

(* =mandatory field)

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- **Dataset_Info:*(-)**
 - **Dataset_ID*:** TAO140W_0_Sep04_Mar05
 - **Submission_Dates:*(-)**
 - **Initial_Submission:** 20061116 (YYYYMMDD)
 - **Revised_Submission:** (YYYYMMDD)
- **Cruise_Info:*(-)**
 - **Experiment:(-)**
 - **Experiment_Name*:**
 - **Cruise:(-)**
 - **Cruise_ID:** (EXPOCODE)
 - **Section:** (Leg)
 - **Geographical_Coverage:*(-)**
 - **Geographical_Region:**
 - **Bounds:*(-)** 124.37W 0.18S
 - **Westernmost_Longitude:**
Enter decimal fractions of degrees: -139.90W (+ = E, - = W)
or Degrees, Minutes, Seconds:
 - **Easternmost_Longitude:**
Enter decimal fractions of degrees:
or Degrees, Minutes, Seconds:
 - **Northernmost_Latitude:**
Enter decimal fractions of degrees: 0 (+ = E, - = W)
 - **Southernmost_Latitude:**
Enter decimal fractions of degrees:
 - **Temporal_Coverage:(-)**
 - **Start_Date:** 20040913 (YYYYMMDD)
 - **End_Date:** 20050301 (YYYYMMDD)
 - **Vessel:*(-)**
 - **Vessel_Name:**
 - **Vessel_ID:**
 - **Country:**
 - **Vessel_Owner:**

Platform Identifier: Mooring

Mooring Location

Longitude: Enter decimal fractions of degrees: -139.90W (+ = E, - = W)

Latitude: Enter decimal fractions of degrees: 0 (+ = E, - = W)

Start_Date: 20040913 (YYYYMMDD)

End_Date: 20050301 (YYYYMMDD)

- **Variables_Info:(-)**
 - **Variable:(-)**
 - Variable_Name*: (show pick list)
 - Description_of_Variable: (E.g., in dry air)

****General notes:**

- 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 a final step in the QC process, each data set is compared with the Marine Boundary Layer (MBL) data from GlobalView-CO₂. The data from this deployment, September 2004 to March 2005, were within 0.3 umol/mol on average of the MBL data and therefore no correction was applied.

GLOBALVIEW-CO₂: Cooperative Atmospheric Data Integration Project - Carbon Dioxide. CD-ROM, NOAA CMDL, Boulder, Colorado [Also available on Internet via anonymous FTP to ftp.cmdl.noaa.gov, Path: ccg/co2/GLOBALVIEW], 2006

Measured Information: (Variable Name/Description)

xCO₂ SW (wet) (umol/mol) - Mole fraction of CO₂ in air in equilibrium with the seawater at sea surface temperature and measured humidity.

QF – Quality Flag for xCO₂ SW (wet).

H₂O (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.

QF – Quality Flag for xCO₂ Air (wet)

H₂O (mmol/mol) - Mole fraction of H₂O in air from airblock, 4 feet above the sea surface.

Pressure of Licor (hPa) and Atm – Atmospheric pressure at the airblock, 4 feet above the sea surface

Licor Temp (C) – Temperature of the Infrared Licor 820 in degrees Celsius

% Saturation of O₂ - The percent oxygen of the surface seawater divided by the percent oxygen of the atmosphere at 4 feet above the sea surface

SST (C) - Sea Surface Temperature collected by NOAA/PMEL/TAO. Next Generation ATLAS sites provide internally recorded SST data at 10 minute resolution. The sea surface temperature collected during the equilibration period is reported in this dataset. The data presented here are not necessarily from the TAO finalized data set. The TAO Project Office 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. TAO 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. The data presented here are not necessarily from the TAO finalized data set. The TAO Project Office advises to check the TAO site at the time of use for the most accurate data available.

Derived Parameters:

x_{CO_2} SW (dry) (umol/mol) – Mole fraction of CO_2 in air in equilibrium with the seawater at sea surface temperature (dry air).

x_{CO_2} Air (dry) (umol/mol) – Mole fraction of CO_2 in air at the airblock, 4 feet above the sea surface (dry air).

f_{CO_2} SW (sat) uatm – Fugacity of CO_2 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.

f_{CO_2} Air (sat) uatm – Fugacity of CO_2 in air at the airblock, 4 feet above the sea surface (100% humidity).

df_{CO_2} – Difference of the fugacity of the CO_2 in seawater and the fugacity of the CO_2 in air (f_{CO_2} SW - f_{CO_2} 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 CMDL (now Earth System Research Laboratory (ESRL))

- **CO₂_Sensors:(-)**

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- 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, 547.19 umol/mol, from CMDL. CMDL standards are traceable to WMO x93 scale with a stated reproducibility of 0.06 micromole/mole. The standard used for this deployment was calibrated in July 2004. This cylinder is still in service and has not yet been post calibrated.

- **Other_Sensors:(-)**

- Manufacturer: Oxygen Sensor
Maxtec
 - Model: Max-250
 - Resolution: 0.01 %
 - Uncertainty: ± 2.0% Full Scale over operating temperature range
± 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 in July 2004.

- **Other_Sensors:(-)**

- Manufacturer: Humidity Sensor
Sensirion
 - Model: SHT71
 - Resolution: 0.01 %

- Uncertainty: Measurement range: 0-100% RH
Absolute. RH accuracy: +/- 3% RH (20-80% RH)
Repeatability RH: +/- 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 in July 2004.

○ 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.

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

• Citation: (How to cite this data set)

• **Data_Set_Link: (-)**

- URL*:(m s t)
- Label*:(m s t)
- 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 down for this measurement from this bottle.

Quality Flag Log for this dataset.

Date	Measurement	Value (Dry)	Flag	Comments
9/15/2004 15:18	xCO2_SW	443.2062934	4	equilibrator problem
9/15/2004 18:18	xCO2_SW	425.0148151	4	equilibrator problem
9/16/2004 3:18	xCO2_SW	418.0648408	4	equilibrator problem
9/16/2004 6:18	xCO2_SW	367.6469568	4	equilibrator problem
9/16/2004 9:18	xCO2_SW	404.4034474	4	equilibrator problem
9/19/2004 15:18	xCO2_SW	414.6845122	4	equilibrator problem
9/19/2004 18:18	xCO2_SW	401.7173102	4	equilibrator problem
9/23/2004 18:18	xCO2_SW	414.5803649	4	equilibrator problem
9/23/2004 21:18	xCO2_SW	458.1669079	4	equilibrator problem
9/26/2004 18:18	xCO2_SW	382.0779186	4	equilibrator problem
9/26/2004 21:18	xCO2_SW	369.2615023	4	equilibrator problem
9/27/2004 0:18	xCO2_SW	402.1920054	4	equilibrator problem
9/27/2004 3:18	xCO2_SW	450.1200753	3	possible equilibrator problem
9/27/2004 6:18	xCO2_SW	457.2102515	3	possible equilibrator problem
9/27/2004 9:18	xCO2_SW	443.7895409	3	possible equilibrator problem
9/27/2004 12:18	xCO2_SW	449.9727702	3	possible equilibrator problem
9/27/2004 15:18	xCO2_SW	452.6063829	3	possible equilibrator problem

9/27/2004 18:18	xCO2_SW	433.9885597	4	equilibrator problem
9/27/2004 21:18	xCO2_SW	415.2897357	4	equilibrator problem
9/28/2004 0:18	xCO2_SW	435.8516061	4	equilibrator problem
9/28/2004 3:18	xCO2_SW	450.488128	3	possible equilibrator problem
9/28/2004 6:18	xCO2_SW	454.2965594	3	possible equilibrator problem
9/28/2004 9:18	xCO2_SW	393.9210831	4	equilibrator problem
9/28/2004 12:18	xCO2_SW	433.9809982	3	possible equilibrator problem
9/28/2004 15:18	xCO2_SW	453.0766243	3	possible equilibrator problem
9/28/2004 18:18	xCO2_SW	464.6675869	3	possible equilibrator problem
9/28/2004 21:18	xCO2_SW	445.4006126	3	possible equilibrator problem
9/29/2004 0:18	xCO2_SW	433.2518963	4	equilibrator problem
9/29/2004 3:18	xCO2_SW	451.7909966	3	possible equilibrator problem
9/29/2004 6:18	xCO2_SW	455.4469655	3	possible equilibrator problem
9/29/2004 9:18	xCO2_SW	452.0662375	3	possible equilibrator problem
9/29/2004 12:18	xCO2_SW	415.4087912	4	equilibrator problem
9/29/2004 15:18	xCO2_SW	427.33914	4	equilibrator problem
9/29/2004 18:18	xCO2_SW	453.1390227	3	possible equilibrator problem
9/29/2004 21:18	xCO2_SW	423.4050176	4	equilibrator problem
9/30/2004 0:18	xCO2_SW	399.4848	4	equilibrator problem
9/30/2004 3:18	xCO2_SW	417.9064419	4	equilibrator problem
9/30/2004 6:18	xCO2_SW	446.2191085	4	equilibrator problem
9/30/2004 9:18	xCO2_SW	455.294588	4	equilibrator problem
9/30/2004 12:18	xCO2_SW	418.2041091	4	equilibrator problem
9/30/2004 15:18	xCO2_SW	402.0630781	4	equilibrator problem
9/30/2004 18:18	xCO2_SW	449.2795538	3	possible equilibrator problem
10/2/2004 3:18	xCO2_SW	438.4403127	3	possible equilibrator problem
10/2/2004 15:18	xCO2_SW	445.2149443	3	possible equilibrator problem
10/2/2004 18:18	xCO2_SW	426.0457477	3	possible equilibrator problem
10/2/2004 21:18	xCO2_SW	415.9759603	3	possible equilibrator problem
10/3/2004 0:18	xCO2_SW	443.4952125	3	possible equilibrator problem
12/13/2004 6:18	xCO2_SW	473.7530715	3	bad cal , data point is probably 6 ppm high
12/13/2004 6:18	xCO2_Air	383.5340191	3	bad cal , data point is probably 6 ppm high
12/22/2004 6:18	xCO2_SW	491.7527288	3	bad cal, data point probably 7 ppm high
12/22/2004 6:18	xCO2_Air	384.4240789	3	bad cal, data point probably 7 ppm high
12/23/2004 3:18	xCO2_SW	481.4124033	3	bad cal, data point probably 7 ppm low
12/23/2004 3:18	xCO2_Air	370.6120547	3	bad cal, data point probably 7 ppm low