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Dataset Information:
Funding_Info: NOAA Climate Program Office; NOAA Ocean Acidification Program
Initial_Submission: 20150703
Revised_Submission: 20160130

Cruise Information:
Experiment Name: EX1426
Experiment Type: SOOP Line
Platform Type: Ship
CO2 Instrument Type: Equilibrator-IR or CRDS or GC
Cruise ID: 33KF20140712
Cruise Info: AOML_SOOP_CO2
Geographical Region:
Westernmost Longitude: -74.0
Easternmost Longitude: -64.5
Northernmost Latitude: 40.6
Southernmost Latitude: 32.3
Cruise Dates (YYYYMMDD)
Start_Date: 20140712
End_Date: 20140717
Ports of Call:
Bayonne, NJ
Kings Wharf, Bermuda
Vessel Name: Explorer of the Seas
Vessel ID: 33KF
Vessel Owner: Royal Caribbean International

Variables Information:
Variable Name: xCO2_EQU_ppm
Description of Variable: Mole fraction of CO2 in the equilibrator headspace (dry) at equilibrator temperature
Unit of Variable: ppm

Variable Name: xCO2_ATM_ppm
Description of Variable: Mole fraction of CO2 measured in dry outside air (ppm)
Unit of Variable: ppm

Variable Name: xCO2_ATM_interpolated_ppm
Description of Variable: 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)
Unit of Variable: ppm

Variable Name: PRES_EQU_hPa
Description of Variable: Barometric pressure in the equilibrator headspace (hectopascals)
Unit of Variable: hPa

Variable Name: PRES_ATM@SSP_hPa
Description of Variable: Barometric pressure measured outside, corrected to sea level (hectopascals)
Unit of Variable: hPa

Variable Name: TEMP_EQU_C
Description of Variable: Water temperature in equilibrator (degrees Celsius)
Unit of Variable: Degree C

Variable Name: SST_C
Description of Variable: Sea surface temperature (degrees Celsius)
Unit of Variable: Degree C

Variable Name: SAL_permil
Description of Variable: Sea surface salinity on Practical Salinity Scale (permil)
Unit of Variable: ppt

Variable Name: fCO2_SW@SST_uatm
Description of Variable: Fugacity of CO2 in sea water at SST and 100% humidity (microatmospheres)
Unit of Variable: μatm

Variable Name: fCO2_ATM_interpolated_uatm
Description of Variable: Fugacity of CO2 in air corresponding to the interpolated xCO2 at SST and 100% humidity (microatmospheres)
Unit of Variable: μatm

Variable Name: dfCO2_uatm
Description of Variable: Sea water fCO2 minus interpolated air fCO2 (microatmospheres)
Unit of Variable: μatm

Variable Name: WOCE_QC_FLAG
Description of Variable: Quality control flag for fCO2 values (2=good, 3=questionable)
Unit of Variable: None

Variable Name: QC_SUBFLAG
Description of Variable: Quality control subflag for fCO2 values, provides explanation when QC flag=3
Unit of Variable: None

Method Description:

Equilibrator Design:
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth of Seawater Intake</td>
<td>5 meters</td>
</tr>
<tr>
<td>Location of Seawater Intake</td>
<td>Forward port side, just above the bow thruster tunnel</td>
</tr>
<tr>
<td>Equilibrator Type</td>
<td>Sprayhead above dynamic pool, with thermal jacket</td>
</tr>
<tr>
<td>Equilibrator Volume</td>
<td>0.95 L (0.4 L water, 0.55 L headspace)</td>
</tr>
<tr>
<td>Water Flow Rate</td>
<td>1.5 - 2.5 L/min</td>
</tr>
<tr>
<td>Headspace Gas Flow Rate</td>
<td>70 - 150 ml/min</td>
</tr>
<tr>
<td>Vented</td>
<td>Yes</td>
</tr>
<tr>
<td>Drying Method for CO2 in Water</td>
<td>Gas stream passes through a thermoelectric condenser (~5 °C) and then through a Perma Pure (Nafion) dryer before reaching the analyzer (90% dry).</td>
</tr>
<tr>
<td>Additional Information</td>
<td>Primary equilibrator is vented through a secondary equilibrator</td>
</tr>
</tbody>
</table>

**CO2 in Marine Air:**

- **Measurement:** Yes, 5 readings in a group every 3.2 hours
- **Location and Height:** On bow mast at ~20 meters above the 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).

**CO2 Sensor:**

- **Measurement Method:** Infrared absorption of dry sample gas
- **Manufacturer:** LI-COR
- **Model:** 6262
- **Frequency:** Every 140 seconds, except during calibration
- **Resolution Water:** 0.01 microatmosphere
- **Uncertainty Water:** ± 1 microatmospheres
- **Resolution Air:** 0.01 ppm
- **Uncertainty Air:** ± 0.2 ppm
- **Manufacturer of Calibration Gas:**
  - ESRL, Boulder - Std 1: Commercial UHP Nitrogen, 0.00 ppm / Std 2: CA04890, 282.59 ppm / Std 3: CC115007, 381.54 ppm / Std 4: CB09022, 537.45 ppm
- **Number of Non Zero Gas Standards:** 3
- **CO2 Sensor Calibration:** The analyzer is calibrated every 3.2 hours using standards directly traceable to the WMO scale.
- **Other Comments:** Instrument is located in the ship's air-conditioned bow thruster space. Ultra-High Purity nitrogen gas (0.0 ppm CO2) and the high standard are used to zero and span the LI-COR analyzer.
- **Details Co2 Sensing:** details of CO2 sensing (not required)
- **Measured Co2 Params:** xco2(dry)

**Sea Surface Temperature:**

- **Location:** In bow thruster room between the inlet and sea water pump
- **Manufacturer:** Seabird
Model: SBE-38  
Accuracy Degrees Celsius: 0.001  
Precision Degrees Celsius: 0.00025  
Calibration: Factory calibration.  
Comments: Manufacturer's Resolution is taken as Precision; Maintained by other scientists.

Equilibrator Temperature:
Location: Inserted into equilibrator ~ 5 cm below the water level.
Manufacturer: Hart  
Model: 1523  
Accuracy Degrees Celsius: 0.015  
Precision Degrees Celsius: 0.001  
Calibration: Factory calibration  
Comments: Manufacturer's Resolution is taken as Precision.

Equilibrator Pressure:
Location: Attached to equilibrator headspace  
Manufacturer: Setra  
Model: 239  
Accuracy hPa: 0.052  
Precision hPa: 0.01  
Calibration: Factory calibration  
Comments: Differential pressure reading from Setra-239 attached to the equilibrator headspace was added to the pressure reading from the Setra-270 on the exit of the analyzer to yield equilibrator pressure. Manufacturer's Resolution is taken as Precision.

Atmospheric Pressure:
Location: On mast above bridge and atmospheric lab, ~59 m above sea surface.  
Manufacturer: R.M.Young  
Model: 61302V  
Accuracy: ± 0.3 hPa  
Precision: 0.15 hPa  
Calibration: Factory calibration  
Normalized: yes  
Comments: Manufacturer's Resolution is taken as Precision; Maintained by other scientists.

Sea Surface Salinity:
Location: In bow thruster space, next to CO2 system.  
Manufacturer: Seabird  
Model: SBE 45  
Accuracy: ± 0.005 permil  
Precision: 0.0002 permil  
Calibration: Factory calibration  
Comments: Manufacturer's Resolution is taken as Precision; Maintained by other scientists.

Additional Information:
The CO2 analytical system performed well throughout this cruise.

Preliminary Quality Control:
NA
<table>
<thead>
<tr>
<th>Form Type:</th>
</tr>
</thead>
<tbody>
<tr>
<td>underway</td>
</tr>
</tbody>
</table>