Dataset Expocode	**WFCH20220615**
Primary Contact	**Name:** Medley, Daryin **Organization:** NOAA/AOML **Address:** 4301 Rickenbacker Causeway, Miami, Fl 33149 **Phone:** (305) 361-4375 **Email:** daryin.medley@noaa.gov
Investigator	**Name:** Wanninkhof, Rik **Organization:** NOAA/Atlantic Oceanographic & Meteorological Laboratory **Address:** 4301 Rickenbacker Causeway, Miami Fl, 33149 **Phone:** 305-361-4379 **Email:** Rik.Wanninkhof@noaa.gov
Investigator	**Name:** Pierrot, Denis **Organization:** NOAA/AOML CIMAS **Address:** 4301 Rickenbacker Causeway, Miami, Fl 33149 **Phone:** (305) 361-4441 **Email:** Denis.Pierrot@noaa.gov
Dataset	**Funding Info:** NOAA Climate Program Office; NOAA Ocean Acidification Program **Initial Submission (yyyymmdd):** 20230727 **Revised Submission (yyyymmdd):** 20230727
Campaign/Cruise	**Expocode:** WFCH20220615 **Campaign/Cruise Name:** Charcot_20220615 **Campaign/Cruise Info:** AOML_SOOP_CO2 **Platform Type:** **CO2 Instrument Type:** Equilibrator-IR or CRDS or GC **Survey Type:** SOOP_Line **Vessel Name:** Le Commandant Charcot **Vessel Owner:** Compagnie du Ponant **Vessel Code:** WFCH
Coverage	**Start Date (yyyymmdd):** 20220615 **End Date (yyyymmdd):** 20220623 **Westernmost Longitude:** 9.5 E **Easternmost Longitude:** 33.7 E **Northernmost Latitude:** 81.0 N **Southernmost Latitude:** 78.0 N **Port of Call:** Lonyearbyen, Norway
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:** In scientific sensor and pump room, before the SW pump and about 3m after the intake, which is directly through the ship's hull. **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 the ship.
Sea Surface Salinity	**Location:** Near the pCO2 System in the Wet Laboratory **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: Attached to EUCA Weather Station on deck 10, 26 m above sea level
Normalized to Sea Level: no
Manufacturer: Vaisala
Model: PTB220
Accuracy: ± 0.15 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 3.5 hours
Intake Location: Inlet on radar mast, 34m 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: 9 meters
Intake Location: Through the bottom of the hull, three decks below Wet Laboratory
Equilibration Type: Spray head above dynamic pool with 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): 2 - 3 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: 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 5 hours with field standards that in turn were calibrated with primary standards that are directly traceable to the WMO X2019 scale. Standards on the X2007 scale will be specified if used. The zero gas is ultra-high purity air.
Number Non-Zero Gas Standards: 4
Calibration Gases:

Std 1: CB10923, 305.52 ppm, owned by ESRL, used every ~5.0 hours.
Std 2: CC114995, 376.31 ppm, owned by ESRL, used every ~5.0 hours.
Std 3: CA04480, 420.54 ppm, owned by ESRL, used every ~5.0 hours.
Std 4: CB11297, 504.52 ppm, owned by ESRL, used every ~5.0 hours.
Std 5: LL100000, 0.00 ppm, owned by AOML, used every ~5.0 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: 0.0003 (°C if units not given)
Calibration: Factory calibration
Comments: Resolution is taken as Precision.

Equilibrator Pressure Sensor

Location: Attached to equilibrator headspace. Differential pressure reading from Setra 239 attached to the equilibrator headspace is added to the pressure reading from the internal LICOR pressure sensor.
Manufacturer: LI-COR
Model: 6262-03
Accuracy: 1.15 (hPa if units not given)
Precision: 0.002 (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. The seawater pump was not run while the ship was among ice. The LICOR pressure sensor showed a drift from normal operation. The LICOR pressure was estimated by subtracting 1.6 mbar from the sea surface atmospheric pressure. The offset between the LICOR and atmospheric pressures was measured during the first cruise, WFCH20220424. The XCO2 output of the LI-6262 was recalculated with the updated pressures before processing the pCO2 raw data. Original Data Location: http://www.aoml.noaa.gov/ocd/ocdweb/charcot/charcot_introduction.html Full unprocessed data files from analytical instrument including flow information and TSG data at time of sampling can be obtained upon request.
Citation for this Dataset:
Other References for this Dataset: