Dataset Expocode	**33RR20160814**
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Dataset	**Funding Info:** NOAA Climate Program Office **Initial Submission (yyyymmdd):** 20161215 **Revised Submission (yyyymmdd):** 20161215
Campaign/Cruise	**Expocode:** 33RR20160814 **Campaign/Cruise Name:** RR1610 **Campaign/Cruise Info:** AOML_SOOP_CO2; SPURS2 **Platform Type:** **CO2 Instrument Type:** Equilibrator-IR or CRDS or GC **Survey Type:** Research Cruise **Vessel Name:** Roger Revelle **Vessel Owner:** U.S. Navy; operated by Scripps Institute of Oceanography **Vessel Code:** 33RR
Coverage	**Start Date (yyyymmdd):** 20160814 **End Date (yyyymmdd):** 20160922 **Westernmost Longitude:** 157.6 W **Easternmost Longitude:** 123.3 W **Northernmost Latitude:** 20.9 N **Southernmost Latitude:** 5.0 N **Port of Call:** Honolulu, Hawaii
Variable	**Name:** xCO2_EQU_ppm **Unit:** ppm **Description:** Mole fraction of CO2 in the equilibrator headspace (dry) at equilibrator temperature (ppm)
Variable	**Name:** xCO2_ATM_ppm **Unit:** ppm **Description:** Mole fraction of CO2 measured in dry outside air (ppm)
Variable	**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)
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: µatm
	Description: Fugacity of CO2 in sea water at SST and 100% humidity (µatm)
Variable	**Name:** fCO2_ATM_interpolated_uatm
	Unit: µatm
	Description: Fugacity of CO2 in air corresponding to the interpolated xCO2 at SST and 100% humidity (µatm)
Variable	**Name:** dfCO2_uatm
	Unit: µatm
	Description: Sea water fCO2 minus interpolated air fCO2 (µatm)
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:** Hydro Lab
	Manufacturer: Seabird
	Model: 45
	Accuracy: 0.002 (°C if units not given)
	Precision: 0.0002 (°C if units not given)
	Calibration: Factory calibration
	Comments: Manufacturer's Typical Stability is taken as Precision; Maintained by ship. A regression fit between the average temperatures measured in the Hydro Lab and the CTD surface temperatures during a prior GO-SHIP cruise was done to estimate SST. See additional comments below.
Sea Surface Salinity	**Location:** In Hydro Lab, near CO2 system
	Manufacturer: Seabird
	Model: SBE 45
	Accuracy: ± 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:** On MET mast, ~17 m above the sea surface water **Normalized to Sea Level:** yes **Manufacturer:** RMYoung **Model:** 61302V **Accuracy:** ± 0.3 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 ~4.5 hours **Intake Location:** Bow mast, ~14 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 µatm in fCO2_ATM **Atmospheric CO2 Precision:** ± 0.01 µatm in fCO2_ATM
Aqueous CO2 Equilibrator Design	**System Manufacturer:** **Intake Depth:** 5 meters **Intake Location:** Bow, or engine room sea chest (mid-ship) **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):** 1.3 - 2.5 L/min **Equilibrator Vented:** Yes **Equilibration Comments:** Primary equilibrator is vented through a secondary equilibrator. Depending on weather conditions, the inlet of the scientific seawater system was switched between the bow and engine room. **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:** 6262 **Measured CO2 Values:** xco2(dry) **Measurement Frequency:** Every 140 seconds, except during calibration **Aqueous CO2 Accuracy:** ± 2 µatm in fCO2_SW **Aqueous CO2 Precision:** ± 0.01 µatm in fCO2_SW **Sensor Calibrations:** **Calibration of Calibration Gases:** The analyzer is calibrated every 4.5 hours with field standards that in turn were calibrated with primary standards that are directly traceable to the WMO scale. The zero gas is ultra-high purity air. **Number Non-Zero Gas Standards:** 4 **Calibration Gases:** Std 1: JA02280, 233.46 ppm, owned by AOML, used every ~4.5 hours. Std 2: JA02264, 326.18 ppm, owned by AOML, used every ~4.5 hours. Std 3: JA02285, 406.06 ppm, owned by AOML, used every ~4.5 hours. Std 4: JA02646, 463.00 ppm, owned by AOML, used every ~4.5 hours. Std 5: 0.00 ppm, owned by AOML, used every ~23.5 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:** 1523 **Accuracy:** 0.015 (°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. The differential pressure reading from Setra 239, which is attached to the equilibrator headspace, is added to the pressure reading from the LICOR analyzer, which is measured by an external Setra 270 connected to the exit of the analyzer. **Manufacturer:** Setra **Model:** 270 **Accuracy:** 0.15 (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 performed fine during this cruise. Values for the ship's sensors were taken from the MET files logged by the ship. The HydroLabTSG Temp, oxygen Temp, and equilibrator Temp all tracked each other nicely. The average difference between the HydroLabTSG Temp and Equ Temp is 0.047 (+/-0.027) degC , n=15475. During a prior cruise (RR1604, I09N) the temperature data from the CTD casts and shipboard sensors were used to estimate SSTemperature. A regression fit between the average temperature measured in the Hydro Lab (HLT, average of equilibrator and TSG temperatures) and the CTD temperature (average over top 8 db) was done for all 117 casts. After eliminating eleven outlying data, the resulting second degree polynomial equation was used to estimate the SST. SST(estimated) = $0.001424*HLT^2 + 0.950053*HLT + 0.048227$; standard deviation of the differences between the CTD temperatures and the SST(estimated) was +/- 0.061 degree Celcius. The temperatures measured during this cruise fall within the range covered by the regression equation. The same temperature sensors in the hydro lab were used on both cruises. Original Data Location: http://www.aoml.noaa.gov/ocd/ocdweb/revelle/revelle_2016.html **Citation for this Dataset:** **Other References for this Dataset:**