

(* =mandatory field)

- **Investigator:*(-)**
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- **Dataset_Info:*(-)**
 - **Dataset_ID*:** TAO125W,0 May04-Dec04
 - **Submission_Dates:*(-)**
 - **Initial_Submission:** 20041014 (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: -124.37 (+ = E, - = W)
or Degrees, Minutes, Seconds:
 - **Easternmost_Longitude:**
Enter decimal fractions of degrees:
or Degrees, Minutes, Seconds:
 - **Northernmost_Latitude:**
Enter decimal fractions of degrees: -0.18 (+ = E, - = W)
 - **Southernmost_Latitude:**
Enter decimal fractions of degrees:
 - **Temporal_Coverage:(-)**
 - **Start_Date:** 20040508 (YYYYMMDD)
 - **End_Date:** 20041220 (YYYYMMDD)
 - **Vessel:*(-)**
 - **Vessel_Name:**
 - **Vessel_ID:**
 - **Country:**
 - **Vessel_Owner:**

Platform Identifier: Mooring

Mooring Location

Longitude: Enter decimal fractions of degrees: -124.37 (+ = E, - = W)

Latitude: Enter decimal fractions of degrees: -0.18 (+ = E, - = W)

Start_Date: 20040508 (YYYYMMDD)

End_Date: 20041220 (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 is opened 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 is opened 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 stream for both the air cycle and equilibrator cycle is 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 as 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 next the detector. The water vapor of the detector can be calculated based on the relative humidity of that sensor. In the lab, it has been determined that the temperature of the relative humidity sensor is general 0.9°C lower than the temperature of the Licor. To make these calculations, it was assumed that the temperature of the relative humidity sensor is 0.9 less than the temperature of the Licor.
- As a final step in the QC process, each data set is compared with the Marine Boundary Layer data from GlobalView-CO₂. The data from this deployment, May 2004 to December 2004, were consistently low by approximately 2.9 umol/mol. This offset was added to both the xCO₂_SW (wet) and the xCO₂ _Air (wet) measurements.

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], 2005

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. Due to the mooring being lost before recovery, only a daily average, centered around 1200 UTC is available. 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.

Sal (PSU) - Sea Surface Salinity collected by NOAA/PMEL/TAO. Due to the mooring being lost before recovery, only a daily average, centered around 1200 UTC is available. 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:

$x\text{CO}_2$ SW (dry) (umol/mol) – Mole fraction of CO_2 in air in equilibrium with the seawater at sea surface temperature (dry air).

$x\text{CO}_2$ Air (dry) (umol/mol) – Mole fraction of CO_2 in air from airblock, 4 feet above the sea surface (dry air).

$f\text{CO}_2$ 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.

$f\text{CO}_2$ Air (sat) uatm – Fugacity of CO_2 in air airblock, 4 feet above the sea surface (100% humidity).

$df\text{CO}_2$ – Difference of the fugacity of the CO_2 in seawater and the fugacity of the CO_2 in air ($f\text{CO}_2$ SW - $f\text{CO}_2$ 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 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 August 2003. No post deployment calibration was possible because the mooring was lost at sea.

○ Other_Sensors:(-)

- Manufacturer: Oxygen Sensor
- Model: Maxtec
- Resolution: Max-250
- Uncertainty: 0.01 %
± 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.)
Calibrated immediately before the deployment, May 7, 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 June 2003.

- 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
6/1/2004 9:19	xCO ₂ _SW	479.10	3	Cal error - May be ~2 ppm low
6/1/2004 9:19	xCO ₂ _Air	377.06	3	Cal error - May be ~2 ppm low
7/1/2004 3:19	xCO ₂ _SW	489.40	3	Cal error - May be 3 ppm high
7/1/2004 3:19	xCO ₂ _Air	380.10	3	Cal error - May be 3 ppm high
8/19/2004 6:19	xCO ₂ _SW	476.41	4	Cal error - 10 ppm low
8/19/2004 6:19	xCO ₂ _Air	366.94	4	Cal error - 10 ppm low
8/20/2004 6:19	xCO ₂ _SW	487.00	4	Cal error - 10 ppm high
8/20/2004 6:19	xCO ₂ _Air	386.71	4	Cal error - 10 ppm high