

* =mandatory field)

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 - **Dataset Info:**
 - **Dataset_ID*:** [TAO170W_0N_Jul2007_Aug2008](#)
 - **Submission Dates:**
 - **Initial_Submission:** [20101022](#) (YYYYMMDD)
 - **Revised_Submission:** (YYYYMMDD)
 - **Cruise Info:**
 - **Experiment:**
 - **Experiment_Name*:**
 - **Cruise:(-)**
 - **Cruise_ID:** (EXPOCODE)
 - **Section:** (Leg)
 - **Geographical_Coverage:**
 - **Geographical_Region:**
 - **Bounds:**
 - **Westernmost_Longitude:**
Enter decimal fractions of degrees:
or Degrees, Minutes, Seconds:
 - **Easternmost_Longitude:**
Enter decimal fractions of degrees: [-170.09](#) (+ = E, - = W)
or Degrees, Minutes, Seconds:
 - **Northernmost_Latitude:**
Enter decimal fractions of degrees: [-0.05](#) (+ = N, - = S)
 - **Southernmost_Latitude:**
Enter decimal fractions of degrees:
 - **Temporal_Coverage:**
 - **Start_Date:** [20070731](#) (YYYYMMDD)
 - **End_Date:** [20080813](#) (YYYYMMDD)
 - **Vessel:** [Mooring platform](#)
 - **Vessel_Name:**
 - **Vessel_ID:**
 - **Country:**
 - **Vessel_Owner:**
- **Variables Info:**
 - **Variable:**
 - **Variable_Name and Description*:**
- [xCO₂ SW \(wet\) \(umol/mol\) - Mole fraction of CO₂ in air in equilibrium with the seawater at sea surface temperature and measured humidity.](#)
- [CO₂ SW QF – Quality Flag for xCO₂ SW \(wet\).](#)
- [H₂O SW \(mmol/mol\) - Mole fraction of H₂O in air from equilibrator .](#)
- [xCO₂ Air \(wet\) \(umol/mol\) - Mole fraction of CO₂ in air from airblock, 4 feet above the sea surface at measured humidity.](#)
- [CO₂ Air QF – Quality Flag for xCO₂ Air \(wet\)](#)
- [H₂O Air \(mmol/mol\) - Mole fraction of H₂O in air from airblock, 4 feet above the sea surface.](#)

- Licor Atm Pressure (hPa) – Atmospheric pressure at the airblock, 4 feet above the sea surface
- Licor Temp (C) – Temperature of the Infrared Licor 820 in degrees Celsius
- % O₂ - The percent oxygen of the surface seawater divided by the percent oxygen of the atmosphere at 4 feet above the sea surface. Disclaimer: The oxygen measurement is made in the equilibrated air. We have found that the oxygen does not come to complete equilibrium so any rapid changes in oxygen do not get properly captured using this system. Therefore, we tend to use the oxygen data only as a qualitative sense of the biology. It is not a quantitative measure.
- SST (C) - Sea Surface Temperature collected by NOAA/PMEL/TAO provide internally recorded SST data at 10 minute resolution. The sea surface temperature collected during the equilibration period is reported in this dataset. NOAA/PMEL/TAO advises to check the TAO site at the time of use for the most accurate data available.
- Salinity - Sea Surface Salinity collected by NOAA/PMEL/TAO. Papa records conductivity data at 10 minute intervals and then computes hourly averaged salinity during post-processing. The salinity reported during the equilibration period is reported in this dataset. NOAA/PMEL/TAO advises to check the TAO site at the time of use for the most accurate data available.
- xCO₂ SW (dry) (umol/mol) – Mole fraction of CO₂ in air in equilibrium with the seawater at sea surface temperature (dry air).
- xCO₂ Air (dry) (umol/mol) – Mole fraction of CO₂ in air at the airblock, 4 feet above the sea surface (dry air).
- fCO₂ SW (sat) uatm – Fugacity of CO₂ in air in equilibrium with the seawater at sea surface temperature (100% humidity). Since the measurements are taken at the sea surface, warming calculations are not necessary.
- fCO₂ Air (sat) uatm – Fugacity of CO₂ in air at the airblock, 4 feet above the sea surface (100% humidity).
- dfCO₂ – Difference of the fugacity of the CO₂ in seawater and the fugacity of the CO₂ in air (fCO₂ SW - fCO₂ Air).

- **Method_Description:***

- **Equilibrator_Design:**

- Equilibrator_Type: (show pick list) Bubble Equilibrator
 - Equilibrator_Volume: (L) N/A
 - Water_Flow_Rate: (L/min) N/A
 - Headspace_Gas_Flow_Rate: (L/min) ~600 cc/min
 - Vented: (show pick list) Yes

- Measurement_Method: Absolute, non-dispersive infrared (NDIR) gas analyzer

- Manufacturer_of_Calibration_Gas: NOAA Earth System Research Laboratory (ESRL)

- **CO₂_Sensors:**

- **CO₂_Sensor:**

- Manufacturer: Licor
 - Model: Environmental_Control: LI-820
 - Resolution: 0.01 ppm
 - Uncertainty: < 2.5% of reading with 14 cm bench (stated)
<1.5 ppm determined in lab
 - CO₂_Sensor_Calibration: (For each calibration gas, document traceability to an internationally recognized scale, including date and place of last calibration. Include uncertainty of assigned value.)

At the beginning of each sample, the instrument self-calibrates using a zero and high standard. The zero standard is generated by cycling a small amount of air through a soda lime chamber. The high standard is from a cylinder of calibrated standard reference gas, 500.35 umol/mol, from ESRL. ESRL

standards are traceable to WMO x93 scale with a stated reproducibility of 0.06 micromole/mole.

- **Other_Sensors:**
 - Manufacturer: Oxygen Sensor
 - Model: Maxtec
 - Resolution: Max-250
 - Uncertainty: 0.01 %
 - range: $\pm 2.0\%$ Full Scale over operating temperature
 - pressure: $\pm 1.0\%$ Full Scale @ constant temperature and pressure
 - Calibration: (For each sensor of pressure, temperature, and salinity, document traceability to an internationally recognized scale, including date and place of last calibration.)
Factory calibrated before purchase. Recalibrated to sea level atmospheric air every 7 days.
- **Other_Sensors:**
 - Manufacturer: Humidity Sensor
 - Model: Sensirion
 - Resolution: SHT71
 - Uncertainty: 0.01 %
 - Measurement range: 0-100% RH
 - Absolute RH accuracy: $\pm 3\%$ RH (20-80% RH)
 - Repeatability RH: $\pm 0.1\%$ RH
 - Calibration: (For each sensor of pressure, temperature, and salinity, document traceability to an internationally recognized scale, including date and place of last calibration.)
Factory calibrated before purchase.
- Method_References: (Publication(s) describing method)

Sabine, C. (2005): High-resolution ocean and atmosphere pCO₂ time-series measurements. The State of the Ocean and the Ocean Observing System for Climate, Annual Report, Fiscal Year 2004, NOAA/OGP/Office of Climate Observation, Section 3.32a, 246–253.

- Additional Information

- All measurements are at sea surface temperature and atmospheric pressure.
- During the equilibration cycle, a closed loop of air equilibrates with seawater for 10 minutes. Once the equilibration period is complete, the pump stops and the system opens to the atmosphere allowing the pressure to equilibrate with atmospheric pressure. Measurements are recorded for 30 seconds at 2 hertz and then averaged.
- During the air cycle, fresh air is pumped through the detector for 1 minute. Once the pump stops, the system opens to the atmosphere allowing the pressure to equilibrate with atmospheric pressure. Measurements are recorded for 30 seconds at 2 hertz and then averaged.
- The gas streams for both the air cycle and equilibrator cycle are partially dried before entering the detector. The values listed as wet xCO₂ generally have relative humidity levels ranging from 40 to 80 percent. The humidity levels increase over the course of a deployment.
- Sampling occurs every 3 hours. The infrared detector is calibrated at the beginning of every sampling period. Averaged data and standard deviations for each measurement are transmitted back daily.
- To calculate the dry measurements, the water mole fraction in the Licor detector must be known. A relative humidity sensor is located immediately downstream of the detector.

- As part of the QC process, each data set is compared with the Marine Boundary Layer (MBL) data from GlobalView-CO₂. The CO₂ air data from this deployment, Jul 2007 to Aug 2008, were -1.7 ± 1.5 umol/mol on average of the MBL data and therefore no correction was applied to the data.

GLOBALVIEW-CO₂: Cooperative Atmospheric Data Integration Project - Carbon Dioxide. CD-ROM, NOAA ESRL, Boulder, Colorado [Also available on Internet via anonymous FTP to ftp.cmdl.noaa.gov, Path: ccg/co2/GLOBALVIEW], 2010

- During the QC process, an adjustment to the Licor pressure is also made based on each sensor's bias to barometric pressure as measured in the lab. For this system, the Licor pressure was adjusted by +0.1 kPa

- On 29 November 2007, the calibration gas delivery pressure decreased by 50% which caused an immediate drop of 3 umol/mol in the CO₂ data and over the course of the remaining deployment caused the detector to drift. In the lab, preliminary data returns suggested that the detector was reading 12 umol/mol low by the time it was recovered. The drift from 29 November 2007 to the end of the deployment was corrected during post-processing by lifting the data by 3 umol/mol plus the difference between the linear correlation of the drift after Nov 29 and the average of xCO₂ air measurements before Nov 29 (376.62 umol/mol). xCO₂ sw was then lifted the same amount as the air data. The correction for the last xCO₂ air measurement of the deployment was 11.8 umol/mol, so the drift correction matched what was estimated in the lab when the system was recovered. The data that was corrected for drift also followed the seasonal pattern predicted by MBL data.

- No data = -9.999 or -999

- Data_set_References: (Publication(s) describing data set) None

- Citation: (How to cite this data set) Sabine, C. 2008. High-resolution ocean and atmosphere pCO₂ time-series measurements from mooring TAO170W.

- **Data_Set_Link:**

- URL*: http://www.pmel.noaa.gov/co2/moorings/eq_pco2/eq_pco2.htm
 - Label*: PMEL CO₂ Group – TAO170W mooring

- Link_Note: (Optional instructions or remarks)(m s t)

Quality Flags definitions:

- 2 = Acceptable measurement;
- 3 = Questionable measurement;
- 4 = Bad measurement
- 5 = Not reported;
- 9 = Sample not drawn for this measurement from this bottle.

Quality Flag Log for this dataset.

Date	Measurement	Value (Dry)	Flag	Comments
9/10/2007 15:16	xCO ₂ _SW	407.5653703	4	bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
10/31/2007 12:16	xCO ₂ _SW	524.6962526	3	likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
10/31/2007 21:16	xCO ₂ _SW	518.4523639	3	likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
11/1/2007 0:16	xCO ₂ _SW	512.467911	3	likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

Time	Parameter	Value	Unit	Notes
11/22/2007 0:16	xCO2_SW	521.4666476	3	likely bad measurement due to change in equil pump
11/20/2007 21:16	xCO2_SW	578.6961325	4	bad measurement due to change in equil pump
11/21/2007 0:16	xCO2_SW	595.434615	4	bad measurement due to change in equil pump
11/21/2007 3:16	xCO2_SW	592.5112618	4	bad measurement due to change in equil pump
11/21/2007 6:16	xCO2_SW	593.6920216	4	bad measurement due to change in equil pump
11/21/2007 9:16	xCO2_SW	579.8644828	4	bad measurement due to change in equil pump
11/21/2007 12:16	xCO2_SW	575.2391852	4	bad measurement due to change in equil pump
11/21/2007 15:16	xCO2_SW	563.3933226	4	bad measurement due to change in equil pump
11/21/2007 18:16	xCO2_SW	548.8762196	4	bad measurement due to change in equil pump
11/21/2007 21:16	xCO2_SW	575.497518	4	bad measurement due to change in equil pump
11/22/2007 0:16	xCO2_SW	571.6379174	4	bad measurement due to change in equil pump
11/22/2007 3:16	xCO2_SW	581.6828243	4	bad measurement due to change in equil pump
11/22/2007 6:16	xCO2_SW	561.4929817	4	bad measurement due to change in equil pump
11/22/2007 9:16	xCO2_SW	563.4943578	4	bad measurement due to change in equil pump
11/22/2007 12:16	xCO2_SW	562.9469222	4	bad measurement due to change in equil pump
11/22/2007 15:16	xCO2_SW	543.2710807	4	bad measurement due to change in equil pump
11/22/2007 18:16	xCO2_SW	544.9596287	4	bad measurement due to change in equil pump
11/22/2007 21:16	xCO2_SW	554.1837419	4	bad measurement due to change in equil pump
11/23/2007 0:16	xCO2_SW	558.548919	4	bad measurement due to change in equil pump
11/23/2007 3:16	xCO2_SW	567.5173257	4	bad measurement due to change in equil pump
11/23/2007 6:16	xCO2_SW	564.2495239	4	bad measurement due to change in equil pump
11/23/2007 9:16	xCO2_SW	547.6894151	4	bad measurement due to change in equil pump
11/23/2007 12:16	xCO2_SW	541.1356455	4	bad measurement due to change in equil pump
11/23/2007 15:16	xCO2_SW	551.3535521	4	bad measurement due to change in equil pump
11/23/2007 18:16	xCO2_SW	542.605628	4	bad measurement due to change in equil pump
11/23/2007 21:16	xCO2_SW	555.1735271	4	bad measurement due to change in equil pump
11/24/2007 0:16	xCO2_SW	551.9508926	4	bad measurement due to change in equil pump
11/24/2007 3:16	xCO2_SW	574.3134717	4	bad measurement due to change in equil pump
11/24/2007 6:16	xCO2_SW	561.5729883	4	bad measurement due to change in equil pump

[illegible]

[illegible]

12/1/2007 15:16	xCO2_SW	528.4653927	4	bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
12/1/2007 18:16	xCO2_SW	525.5993534	4	bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
12/1/2007 21:16	xCO2_SW	524.2356645	4	bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
12/2/2007 0:16	xCO2_SW	542.1096751	4	bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
12/2/2007 3:16	xCO2_SW	545.0101331	4	bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
12/2/2007 6:16	xCO2_SW	531.7451592	4	bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
12/2/2007 9:16	xCO2_SW	508.7481427	4	bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
12/8/2007 18:16	xCO2_SW	513.3229921	4	bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
12/8/2007 21:16	xCO2_SW	517.039621	4	bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater and CO2 data submitted was adjusted by - 3 ppm b/c span calibration was off as predicted by change in Licor temperature
12/8/2007 21:16	xCO2_Air	381.4534195	3	CO2 data submitted was adjusted by - 3 ppm b/c span calibration was off as predicted by change in Licor temperature
12/9/2007 0:16	xCO2_SW	544.9413657	4	bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
12/9/2007 3:16	xCO2_SW	529.8621046	4	bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
12/9/2007 6:16	xCO2_SW	520.3220042	4	bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
12/9/2007 9:16	xCO2_SW	529.2027016	4	bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
12/9/2007 12:16	xCO2_SW	519.4809706	4	bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
12/13/2007 3:16	xCO2_SW	520.0813355	4	bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
12/14/2007 6:16	xCO2_SW	524.178363	4	bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
12/19/2007 6:16	xCO2_SW	521.1752436	4	bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
12/25/2007 0:16	xCO2_SW	503.3288597	3	likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
12/25/2007 3:16	xCO2_SW	502.4325543	3	likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
12/25/2007 6:16	xCO2_SW	491.7843782	3	likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
12/25/2007 9:16	xCO2_SW	512.1564599	3	likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
12/25/2007 12:16	xCO2_SW	496.3482681	3	likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
12/25/2007 15:16	xCO2_SW	492.1518221	3	likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
12/25/2007 18:16	xCO2_SW	500.5889636	3	likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
12/25/2007 21:16	xCO2_SW	502.3441648	3	likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
12/26/2007 0:16	xCO2_SW	515.4121745	3	likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
12/26/2007 3:16	xCO2_SW	501.5868374	3	likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

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[illegible]

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1/6/2008 3:16 xCO2_SW 545.023743 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

1/6/2008 6:16 xCO2_SW 541.4421521 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

1/6/2008 9:16 xCO2_SW 534.7049898 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

1/6/2008 12:16 xCO2_SW 532.4740417 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

1/6/2008 15:16 xCO2_SW 526.4543303 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

1/6/2008 18:16 xCO2_SW 532.161367 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

1/6/2008 21:16 xCO2_SW 533.5890216 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

1/7/2008 0:16 xCO2_SW 532.0750108 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

1/7/2008 3:16 xCO2_SW 531.4127713 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

1/7/2008 6:16 xCO2_SW 524.2946564 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

1/7/2008 9:16 xCO2_SW 524.2944037 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

1/7/2008 12:16 xCO2_SW 521.7364014 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

1/7/2008 15:16 xCO2_SW 521.5247746 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

1/7/2008 18:16 xCO2_SW 523.4142085 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

1/7/2008 21:16 xCO2_SW 528.7783153 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

1/8/2008 0:16 xCO2_SW 523.829176 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

1/8/2008 3:16 xCO2_SW 518.6674282 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

1/8/2008 6:16 xCO2_SW 516.4040512 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

1/8/2008 9:16 xCO2_SW 519.0992901 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

1/8/2008 12:16 xCO2_SW 516.8524809 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

1/8/2008 15:16 xCO2_SW 513.58751 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

1/8/2008 18:16 xCO2_SW 509.8205791 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

1/8/2008 21:16 xCO2_SW 512.4259508 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

1/9/2008 0:16 xCO2_SW 511.2661536 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

1/9/2008 3:16 xCO2_SW 506.2288095 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater and CO2 data submitted was adjusted by + 2 ppm b/c span calibration was off as predicted by change in Licor temperature

1/9/2008 3:16 xCO2_Air 381.4186647 3 CO2 data submitted was adjusted by + 2 ppm b/c span calibration was off as predicted by change in Licor temperature

1/9/2008 6:16 xCO2_SW 506.8786346 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

1/9/2008 9:16 xCO2_SW 505.6598711 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

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1/13/2008 3:16 xCO2_SW 519.9199324 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/13/2008 6:16 xCO2_SW 524.8101931 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater and CO2 data submitted was adjusted by - 2 ppm b/c span calibration was off as predicted by change in Licor temperature
 1/13/2008 6:16 xCO2_Air 383.9200439 3 CO2 data submitted was adjusted by - 2 ppm b/c span calibration was off as predicted by change in Licor temperature
 1/13/2008 9:16 xCO2_SW 521.3859694 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/13/2008 12:16 xCO2_SW 522.9276563 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/13/2008 15:16 xCO2_SW 521.3811014 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/13/2008 18:16 xCO2_SW 523.5482516 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/13/2008 21:16 xCO2_SW 526.3746577 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/14/2008 0:16 xCO2_SW 526.4303774 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/14/2008 3:16 xCO2_SW 526.8626438 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/14/2008 6:16 xCO2_SW 512.616246 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/14/2008 9:16 xCO2_SW 501.7647489 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/14/2008 12:16 xCO2_SW 521.9604286 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/14/2008 15:16 xCO2_SW 501.3925931 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/14/2008 18:16 xCO2_SW 503.2711218 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/14/2008 21:16 xCO2_SW 520.363085 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/15/2008 0:16 xCO2_SW 504.0289358 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/15/2008 3:16 xCO2_SW 505.894554 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/15/2008 6:16 xCO2_SW 521.148012 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/15/2008 9:16 xCO2_SW 496.4365463 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/15/2008 12:16 xCO2_SW 497.7726337 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/15/2008 15:16 xCO2_SW 501.9385546 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/15/2008 18:16 xCO2_SW 501.5529953 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/15/2008 21:16 xCO2_SW 499.6446679 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/16/2008 0:16 xCO2_SW 503.7282894 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/16/2008 3:16 xCO2_SW 537.1504847 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/16/2008 6:16 xCO2_SW 524.6154039 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/16/2008 9:16 xCO2_SW 526.9104019 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

1/16/2008 12:16 xCO2_SW 533.5705995 3 likely bad measurement due to change in equil
 pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/16/2008 15:16 xCO2_SW 528.1422977 3 likely bad measurement due to change in equil
 pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/16/2008 18:16 xCO2_SW 528.4059675 3 likely bad measurement due to change in equil
 pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/16/2008 21:16 xCO2_SW 526.9184667 3 likely bad measurement due to change in equil
 pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/17/2008 0:16 xCO2_SW 528.2188739 3 likely bad measurement due to change in equil pump
 pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/17/2008 3:16 xCO2_SW 511.4634951 3 likely bad measurement due to change in equil pump
 pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/17/2008 6:16 xCO2_SW 505.8723967 3 likely bad measurement due to change in equil pump
 pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/17/2008 9:16 xCO2_SW 517.5692822 3 likely bad measurement due to change in equil pump
 pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/17/2008 12:16 xCO2_SW 504.4405935 3 likely bad measurement due to change in equil
 pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/17/2008 15:16 xCO2_SW 508.6709133 3 likely bad measurement due to change in equil
 pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/17/2008 18:16 xCO2_SW 504.4946095 3 likely bad measurement due to change in equil
 pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/17/2008 21:16 xCO2_SW 509.2346422 3 likely bad measurement due to change in equil
 pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/18/2008 0:16 xCO2_SW 515.6477631 3 likely bad measurement due to change in equil pump
 pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/18/2008 3:16 xCO2_SW 520.7585254 3 likely bad measurement due to change in equil pump
 pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/18/2008 6:16 xCO2_SW 507.2307833 3 likely bad measurement due to change in equil pump
 pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/18/2008 9:16 xCO2_SW 502.1832723 3 likely bad measurement due to change in equil pump
 pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/18/2008 12:16 xCO2_SW 507.2721586 3 likely bad measurement due to change in equil
 pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/18/2008 15:16 xCO2_SW 505.4583178 3 likely bad measurement due to change in equil
 pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/18/2008 18:16 xCO2_SW 503.0860622 3 likely bad measurement due to change in equil
 pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/18/2008 21:16 xCO2_SW 502.2004314 3 likely bad measurement due to change in equil
 pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/19/2008 0:16 xCO2_SW 519.5540013 3 likely bad measurement due to change in equil pump
 pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/19/2008 3:16 xCO2_SW 524.0013533 3 likely bad measurement due to change in equil pump
 pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 1/21/2008 9:16 xCO2_SW 503.8224909 3 CO2 data submitted was adjusted by + 2 ppm b/c span
 calibration was off as predicted by change in Licor temperature
 1/21/2008 9:16 xCO2_Air 382.7590498 3 CO2 data submitted was adjusted by + 2 ppm b/c span
 calibration was off as predicted by change in Licor temperature
 1/23/2008 12:16 xCO2_SW 519.3738983 3 CO2 data submitted was adjusted by - 2 ppm b/c
 span calibration was off as predicted by change in Licor temperature
 1/23/2008 12:16 xCO2_Air 382.3703218 3 CO2 data submitted was adjusted by - 2 ppm b/c
 span calibration was off as predicted by change in Licor temperature
 2/1/2008 6:16 xCO2_SW 487.9167705 3 CO2 data submitted was adjusted by + 2 ppm b/c span
 calibration was off as predicted by change in Licor temperature
 2/1/2008 6:16 xCO2_Air 381.6008518 3 CO2 data submitted was adjusted by + 2 ppm b/c span
 calibration was off as predicted by change in Licor temperature
 2/3/2008 6:16 xCO2_SW 546.6166037 3 60 ppm increase in CO2 sw over one cycle but no clues
 that data is bad in diagnostics

2/7/2008 3:16 xCO2_SW 503.0316306 3 CO2 data submitted was adjusted by + 3 ppm b/c span calibration was off as predicted by change in Licor temperature

2/7/2008 3:16 xCO2_Air 383.0996371 3 CO2 data submitted was adjusted by + 3 ppm b/c span calibration was off as predicted by change in Licor temperature

2/11/2008 0:16 xCO2_SW 534.5161856 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

2/11/2008 3:16 xCO2_SW 535.0303312 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

2/11/2008 6:16 xCO2_SW 512.3009989 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

2/11/2008 9:16 xCO2_SW 497.7600545 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

2/11/2008 12:16 xCO2_SW 494.6757081 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

2/11/2008 15:16 xCO2_SW 499.5256466 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

2/11/2008 18:16 xCO2_SW 497.2861577 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

2/11/2008 21:16 xCO2_SW 506.7447864 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

2/12/2008 0:16 xCO2_SW 523.0111068 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

2/12/2008 3:16 xCO2_SW 544.4182337 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

2/12/2008 6:16 xCO2_SW 502.0337642 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

2/12/2008 9:16 xCO2_SW 497.6374072 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

2/12/2008 12:16 xCO2_SW 492.6964325 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

2/12/2008 15:16 xCO2_SW 494.5259927 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

2/12/2008 18:16 xCO2_SW 495.692168 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

2/12/2008 21:16 xCO2_SW 498.2930706 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

2/13/2008 0:16 xCO2_SW 508.6978237 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater and CO2 data submitted was adjusted by - 2 ppm b/c span calibration was off as predicted by change in Licor temperature

2/13/2008 0:16 xCO2_Air 384.4866142 3 CO2 data submitted was adjusted by - 2 ppm b/c span calibration was off as predicted by change in Licor temperature

2/13/2008 3:16 xCO2_SW 507.4567951 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

2/13/2008 6:16 xCO2_SW 503.3792673 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

2/13/2008 9:16 xCO2_SW 490.8146068 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

2/13/2008 12:16 xCO2_SW 494.4630979 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

2/13/2008 15:16 xCO2_SW 497.0284425 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

2/13/2008 18:16 xCO2_SW 495.2613426 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

2/13/2008 21:16 xCO2_SW 498.7323161 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

2/14/2008 0:16 xCO2_SW 521.6784511 3 likely bad measurement due to change in equil pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater

[illegible]

2/20/2008 15:16 xCO2_SW 498.8609208 3 likely bad measurement due to change in equil
 pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 2/20/2008 18:16 xCO2_SW 509.4763629 3 likely bad measurement due to change in equil
 pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 2/20/2008 21:16 xCO2_SW 516.1520406 3 likely bad measurement due to change in equil
 pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 2/21/2008 0:16 xCO2_SW 534.6674969 3 likely bad measurement due to change in equil pump
 pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 2/21/2008 3:16 xCO2_SW 532.952827 3 likely bad measurement due to change in equil pump
 pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 2/21/2008 6:16 xCO2_SW 506.9114913 3 likely bad measurement due to change in equil pump
 pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 2/21/2008 9:16 xCO2_SW 510.8296369 3 likely bad measurement due to change in equil pump
 pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 2/21/2008 12:16 xCO2_SW 500.8205013 3 likely bad measurement due to change in equil
 pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 2/21/2008 15:16 xCO2_SW 498.9052047 3 likely bad measurement due to change in equil
 pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 2/21/2008 18:16 xCO2_SW 498.9704268 3 likely bad measurement due to change in equil
 pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 2/21/2008 21:16 xCO2_SW 501.4130541 3 likely bad measurement due to change in equil
 pump pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 2/22/2008 0:16 xCO2_SW 518.9105322 3 likely bad measurement due to change in equil pump
 pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 2/22/2008 3:16 xCO2_SW 517.3151571 3 likely bad measurement due to change in equil pump
 pressure - buoy pressure readings at 300 and 500m indicate it may have been tugged or underwater
 6/8/2008 12:16 xCO2_SW 472.0640836 3 CO2 data submitted was adjusted by + 5 ppm b/c span
 calibration was off as predicted by change in Licor temperature
 6/8/2008 12:16 xCO2_Air 383.8827425 3 CO2 data submitted was adjusted by + 5 ppm b/c span
 calibration was off as predicted by change in Licor temperature
 6/9/2008 12:16 xCO2_SW 476.1266981 3 CO2 data submitted was adjusted by - 5 ppm b/c span
 calibration was off as predicted by change in Licor temperature
 6/9/2008 12:16 xCO2_Air 382.1753969 3 CO2 data submitted was adjusted by - 5 ppm b/c span
 calibration was off as predicted by change in Licor temperature
 6/13/2008 12:16 xCO2_SW 476.6632838 3 CO2 data submitted was adjusted by + 5 ppm b/c
 span calibration was off as predicted by change in Licor temperature
 6/13/2008 12:16 xCO2_Air 382.072142 3 CO2 data submitted was adjusted by + 5 ppm b/c
 span calibration was off as predicted by change in Licor temperature