

Dataset Expocode 09AR20060102

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Dataset **Funding Info:** Australian Climate Change Research Program
Initial Submission (yyyymmdd): 20161028
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Campaign/Cruise **Expocode:** 09AR20060102
Campaign/Cruise Name: AAV30506
Campaign/Cruise Info: Broke-West
Platform Type:
CO2 Instrument Type: Equilibrator-IR or CRDS or GC
Survey Type: Research Cruise
Vessel Name: Aurora Australis
Vessel Owner: P&O
Vessel Code: 09AR

Coverage **Start Date (yyyymmdd):** 20060102
End Date (yyyymmdd): 20060311
Westernmost Longitude: 29.8896 E
Easternmost Longitude: 147.1651 E
Northernmost Latitude: 32.0485 S
Southernmost Latitude: 69.218 S
Port of Call: Fremantle
Port of Call: Mawson Base
Port of Call: Davis Base
Port of Call: Hobart

Variable **Name:** GROUP/Ship
Unit:
Description: organisation/ship name

Variable **Name:** JD.UTC
Unit:
Description: day of year, UTC time

Variable **Name:** Date.UTC
Unit:
Description: yyyymmdd

Variable **Name:** Time.UTC
Unit:
Description: hh:mm:ss

Variable **Name:** xCO2EQ_PPM

Unit: ppm
Description: mole fraction in equilibrator headspace (dry) at equilibrator temperature

Variable **Name:** xCO2ATM_PPM
Unit: ppm
Description: mole fraction of CO2 in outside air (dry)

Variable **Name:** xCO2ATM_PPM_INTERP
Unit: ppm
Description: mole fraction of outside air (dry), clearly interpolated to time of xCO2EQ measurements

Variable **Name:** Press_EQUIL_hPa
Unit: hPa
Description: pressure in the equilibrator headspace

Variable **Name:** Press_ATM_hPa
Unit: hPa
Description: temperature of water in the equilibrator

Variable **Name:** TEquil_degC
Unit: C
Description: temperature of water in equilibrator

Variable **Name:** SST_degC
Unit: C
Description: sea surface temperature

Variable **Name:** SAL
Unit: practical salinity scale
Description: sea surface salinity

Variable **Name:** fCO2SW_UATM
Unit: microatmospheres
Description: fugacity of CO2 in seawater (100% humidity) at SST and salinity

Variable **Name:** fCO2ATM_UATM
Unit: microatmospheres
Description: fugacity of CO2 in outside air (100% humidity), interpolated to the times of surface water measurements

Variable **Name:** DFCO2_UATM
Unit: microatmospheres
Description: air-sea gradient in the fugacity of CO2

Variable **Name:** WindSpd_True_M_S
Unit:
Description: true wind speed

Variable **Name:** WindDirn_True
Unit: degrees
Description: true direction of wind

Variable **Name:** xCO2_Flag
Unit:
Description: WOCE quality flag (2=good, 3=questionable) for xCO2 measurement

Sea Surface Temperature **Location:** at seawater intake, 4m depth
Manufacturer: Seabird Electronics

Model: SBE38 Thermistor S/N 2770
Accuracy: 0.001 (°C if units not given)
Precision: 0.00025 (°C if units not given)
Calibration: Calibrated at Seabird Electronics, Washington USA in June 2005. More information can be obtained from the Australian Antarctic Data Center. Druck Pressure Sensor (hPa): Calibrated at GE Sensing and Inspection Technologies 11/05/2004. Precision ±0.006hPa. Inlet Seawater Temperature (ITS-90): Calibrated by Australian Antarctic Data Center 02/06/2003. More information can be obtained from the Australian Antarctic Data Center
Comments: verified against calibrated CTD temperatures

Sea Surface Salinity **Location:** next to pCO₂ system in underway laboratory
Manufacturer: Seabird Electronics
Model: SBE21_2111393-1781 S/N 36291
Accuracy: Conductivity: ± 0.001 S/m, Salinity ± 0.005ppt
Precision: Conductivity: ± 0.0001 S/m
Calibration: Thermosalinograph (psu): Temp (ITS-90) and salinity (psu) calibrated at Seabird Electronics, Washington USA in June 2005.
Comments: compared against bottle and calibrated CTD measurements during cruise

Atmospheric Pressure **Location:** Above ships bridge and 16m above sea level
Normalized to Sea Level: yes
Manufacturer: Vaisala
Model: PTB220 S/N: A3920002
Accuracy: ± 0.15hPa (hPa if units not given)
Precision: ±0.01hPa (hPa if units not given)
Calibration: Calibrated annually by Australian Antarctic Division against Australian Bureau of Meteorology reference barometer
Comments:

Atmospheric CO₂ **Measured/Frequency:** yes, 4 hourly
Intake Location: 16m above sea level, above bridge
Drying Method: nafion dryer
Atmospheric CO₂ Accuracy: 2 ppm
Atmospheric CO₂ Precision: 0.1 ppm

Aqueous CO₂ Equilibrator Design **System Manufacturer:** General Oceanics 8050 pCO₂ system
Intake Depth: 4
Intake Location: Propeller shaft tunnel in a region where the hull shape keeps ice from the intake
Equilibration Type: Weiss style spray equilibrator
Equilibrator Volume (L): 0.5
Headspace Gas Flow Rate (ml/min): 80
Equilibrator Water Flow Rate (L/min): 2.5
Equilibrator Vented: Yes
Equilibration Comments:
Drying Method: nafion, >99% dry

Aqueous CO₂ Sensor Details **Measurement Method:** IR
Method details: CO₂ mole fraction in dry air, stopped flow
Manufacturer: LI-COR
Model: 7000
Measured CO₂ Values: xCO₂(dry)
Measurement Frequency: 60

Aqueous CO2 Accuracy: 2 ppm
Aqueous CO2 Precision: 0.1 ppm
Sensor Calibrations: Calibrations of CO2 sensor using four CO2-in-air standards approximately every 4 hours during deployment
Calibration of Calibration Gases: Standards calibrated on WMO-X2007 mole fraction scale for CO2-in-air at CSIRO Oceans and Atmosphere GASLAB, Melbourne.
Number Non-Zero Gas Standards: 3
Calibration Gases:
CO2-in-air standards are made at the GASLAB of CSIRO Oceans and Atmosphere and calibrated on WMO-X2007 mole fraction scale.
Standard XCO2 values: 0.00ppm, 299.34ppm, 352.87ppm, 401.94ppm. Uncertainty ± 0.05 ppm.
Comparison to Other CO2 Analyses:
Comments:
Method Reference:
Pierrot D., C. Neill, K. Sullivan, R. Castle, R. Wanninkhof, H. Luger, T. Johannessen, A. Olsen, R. A. Feely, C. E. Cosca (2009) Recommendations for autonomous underway pCO2 measuring systems and data-reduction routines. Deep-Sea Research II, 56, 512-522.

**Equilibrator
Temperature Sensor**

Location: 4 wire sensor mounted in equilibrator
Manufacturer: Omega
Model: PT-100 RTD, 4-wire sensor
Accuracy: 0.1 (°C if units not given)
Precision: 0.01 (°C if units not given)
Calibration: Calibrated at CSIRO Oceans and Atmosphere NATA test facility on 15/10/2005, $T_{corr} = 0.9939 \cdot \text{temp} + 0.0284$. Accuracy with correction better than ± 0.03 C
Comments:

**Equilibrator
Pressure Sensor**

Location: outlet of equilibrator
Manufacturer: Druck
Model: RPT350
Accuracy: 0.1 (hPa if units not given)
Precision: 0.01 (hPa if units not given)
Calibration: Calibrated at GE Sensing and Inspection Technologies 11/05/2004
Comments:

**Additional
Information**

Suggested QC flag from Data Provider: NB
Additional Comments:
Citation for this Dataset:
Tilbrook, B., J. Akl and C. Neill (2016) Underway CO2 data for Aurora Australis voyage AA030506.
Other References for this Dataset: