

# Sample bottle measurements from CTD casts from NOAA Ship Ronald H. Brown cruise RB-08-02 in the Southwest Atlantic sector of the Southern Ocean near South Georgia Island in 2008 (SO\_GasEx project)

**Website:** <https://www.bco-dmo.org/dataset/3127>

**Version:** 26 July 2010

**Version Date:** 2010-02-16

## Project

» [Southern Ocean Gas Exchange Experiment](#) (SO\_GasEx)

## Programs

» [Ocean Carbon and Biogeochemistry](#) (OCB)

» [United States Surface Ocean Lower Atmosphere Study](#) (U.S. SOLAS)

Contributors	Affiliation	Role
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## Dataset Description

SO-GasEx Final bottle data from CTDs

Values averaged for the time/depth intervals over which niskin bottles were tripped

## Methods & Sampling

**See:** [SO-GasEx cruise report, Section 5.7 ppgs 36-46](#)

### Sample CTD Header File:

\* Sea-Bird SBE 9 Data File:

\* FileName = C:GasExdatage03.hex

\* Software Version Seasave V 7.14c

\* Temperature SN = 4211

\* Conductivity SN = 2887

\* Number of Bytes Per Scan = 34

\* Number of Voltage Words = 4

\* Number of Scans Averaged by the Deck Unit = 1

```

* Append System Time to Every Scan
* System UpLoad Time = Mar 10 2008 14:51:02
** Cruise: GasEx 2008
** Ship: NOAA RONALD H. BROWN
** Station/Cast Number: 03
** Nominal Latitude: 50 43.876
** Nominal Longitude: 38 33.285
# nquan = 12
# nvalues = 75194
# units = specified
# name 0 = timeS: Time, Elapsed [seconds]
# name 1 = prDM: Pressure, Digiquartz [db]
# name 2 = depSM: Depth [salt water, m]
# name 3 = t068C: Temperature [ITS-68, deg C]
# name 4 = t168C: Temperature, 2 [ITS-68, deg C]
# name 5 = c0mS/cm: Conductivity [mS/cm]
# name 6 = c1mS/cm: Conductivity, 2 [mS/cm]
# name 7 = sbeox0V: Oxygen Voltage, SBE 43
# name 8 = sbeox0Mm/Kg: Oxygen, SBE 43 [umol/Kg]
# name 9 = par: PAR/Irradiance, Biospherical/Licor
# name 10 = wetStar: Fluorescence, Wetlab Wetstar [mg/m^3]
# name 11 = flag: 0.000e+00
# span 0 = 0.000, 3133.042
# span 1 = -0.474, 502.611
# span 2 = -0.470, 497.698
# span 3 = 0.5986, 7.8632
# span 4 = 0.6005, 7.2611
# span 5 = 0.038490, 33.003805
# span 6 = 0.058432, 32.964855
# span 7 = 1.8694, 3.9194
# span 8 = 164.630, 390.668
# span 9 = 5.4693e+02, 9.9990e+03
# span 10 = -0.4895, 15.3250
# span 11 = 0.0000e+00, 0.0000e+00
# interval = seconds: 0.0416667
# start_time = Mar 10 2008 14:51:02
# bad_flag = -9.990e-29
# sensor 0 = Frequency 0 temperature, primary, 4211, 08-Nov-07
# sensor 1 = Frequency 1 conductivity, primary, 2887, 18-Oct-07, cpcor = -9.5700e-08
# sensor 2 = Frequency 2 pressure, 209, 09-Jul-07
# sensor 3 = Frequency 3 temperature, secondary, 1455, 13-Nov-07
# sensor 4 = Frequency 4 conductivity, secondary, 2882, 18-Oct-07, cpcor = -9.5700e-08
# sensor 5 = Extrnl Volt 0 Oxygen, SBE, primary, 315, 16-Oct-07p
# sensor 6 = Extrnl Volt 3 userpoly 0, 8756
# sensor 7 = Extrnl Volt 4 irradiance (PAR), primary, 4623, N/A
# sensor 8 = Extrnl Volt 6 WET Labs, WETStar fluorometer, ws3s-418P, 7/9/98
# datsnv_date = May 13 2009 13:16:53, 7.18c
# datsnv_in = C:\cygwinhome mckeeSO-GasExge03.hex C:\cygwinhome mckeeSO-GasExge03.CON
# datsnv_skipover = 0
# datsnv_ox_hysteresis_correction = no
# datsnv_ox_tau_correction = yes
# file_type = ascii
*END*

```

## Data Processing Description

See: [SO-GasEx cruise report, Section 5.7 ppgs 36-46](#)

## BCO-DMO Processing Notes

- Generated from original file Final\_CDT\_Bottle\_data.txt

### Comments from original data file by BH:

CTD bottle data from SOGasEx cruise, Feb-April 2008 aboard RV Ron Brown.  
STAT in this file represents the CTD station number followed by a 1.  
e.g. STAT 11 is CTD station 1, STAT 511 is CTD station 51.

SAMP here is the niskin number appended with a leading 1.  
SAMP 101 is niskin 1. SAMP 124 is niskin 24.

Ox is O2 data calculated from SBE electrode readings.  
O2 is preliminary winkler data provided by R. Hamme.  
Final O2 data is provided with the other water chemistry data sets.

Flags following S0 and O2 columns indicate data quality.

Flag = 2 means good;  
Flag = 3 means questionable;  
Flag = 4 means bad;  
Flag = 9 means no data.

'No data' is written as -9 in original file.

**BCO-DMO Note:** 'No data' converted to BCO-DMO standard of 'nd' in processed file

Station 91 samples 115-124 have bad OX (CTD O2) data but are not flagged.

### BCO-DMO Edits

- parameter names modified to conform to BCO-DMO convention
- event, station, date, time, lon, lat inserted from CTD headers file
- '-9' (No data flag in original) changed to 'nd'
- decimal places padded as appropriate for consistency

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## Data Files

File
<b>CTD_Bottle.csv</b> (Comma Separated Values (.csv), 107.00 KB) MD5:05fca77b7fbec28a076770d910f759ef Primary data file for dataset ID 3127

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## Parameters

Parameter	Description	Units
time	Time UTC	HHMM
date	Date UTC	YYYYMMDD
lat	latitude, negative denotes South	decimal degrees
lon	longitude, negative denotes West	decimal degrees
event	Unique event number	YDAHMM

station	SO-GasEx CTD Station Id	integer
PRES	pressure from CTD	decibars
TE68	temperature from CTD, IPTS-68 (from secondary T1 sensor)	degrees Celsius
COND	conductivity from CTD from secondary C1 sensor	milli Siemens/centimeter
O2	O2 is preliminary winkler data provided by R. Hamme	micro moles/kilogram
SAL	salinity, from CTD, PSS-78 (PSU) from secondary T1,C1 sensors	dimensionless
STAT	STAT in this file represents the CTD station number followed by a 1. e.g. STAT 11 is CTD station 1, STAT 511 is CTD station 51.	integer
SAMP	SAMP here is the niskin number appended with a leading 1. SAMP 101 is niskin 1. SAMP 124 is niskin 24.	integer
OX	OX is O2 data calculated from SBE electrode readings	micro moles/kilogram
OX_minus_O2	OX minus O2 data	micro moles/kilogram
S0	salinity, from CTD, PSS-78 (PSU) from secondary T1,C1 sensors	dimensionless
SAL_minus_S0	SAL minus S0 data	dimensionless
S0_Flag	S0 data quality flag Flag = 2 means good; Flag = 3 means questionable; Flag = 4 means bad; Flag = 9 means no data.	integer
O2_Flag	O2 data quality flag Flag = 2 means good; Flag = 3 means questionable; Flag = 4 means bad; Flag = 9 means no data.	integer

## Instruments

<b>Dataset-specific Instrument Name</b>	CTD Seabird 911plus
<b>Generic Instrument Name</b>	CTD Sea-Bird SBE 911plus

<b>Dataset-specific Description</b>	<p>Instrument Configuration File for SO-GasEx: PSA file: C:GasExacqSeasave.psa Date: 02/23/2008  Instrument configuration file: C:GasExconsec_24_1.con Configuration report for SBE  911plus/917plus CTD ----- Frequency channels suppressed : 0  Voltage words suppressed : 0 Computer interface : RS-232C Scans to average : 1 Surface PAR  voltage added : No NMEA position data added : No Scan time added : Yes 1) Frequency 0,  Temperature Serial number : 4211 Calibrated on : 08-Nov-07 G : 4.38706278e-003 H :  6.46536683e-004 I : 2.23272060e-005 J : 1.77872902e-006 F0 : 1000.000 Slope : 1.00000000  Offset : 0.0000 2) Frequency 1, Conductivity Serial number : 2887 Calibrated on : 18-Oct-07 G :  -1.00439325e+001 H : 1.36330343e+000 I : -2.56289727e-003 J : 2.54823008e-004 CTcor :  3.2500e-006 CPcor : -9.57000000e-008 Slope : 1.00000000 Offset : 0.0000 3) Frequency 2,  Pressure, Digiquartz with TC Serial number : 209 Calibrated on : 09-Jul-07 C1 : -3.920451e+004  C2 : 6.234560e-001 C3 : 1.350570e-002 D1 : 3.894300e-002 D2 : 0.000000e+000 T1 :  3.046303e+001 T2 : -9.018862e-005 T3 : 4.528890e-006 T4 : 3.309590e-009 T5 :  0.000000e+000 Slope : 0.99985000 Offset : 1.00090 AD590M : 1.144000e-002 AD590B : -  8.805040e+000 4) Frequency 3, Temperature, 2 Serial number : 1455 Calibrated on : 13-Nov-  07 G : 4.84617647e-003 H : 6.77841857e-004 I : 2.60561588e-005 J : 2.02936086e-006 F0 :  1000.000 Slope : 1.00000000 Offset : 0.0000 5) Frequency 4, Conductivity, 2 Serial number :  2882 Calibrated on : 18-Oct-07 G : -1.02006582e+001 H : 1.39961765e+000 I : 7.01158866e-  004 J : 2.20787100e-005 CTcor : 3.2500e-006 CPcor : -9.57000000e-008 Slope : 1.00000000  Offset : 0.0000 6) A/D voltage 0, Oxygen, SBE 43 Serial number : 315 Calibrated on : 16-Oct-  07p Equation : Owens-Millard Coefficients for Owens-Millard: Soc : 3.6150e-001 Boc : 0.0000  Offset : -0.5838 Tcor : -0.0001 Pcor : 1.35e-004 Tau : 0.0 Coefficients for Murphy-Larson: Soc :  0.00000e+000 Offset : 0.00000e+000 A : 0.00000e+000 B : 0.00000e+000 C : 0.00000e+000  E : 0.00000e+000 Tau : 2.00000e+000 7) A/D voltage 1, Free 8) A/D voltage 2, Free 9) A/D  voltage 3, User Polynomial Serial number : 8756 Calibrated on : Sensor name : Metrox A0 :  12.00000000 A1 : 445.60000000 A2 : 0.00000000 A3 : 0.00000000 10) A/D voltage 4, Free 11)  A/D voltage 5, Free 12) A/D voltage 6, Free 13) A/D voltage 7, Free -----</p>
	<p>----- Pump Control This setting is only applicable to a custom build of the SBE 9plus. Enable  pump on / pump off commands: NO ----- Data Acquisition:  Archive data: YES Delay archiving: NO Data archive: C:P18_07data h21731.hex Timeout  (seconds) at startup: 20 Timeout (seconds) between scans: 20 -----  --- Instrument port configuration: Port = COM1 Baud rate = 19200 Parity = N Data bits = 8  Stop bits = 1 ----- Water Sampler Data: Water Sampler Type: SBE  Carousel Number of bottles: 24 Port: COM2 Enable remote firing: NO Firing sequence:  Sequential ----- Header information: Header Choice = Prompt for  Header Information prompt 0 = Cruise: CLIVAR P18 2007 prompt 1 = Ship: NOAA RONALD H.  BROWN prompt 2 = Station/Cast Number: prompt 3 = Nominal Latitude: prompt 4 = Nominal  Longitude: ----- TCP/IP - port numbers: Data acquisition: Data  port: 49163 Status port: 49165 Command port: 49164 Remote bottle firing: Command port:  49167 Status port: 49168 Remote data publishing: Converted data port: 49161 Raw data port:  49160 ----- Miscellaneous data for calculations Depth and  Average Sound Velocity Latitude when NMEA is not available: 0.00000000 Average Sound  Velocity Minimum pressure [db]: 20.00000000 Minimum salinity [psu]: 20.00000000 Pressure  window size [db]: 20.00000000 Time window size [s]: 60.00000000 Descent and Acceleration  Window size [s]: 2.00000000 Plume Anomaly Theta-B: 0.00000000 Salinity-B 0.00000000  Theta-Z / Salinity-Z 0.00000000 Reference pressure [db] 0.00000000 Oxygen Window size [s]:  2.00000000 Potential Temperature Anomaly A0: 0.00000000 A1: 0.00000000 A1 Multiplier:  Salinity ----- Serial Data Output: Output data to serial port: NO ----  ----- Mark Variables: Variables: Digits Variable Name [units] -----  ----- 0 Scan Count 4 Pressure, Digiquartz [db] 5 Temperature [ITS-90, deg C] 5 Salinity  [PSU] 4 Oxygen, SBE 43 [umol/Kg] 5 Density [sigma-theta, Kg/m^3] -----  ----- Shared File Output: Output data to shared file: NO -----  TCP/IP Output: Raw data: Output raw data to socket: NO XML wrapper and settings: NO  Seconds between raw data updates: 0.00000000 Converted data: Output converted data to  socket: NO XML format: NO ----- SBE 11plus Deck Unit Alarms  Enable minimum pressure alarm: NO Enable maximum pressure alarm: NO Enable altimeter  alarm: NO ----- SBE 14 Remote Display Enable SBE 14 Remote  Display: NO ----- Options: Prompt to save program setup  changes: YES Automatically save program setup changes on exit: NO Confirm instrument  configuration change: YES Confirm display setup changes: YES Confirm output file overwrite:  YES Check scan length: YES Compare serial numbers: YES Maximized plot may cover Seasave:  NO</p>

<b>Generic Instrument Description</b>	The Sea-Bird SBE 911 plus is a type of CTD instrument package for continuous measurement of conductivity, temperature and pressure. The SBE 911 plus includes the SBE 9plus Underwater Unit and the SBE 11plus Deck Unit (for real-time readout using conductive wire) for deployment from a vessel. The combination of the SBE 9 plus and SBE 11 plus is called a SBE 911 plus. The SBE 9 plus uses Sea-Bird's standard modular temperature and conductivity sensors (SBE 3 plus and SBE 4). The SBE 9 plus CTD can be configured with up to eight auxiliary sensors to measure other parameters including dissolved oxygen, pH, turbidity, fluorescence, light (PAR), light transmission, etc.). more information from Sea-Bird Electronics
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## Deployments

### RB-08-02

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/57846">https://www.bco-dmo.org/deployment/57846</a>
<b>Platform</b>	NOAA Ship Ronald H. Brown
<b>Report</b>	<a href="http://bcodata.whoi.edu/SO-GasEx/SO_GasEx_Cruise_Report.pdf">http://bcodata.whoi.edu/SO-GasEx/SO_GasEx_Cruise_Report.pdf</a>
<b>Start Date</b>	2008-02-29
<b>End Date</b>	2008-04-12
<b>Description</b>	The Southern Ocean GasEx experiment was conducted aboard the NOAA ship Ronald H. Brown with 31 scientists representing 22 institutions, companies and government labs. The cruise departed Punta Arenas, Chile on 29 February, 2008 and transited approximately 5 days to the nominal study region at 50°S, 40°W in the Atlantic sector of the Southern Ocean. The scientific work concentrated on quantifying gas transfer velocities using deliberately injected tracers, measuring CO <sub>2</sub> and DMS fluxes directly in the marine air boundary layer, and elucidating the physical, chemical, and biological processes controlling air-sea fluxes with measurements in the upper-ocean and marine air. The oceanic studies used a Lagrangian approach to study the evolution of chemical and biological properties over the course of the experiment using shipboard and autonomous drifting instruments. The first tracer patch was created and studied for approximately 6 days before the ship was diverted from the study site, 350 miles to the south, to wait near South Georgia Island for calmer seas. After more than 4 days away, we returned to the study area and managed to find some remnants of the tracer patch. After collecting one final set of water column samples and recovering the two drifting buoys deployed with the patch, we relocated to the northwest, closer to the area where the first patch was started. A second tracer patch was created and studied for approximately 15 days before we had to break off the experiment and transit to Montevideo, Uruguay for the completion of the cruise.

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## Project Information

### Southern Ocean Gas Exchange Experiment (SO\_GasEx)

**Website:** <http://so-gasex.org/>

**Coverage:** Southwest Atlantic sector of the Southern Ocean (nominally at 50°S, 40°W, near South Georgia Island)

The Southern Ocean Gas Exchange Experiment (SO-GasEx; also known as GasEx III) took place in the Southwest Atlantic sector of the Southern Ocean (nominally at 50°S, 40°W, near South Georgia Island) in austral fall of 2008 (February 29-April 12, 2008) on the [NOAA ship Ronald H. Brown](#). SO-GasEX is funded by NOAA, NSF and NASA.

The research objectives for Southern Ocean GasEx are to answer the following questions:

- What are the gas transfer velocities at high winds?
- What is the effect of fetch on the gas transfer?
- How do other non-direct wind effects influence gas transfer?
- How do changing pCO<sub>2</sub> and DMS levels affect the air-sea CO<sub>2</sub> and DMS flux, respectively in the same locale?
- Are there better predictors of gas exchange in the Southern Ocean other than wind?
- What is the near surface horizontal and vertical variability in turbulence, pCO<sub>2</sub>, and other relevant biochemical and physical parameters?
- How do biological processes influence pCO<sub>2</sub> and gas exchange?
- Do the different disparate estimates of fluxes agree, and if not why?
- With the results from Southern Ocean GasEx, can we reconcile the current discrepancy between model based CO<sub>2</sub> flux estimates and observation based estimates?

## Related files

[SO-GasEx cruise report](#)

[SO-GasEx Science Plan](#)

[SO-GasEx Implementation Plan](#)

The SO-GasEx cruise report and Science and Implementation plans, may also be available at [the SO-GasEx science Web page](#).

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## Program Information

### Ocean Carbon and Biogeochemistry (OCB)

**Website:** <http://us-ocb.org/>

**Coverage:** Global

The Ocean Carbon and Biogeochemistry (OCB) program focuses on the ocean's role as a component of the global Earth system, bringing together research in geochemistry, ocean physics, and ecology that inform on and advance our understanding of ocean biogeochemistry. The overall program goals are to promote, plan, and coordinate collaborative, multidisciplinary research opportunities within the U.S. research community and with international partners. Important OCB-related activities currently include: the Ocean Carbon and Climate Change (OCCC) and the North American Carbon Program (NACP); U.S. contributions to IMBER, SOLAS, CARBOOCEAN; and numerous U.S. single-investigator and medium-size research projects funded by U.S. federal agencies including NASA, NOAA, and NSF.

The scientific mission of OCB is to study the evolving role of the ocean in the global carbon cycle, in the face of environmental variability and change through studies of marine biogeochemical cycles and associated ecosystems.

The overarching OCB science themes include improved understanding and prediction of: 1) oceanic uptake and release of atmospheric CO<sub>2</sub> and other greenhouse gases and 2) environmental sensitivities of biogeochemical cycles, marine ecosystems, and interactions between the two.

The OCB Research Priorities (updated January 2012) include: ocean acidification; terrestrial/coastal carbon fluxes and exchanges; climate sensitivities of and change in ecosystem structure and associated impacts on biogeochemical cycles; mesopelagic ecological and biogeochemical interactions; benthic-pelagic feedbacks on biogeochemical cycles; ocean carbon uptake and storage; and expanding low-oxygen conditions in the coastal and open oceans.



## United States Surface Ocean Lower Atmosphere Study (U.S. SOLAS)

**Website:** <http://www.us-solas.org/>

**Coverage:** Global

The Surface Ocean Lower Atmosphere Study (SOLAS) program is designed to enable researchers from different disciplines to interact and investigate the multitude of processes and interactions between the coupled ocean and atmosphere.

Oceanographers and atmospheric scientists are working together to improve understanding of the fate, transport, and feedbacks of climate relevant compounds, and also weather and hazards that are affected by processes at the surface ocean.

Oceanographers and atmospheric scientists are working together to improve understanding of the fate, transport, and feedbacks of climate relevant compounds.

Physical, chemical, and biological research near the ocean-atmosphere interface must be performed in synergy to extend our current knowledge to adequately understand and forecast changes on short and long time frames and over local and global spatial scales.

The findings obtained from SOLAS are used to improve knowledge at process scale that will lead to better quantification of fluxes of climate relevant compounds such as CO<sub>2</sub>, sulfur and nitrogen compounds, hydrocarbons and halocarbons, as well as dust, energy and momentum. This activity facilitates a fundamental understanding to assist the societal needs for climate change, environmental health, weather prediction, and national security.

The US SOLAS program is a component of the International SOLAS program where collaborations are forged with investigators around the world to examine SOLAS issues ubiquitous to the world's oceans and atmosphere.

[Â» International SOLAS Web site](#)

### Science Implementation Strategy Reports

[US-SOLAS](#) (4 MB PDF file)

[Other SOLAS reports](#) are available for download from the US SOLAS Web site

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### Funding

Funding Source	Award
National Oceanic and Atmospheric Administration (NOAA)	<a href="#">unknown SO_GasEx NOAA</a>
National Aeronautics & Space Administration (NASA)	<a href="#">unknown SO_GasEx NASA</a>
National Science Foundation (NSF)	<a href="#">unknown SO_GasEx NSF</a>

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