	Instrument recording error; recovered telemetry data
GMC	No instrument deployed due to maintenance/calibration
GNF	Deployment tube clogged / no flow
GOW	Out of water event
GPF	Power failure / low battery
GQR	Data rejected due to QA/QC checks
GSM	See metadata

Corrected Depth/Level Data Codes

GCC	Calculated with data that were corrected during QA/QC
GCM	Calculated value could not be determined due to missing data
GCR	Calculated value could not be determined due to rejected data
GCS	Calculated value suspect due to questionable data
GCU	Calculated value could not be determined due to unavailable data

Sensor Errors

SBO	Blocked optic
SCF	Conductivity sensor failure
SDF	Depth port frozen
SDG	Suspect due to sensor diagnostics
SDO	DO suspect
SDP	DO membrane puncture
SIC	Incorrect calibration / contaminated standard
SNV	Negative value
SOW	Sensor out of water
SPC	Post calibration out of range
SQR	Data rejected due to QAQC checks
SSD	Sensor drift
SSM	Sensor malfunction
SSR	Sensor removed / not deployed
STF	Catastrophic temperature sensor failure
STS	Turbidity spike
SWM	Wiper malfunction / loss

Comments

CAB*	Algal bloom
CAF	Acceptable calibration/accuracy error of sensor
CAP	Depth sensor in water, affected by atmospheric pressure
CBF	Biofouling
CCU	Cause unknown
CDA*	DO hypoxia (<3 mg/L)
CDB*	Disturbed bottom
CDF	Data appear to fit conditions
CFK*	Fish kill
CIP*	Surface ice present at sample station
CLT*	Low tide
CMC*	In field maintenance/cleaning
CMD*	Mud in probe guard
CND	New deployment begins
CRE*	Significant rain event
CSM*	See metadata
CTS	Turbidity spike
CVT*	Possible vandalism/tampering
CWD*	Data collected at wrong depth
CWE*	Significant weather event

13) Post deployment information

Homer Deep:

Site	Deploy Date	Retrieval Date	DO (%)	Depth (m)	SpCond (50 mS/cm)	pH (7)	pH (10)	Turb (0 NTU)	Turb (123 NTU)	Chl (µg/L)	Comments
HD	12/6/2007	1/4/2008	40.5	-0.354	50.4	7.24	10.15	-2.6	**	**	DO malfunction, turbidity wiper broken; chlorophyll wiper broken; battery compartment flooded
HD	1/4/2008	2/4/2008	100.5	-0.125	50.86	7.12	10.11	0	**	0.7	
HD	2/4/2008	2/12/2008	101.6	-0.23	49.81	7.09	9.97	54	**	0.1	Communication problem; Turbidity wiper broken.
HD	2/12/2008	3/3/2008	106.9	-0.188	49.88	7	10.06	0.6	**	0.7	
HD	3/3/2008	4/3/2008	107.8	-0.055	49.29	7.12	10.13	-0.3	**	-0.2	
HD	4/3/2008	5/12/2008	101.8	-0.327	50.29	7.09	10.12	1.6	**	-0.9	Sonde fell to bottom on 4/26/08 9:30, fixed 5/7/08 12:30
HD	5/12/2008	5/21/2008		-0.008		7.13	9.75	1.5	**	-0.5	Data after 5/14/08 2:30 erroneous
HD	5/21/2008	6/11/2008	101.5	0.28	49.1	7.09	10.09	5	**	3.8	
HD	6/11/2008	7/11/2008	96.5	0.044	49.05	7.06	10.16	4.1	124.8	-0.5	
HD	7/11/2008	8/12/2008	95.6	0	50.29	7.11	10.15	-1.6	**	-3.1	
HD	8/12/2008	9/8/2008	81.7	-0.044	49.9	7.06	10.06	-0.4	**	1.2	
HD	9/8/2008	10/7/2008	98.2	-0.142	50.21	6.82	10.02	0.2	**	1.2	
HD	10/7/2008	11/10/2008	95.6	-0.351	50.81	7.07	10.07	4.5	129.4	14.6	
HD	11/10/2008	12/9/2008	99.4	-0.426	50.62	7.1	10.07	2.1	125	-0.1	
HD	12/9/2008	1/7/2009	69.2	-0.154	50.8	7	10.01	3.7	117.5	0.1	

Homer Surface:

Site	Deploy Date	Retrieval Date	DO (%)	Depth (m)	SpCond (50 mS/cm)	pH (7)	pH (10)	Turb (0 NTU)	Turb (123 NTU)	Chl (µg/L)	Comments
HS											Not deployed this month.
HS											Not deployed this month.
HS											Not deployed this month.
HS	4/3/2008	5/12/2008	89.8	-0.328	49.75	7.17	10.12	2.5	**	n/a	
HS	5/12/2008	6/11/2008	95.8	0.014	44.5	7.8	10.06	0.5	**	n/a	
HS	6/11/2008	6/12/2008	97.2	-0.009	49.75	7.14	10.05	0.8	**	n/a	
HS	6/13/2008	7/11/2008	93.3	0.038	48.35	7.03	10.05	3.7	387.2	n/a	Turbidity wiper broken
HS	7/11/2008	8/12/2008	82	-0.123	49.95	7.35	10.26	37.8	**	n/a	
HS	8/12/2008	9/8/2008	104.1	0.017	50.22	7.06	10.1	6.2	**	n/a	
HS	9/8/2008	10/7/2008	101.9	-0.129	45.24	7.15	10.07	4.9	**	n/a	
HS	10/7/2008	11/10/2008	97.3	-0.672	49.91	7.05	10	2.1	130.7	n/a	
HS	11/10/2008	12/9/2008	97.4	-0.407	50	7.14	10.19	6.4	126.4	n/a	
HS	12/9/2008	12/30/2009									Not deployed this month.

Seldovia Deep:

Site	Deploy Date	Retrieval Date	DO (%)	Depth (m)	SpCond (50 mS/cm)	pH (7)	pH (10)	Turb (0 NTU)	Turb (123 NTU)	Chl (µg/L)	Comments
SD	12/7/2007	1/3/2008	96	-0.413	49.47	7.12	10.12	0.9	**	0.2	
SD	1/3/2008	2/7/2008	101.1	-0.011	51.96	7.06	10.12	1	**	0	
SD	2/7/2008	3/6/2008	65.3	-0.425	49.31	7.11	10.15	-1.1	**	0	DO drift
SD	3/6/2008	3/31/2008	103.8	-0.034	51.02	7.06	10.05	0.6	**	0.5	
SD	3/31/2008	5/15/2008	90.4	-0.058	50.59	7.01	10.09	1	**	0.3	
SD	5/15/2008	6/13/2008	98.2	-0.009	49.41	7.15	10.21	3.4	**	1.8	
SD	6/13//2008	7/10/2008	96.3	0.015	49.56	7.11	10.14	-3	**	1.9	Turbidity probe malfunction
SD	7/10/2008	8/11/2008	99.7	-0.072	49.43	7.03	10.15	1	**	0.3	
SD	8/11/2008	9/9/2008	133.5	-0.184	49.79	7.04	10.06	1.5	119.6	1.1	DO drift
SD	9/9/2008	10/8/2008	93.3	-0.121	50.6	7.24	10.3	0.9	2.6	-72.3	Chl wiper broken
SD	10/8/2008	11/11/2008	107.8	-0.211	50	7.07	10	-2.4	**	0.7	
SD	11/11/2008	12/8/2008	95.7	-0.441	49.45	7.05	10.04	3.3	**	0.7	
SD	12/8/2008	1/8/2009	73.9	-0.18	50.9	7.01	9.98	4.8	121.9	**	

Seldovia Surface:

Site	Deploy Date	Retrieval Date	DO (%)	Depth (m)	SpCond (50 mS/cm)	pH (7)	pH (10)	Turb (0 NTU)	Turb (123 NTU)	Chl (µg/L)	Comments
SS	12/7/2007	1/3/2008	63.7	-0.435	49.8	7.05	10.04	0.3	**	n/a	
SS	1/3/2008	2/7/2008	108.7	-0.01	50.68	7.08	10.11	0.5	**	n/a	
SS	2/7/2008	3/6/2008	77	-0.435	50.2	7.19	10.27	-0.1	**	n/a	DO probe malfunction
SS	3/6/2008	3/31/2008	112.5	-0.024	51.15	7.12	10.17	2.1	**	n/a	
SS	3/31/2008	5/15/2008	96.3	0.019	49.82	7.1	10.12	-0.3	**	n/a	
SS	5/15/2008	6/13/2008	100.2	-0.001	48.76	7.02	9.98	3	**	n/a	
SS	6/13/2008	7/10/2008	96.4	0.009	49.49	7.02	10.14	1.4	**	n/a	
SS	7/10/2008	8/11/2008	105.9	-0.109	50.13	7.24	10.29	1.3	**	1.4	Accidentally deployed chl probe at surface
SS	8/11/2008	9/9/2008	50.6	-0.179	48.36	7.14	10.22	1	120.8	n/a	DO probe malfunction
SS	9/9/2008	10/8/2008	75.9	-0.12	26.16	6.94	10.02	2.1	**	n/a	SpCond malfunction; DO malfunction
SS	10/8/2008	11/11/2008	105.1	-0.201	50.16	6.98	9.95	652.6	**	n/a	Turbidity probe malfunction
SS	11/11/2008	12/8/2008		-0.44	49.68	7.02	10.04	3.6	128.5	n/a	DO probe malfunction
SS	12/8/2008	1/8/2009	99.9	-0.188	50.2	7.01	9.96	5	102.3	n/a	

14) Other remarks/notes –

Data are missing due to equipment or associated specific probes not being deployed, equipment failure, time of maintenance or calibration of equipment, or repair/replacement of a sampling station platform. Any NANs in the dataset stand for "not a number" and are the result of low power, disconnected wires, or out of range readings. If additional information on missing data is needed, contact the Research Coordinator at the reserve submitting the data.

For the Homer Deep site: On 4/26/08, the deployment tube fell from the supports and was re-attached on 5/7/08. All data during this time were rejected.

For the Homer Deep site: SpCond data during the 2/13 deployment is kind of odd. According to the logs the sonde Vitrus was used again in May and had some issues with SpCond probe at post cal. The probe was removed and not used again. We consider the data during this deployment to be suspect.

For the Homer Surface Site: On 11/15/2008 19:30 the sonde lost the buoy and sank to the bottom. All data during this time were rejected. The bouy was replaced on 12/9/2008. The replacement sonde, however, had a power malfunction, and there are no data from 12/9/08 to 12/31/08.

For the Seldovia Deep Site: From 5/15 12:00-16:45 the sonde was deployed at the wrong depth and stuck in the tube. All data during this time were marked as suspect.

For the Seldovia Deep Site: DO data from 9/9 10:45 to 12/8 11:15 does not match up well between deployment. There is nothing in field or equipment related that points to the issue. But, this data should be treated with caution and is marked suspect.

Seldovia Surface & Homer Surface sites move up and down on a cable. Sometimes the sonde gets hung-up on the cable, causing out of water or incorrect depth events. <1.0 meter and >0.1 meter data are retained and all other depths are rejected.