

**Dataset Expocode** 642B20150722

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**Dataset**  
**Funding Info:**  
**Initial Submission (yyyymmdd):** 20150629  
**Revised Submission (yyyymmdd):** 20151120

**Campaign/Cruise**  
**Expocode:** 642B20150722  
**Campaign/Cruise Name:** BS098A  
**Campaign/Cruise Info:** UK-Caribbean  
**Platform Type:**  
**CO2 Instrument Type:** Equilibrator-IR or CRDS or GC  
**Survey Type:** VOS Line  
**Vessel Name:** Benguela Stream  
**Vessel Owner:** Seatrade Reefers, The Netherlands  
**Vessel Code:** 642B

**Coverage**  
**Start Date (yyyymmdd):** 20150722  
**End Date (yyyymmdd):** 20150730  
**Westernmost Longitude:** 59.108 W  
**Easternmost Longitude:** 0.44346 W  
**Northernmost Latitude:** 50.058 N  
**Southernmost Latitude:** 16.122 N  
**Port of Call:** Le Havre, France  
**Port of Call:** Fort-de-France, Martinique

**Variable**  
**Name:** pCO2 in Sea Water (Wet)  
**Unit:** uatm  
**Description:** pCO2 in Sea Water (Wet) at SST

<b>Variable</b>	<b>Name:</b> pCO <sub>2</sub> in Air (wet) <b>Unit:</b> uatm <b>Description:</b> pCO <sub>2</sub> in Air (wet) at SST
<b>Variable</b>	<b>Name:</b> xCO <sub>2</sub> in Sea Water (dry) <b>Unit:</b> ppm <b>Description:</b> xCO <sub>2</sub> in Sea Water (dry) at Tequ
<b>Variable</b>	<b>Name:</b> xCO <sub>2</sub> in Air (Dry) <b>Unit:</b> ppm <b>Description:</b> xCO <sub>2</sub> in Air (Dry) at Tequ
<b>Variable</b>	<b>Name:</b> fCO <sub>2</sub> in Sea Water <b>Unit:</b> uatm <b>Description:</b> fCO <sub>2</sub> in Sea Water at SST
<b>Sea Surface Temperature</b>	<b>Location:</b> Sea chest in engine room, -5m <b>Manufacturer:</b> Aanderaa <b>Model:</b> T-4050 <b>Accuracy:</b> 0.03 (°C if units not given) <b>Precision:</b> 0.01 (°C if units not given) <b>Calibration:</b> Versus ice on ????. - SPEC HEET <b>Comments:</b>
<b>Sea Surface Salinity</b>	<b>Location:</b> Sea chest in engine room, -5m <b>Manufacturer:</b> Aanderaa <b>Model:</b> C-3919B <b>Accuracy:</b> 0.0018 <b>Precision:</b> 0.002 <b>Calibration:</b> Versus discrete samples from throughout voyage, analysed at NOC, UK <b>Comments:</b> Measures conductivity, salinity is calculated from it.
<b>Atmospheric Pressure</b>	<b>Location:</b> Navigation Bridge, 35m <b>Normalized to Sea Level:</b> yes <b>Manufacturer:</b> <b>Model:</b> <b>Accuracy:</b> (hPa if units not given) <b>Precision:</b> (hPa if units not given) <b>Calibration:</b> Performed by MET Office every 6 months <b>Comments:</b>
<b>Atmospheric CO<sub>2</sub></b>	<b>Measured/Frequency:</b> Yes, every 2 hours <b>Intake Location:</b> Monkey Island, 40m <b>Drying Method:</b> <b>Atmospheric CO<sub>2</sub> Accuracy:</b> 1 <b>Atmospheric CO<sub>2</sub> Precision:</b> 0.1
<b>Aqueous CO<sub>2</sub> Equilibrator Design</b>	<b>System Manufacturer:</b> <b>Intake Depth:</b> -5 <b>Intake Location:</b> Sea chest <b>Equilibration Type:</b> Percolating <b>Equilibrator Volume (L):</b> 4 <b>Headspace Gas Flow Rate (ml/min):</b> 100 <b>Equilibrator Water Flow Rate (L/min):</b> 4 <b>Equilibrator Vented:</b> Yes

**Aqueous CO2  
Sensor Details**

**Equilibration Comments:**

**Drying Method:** Condenser, partial

**Measurement Method:** IR

**Method details:** Non-dispersal Infrared

**Manufacturer:** Licor

**Model:** LI7000

**Measured CO2 Values:** xCO2(dry)

**Measurement Frequency:** Every 60 seconds except during calibration routines

**Aqueous CO2 Accuracy:** 1

**Aqueous CO2 Precision:** 0.1

**Sensor Calibrations:** During deployment, every 90 minutes, by 0, 250, 350 and 450 ppm CO2 gas standards

**Calibration of Calibration Gases:** Ship

**Number Non-Zero Gas Standards:** 3

**Calibration Gases:**

NOAA Gas Standards installed 20140614

0B05: 0

45B32: 460.69

35B34: 361.14

25B32: 260.36

**Comparison to Other CO2 Analyses:**

**Comments:** LiCor pressure calibrated against sea level pressure.

**Method Reference:**

Cooper, D. J., Watson, A. J., & Ling, R. D. (1998). Variation of pCO<sub>2</sub> along a North Atlantic shipping route (U.K. to the Caribbean): A year of automated observations. *Marine Chemistry*, 60, 147–164. [http://doi.org/10.1016/S0304-4203\(97\)00082-0](http://doi.org/10.1016/S0304-4203(97)00082-0)

Schuster, U., & Watson, A. J. (2007). A variable and decreasing sink for atmospheric CO<sub>2</sub> in the North Atlantic. *Journal of Geophysical Research*, 112(C11). <http://doi.org/10.1029/2006JC003941>

Watson, A. J., Schuster, U., Bakker, D. C. E., Bates, N. R., Corbière, A., González-Dávila, M., ... Wanninkhof, R. H. (2009). Tracking the variable North Atlantic sink for atmospheric CO<sub>2</sub>. *Science*, 326(5958), 1391–1393. <http://doi.org/10.1126/science.1177394>

Pierrot, D., Neill, C., Sullivan, K. F., Castle, R., Wanninkhof, R. H., Lüger, H., ... Cosca, C. E. (2009). Recommendations for autonomous underway pCO<sub>2</sub> measuring systems and data-reduction routines. *Deep Sea Research Part II: Topical Studies in Oceanography*, 56, 512–522. <http://doi.org/10.1016/j.dsr2.2008.12.005>

**Equilibrator  
Temperature Sensor**

**Location:** Sensor inside equilibrator

**Manufacturer:** Aanderaa

**Model:** PT2000

**Accuracy:** 0.04 (°C if units not given)

**Precision:** 0.04 (°C if units not given)

**Calibration:** Every 28 days, versus ice and against Aanderaa SST sensor

**Comments:**

**Equilibrator  
Pressure Sensor**

**Location:** On the equilibrator

**Manufacturer:** Omega

**Model:** Barometreic pressure transducer, PX2760-600A5V

**Accuracy:** 0.1 (hPa if units not given)

**Precision:** 0.1 (hPa if units not given)

**Calibration:** Every 28 days against LiCor

**Comments:**

**Other Sensor**

**Description:** Oxygen

**Manufacturer:** Aanderaa

**Model:** Optode 3835

**Accuracy:** <1 um

**Precision:** <8 um or 5%, whichever is greater

**Calibration:** None

**Comments:**

**Additional  
Information**

**Suggested QC flag from Data Provider:** NA

**Additional Comments:**

**Citation for this Dataset:**

UK-Caribbean line

**Other References for this Dataset:**

In preparation