

Dataset Expocode	33GG20180902
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Dataset	<p>Funding Info: NOAA Climate Program Office; NOAA Ocean Acidification Program Initial Submission (yyyymmdd): 20181120 Revised Submission (yyyymmdd): 20181120</p>
Campaign/Cruise	<p>Expocode: 33GG20180902 Campaign/Cruise Name: GU1805-Leg1 Campaign/Cruise Info: AOML_SOOP_CO2, SEAMAP Fall Plankton Platform Type: CO2 Instrument Type: Equilibrator-IR or CRDS or GC Survey Type: Research Cruise Vessel Name: R/V Gordon Gunter Vessel Owner: NOAA Vessel Code: 33GG</p>
Coverage	<p>Start Date (yyyymmdd): 20180902 End Date (yyyymmdd): 20180909 Westernmost Longitude: 88.6 W Easternmost Longitude: 75.1 W Northernmost Latitude: 36.7 N Southernmost Latitude: 24.2 N Port of Call: Norfolk, VA Port of Call: Pascagoula, MS</p>
Variable	<p>Name: xCO2_EQU_ppm Unit: ppm Description: Mole fraction of CO2 in the equilibrator headspace (dry) at equilibrator temperature (ppm)</p>
Variable	<p>Name: xCO2_ATM_ppm Unit: ppm Description: Mole fraction of CO2 measured in dry outside air (ppm)</p>
Variable	<p>Name: xCO2_ATM_interpolated_ppm Unit: ppm Description: Mole fraction of CO2 in outside air associated with each water analysis. These values are interpolated between the bracketing averaged good xCO2_ATM analyses (ppm)</p>

Variable	Name: PRES_EQU_hPa Unit: hPa Description: Barometric pressure in the equilibrator headspace (hPa)
Variable	Name: PRES_ATM@SSP_hPa Unit: hPa Description: Barometric pressure measured outside, corrected to sea level (hPa)
Variable	Name: TEMP_EQU_C Unit: Degree C Description: Water temperature in equilibrator (°C)
Variable	Name: SST_C Unit: Degree C Description: Sea surface temperature (°C)
Variable	Name: SAL_permil Unit: ppt Description: Sea surface salinity on Practical Salinity Scale (o/oo)
Variable	Name: fCO2_SW@SST_uatm Unit: μ atm Description: Fugacity of CO2 in sea water at SST and 100% humidity (μ atm)
Variable	Name: fCO2_ATM_interpolated_uatm Unit: μ atm Description: Fugacity of CO2 in air corresponding to the interpolated xCO2 at SST and 100% humidity (μ atm)
Variable	Name: dfCO2_uatm Unit: μ atm Description: Sea water fCO2 minus interpolated air fCO2 (μ atm)
Variable	Name: WOCE_QC_FLAG Unit: None Description: Quality control flag for fCO2 values (2=good, 3=questionable)
Variable	Name: QC_SUBFLAG Unit: None Description: Quality control subflag for fCO2 values, provides explanation when QC flag=3
Sea Surface Temperature	Location: In engine room, about 2 m after the seachest, before the SW pumps. Manufacturer: Seabird, Inc. Model: SBE 38 Accuracy: 0.001 (°C if units not given) Precision: 0.0003 (°C if units not given) Calibration: Factory calibration Comments: Manufacturer's Resolution is taken as Precision; Maintained by ship.
Sea Surface Salinity	Location: In Chem lab, next to CO2 system Manufacturer: Seabird Model: SBE 45 Accuracy: \pm 0.005 o/oo Precision: 0.0002 o/oo Calibration: Factory calibration Comments: Manufacturer's Resolution is taken as Precision; Maintained by ship.

Atmospheric Pressure

Location: Next to the bridge, ~15 m above the sea surface water
Normalized to Sea Level: yes
Manufacturer: RMYoung
Model: 61201
Accuracy: ± 0.5 hPa (hPa if units not given)
Precision: 0.01 hPa (hPa if units not given)
Calibration: Factory calibration
Comments: Manufacturer's Resolution is taken as Precision; Maintained by ship.

Atmospheric CO₂

Measured/Frequency: Yes, 5 readings in a group every 3 hours
Intake Location: Bow mast, ~18 meters above sea surface
Drying Method: Gas stream passes through a thermoelectric condenser (~5 °C) and then through a Perma Pure (Nafion) dryer before reaching the analyzer (90% dry).
Atmospheric CO₂ Accuracy: ± 0.5 μ atm in fCO₂_ATM
Atmospheric CO₂ Precision: ± 0.01 μ atm in fCO₂_ATM

Aqueous CO₂

Equilibrator Design

System Manufacturer:
Intake Depth: 5 meters
Intake Location: Bow
Equilibration Type: Spray head above dynamic pool, no thermal jacket
Equilibrator Volume (L): 0.95 L (0.4 L water, 0.55 L headspace)
Headspace Gas Flow Rate (ml/min): 70 - 150 ml/min
Equilibrator Water Flow Rate (L/min): 1.5 - 2.0 L/min
Equilibrator Vented: Yes
Equilibration Comments: Primary equilibrator is vented through a secondary equilibrator.
Drying Method: Gas stream passes through a thermoelectric condenser (~5 °C) and then through a Perma Pure (Nafion) dryer before reaching the analyzer (90% dry).

Aqueous CO₂ Sensor Details

Measurement Method: IR
Method details: details of CO₂ sensing (not required)
Manufacturer: LI-COR
Model: 7000
Measured CO₂ Values: xco₂(dry)
Measurement Frequency: Every 140 seconds, except during calibration
Aqueous CO₂ Accuracy: ± 2 μ atm in fCO₂_SW
Aqueous CO₂ Precision: ± 0.01 μ atm in fCO₂_SW
Sensor Calibrations:

Calibration of Calibration Gases: The analyzer is calibrated every 4 hours with field standards that in turn were calibrated with primary standards that are directly traceable to the WMO X2007 scale. The zero gas is ultra-high purity air.

Number Non-Zero Gas Standards: 3

Calibration Gases:

Std 1: LL100000, 0.00 ppm, owned by AOML, used every ~4.5 hours.

Std 2: JA02140, 234.21 ppm, owned by AOML, used every ~4.5 hours.

Std 3: JA02689, 406.90 ppm, owned by AOML, used every ~4.5 hours.

Std 4: JB03276, 471.65 ppm, owned by AOML, used every ~4.5 hours.

Comparison to Other CO₂ Analyses:

Comments:

Method Reference:

Pierrot, D., C. Neil, K. Sullivan, R. Castle, R. Wanninkhof, H. Lueger, T. Johannessen, A. Olsen, R. A. Feely, and C. E. Cosca (2009), Recommendations for autonomous underway pCO₂ measuring systems and data reduction routines, Deep-Sea Res II, 56, 512-522.

Equilibrator Temperature Sensor	Location: Inserted into equilibrator ~5 cm below water level Manufacturer: Hart Model: 1521 Accuracy: 0.025 (°C if units not given) Precision: 0.001 (°C if units not given) Calibration: Factory calibration Comments: Resolution is taken as Precision.
Equilibrator Pressure Sensor	Location: Attached to equilibrator headspace. Manufacturer: Setra Model: 270 Accuracy: 0.05 (hPa if units not given) Precision: 0.015 (hPa if units not given) Calibration: Factory calibration Comments: Manufacturer's Resolution is taken as Precision.
Additional Information	Suggested QC flag from Data Provider: NA Additional Comments: The analytical system operated well during this cruise. Original Data Location: http://www.aoml.noaa.gov/ocd/ocdweb/gunter/gunter_introduction.html Full unprocessed data files from analytical instrument including flow information and ship's meteorological and TSG data at time of sampling can be obtained upon request. Citation for this Dataset: Other References for this Dataset: