

# Narrow band shipboard ADCP 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/3221>

**Version:** 10 Sept 2009

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## Project

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

## Programs

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

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

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## Dataset Description

SO-GasEx Narrow Band Shipboard ADCP

Data from the RHB hull mounted 75 kHz Ocean Surveyor Acoustic Doppler Current Profiler (ADCP) operated in two modes, broad-band and narrow-band, throughout most of the cruise using the University of Hawaii Data Acquisition System (UHDAS).

There are 144 columns which are as follows:

1: year (YYYY)

2: yrday (decimal days)

3: longitude (decimal degrees)

4: latitude (decimal degrees)

5 - 74: u component (eastward) of ADCP currents in 70 depth bins

These are identified by the bin number and the center depth of the bin in each parameter i.e. u01\_33 is the bin number (01) and the depth of the center of the bin in meters (33)

74 - 144: v component (northward) of ADCP currents also in 70 depth bins

These are identified by the bin number and the center depth of the bin in each parameter i.e. v01\_33 is the bin number (01) and the depth of the center of the bin in meters (25)

Ensembles are average velocities over 5 minutes

Eastward (u) and northward (v) velocities are in m/s

Bad data values are marked with "nd"

Instrument: hull mounted 75 kHz Ocean Surveyor Acoustic Doppler Current Profiler (ADCP)

## Methods & Sampling

See: [SO-GasEx cruise report, Section 5.6.3 pg 36](#)

## Data Processing Description

See: [SO-GasEx cruise report, Section 5.6.3 pg 36](#)

### BCO-DMO Processing Notes

- Generated from original file os75nb.mat

#### Note:

During the processing of these data, it was noticed that the ASCII .dat files generated from the two original ADCP files (os75bb.mat and o275nb.mat) were identical. Used "diff" to double check.

It seemed odd that the two would be identical. Checking the write\_ascii.m script, it was noticed that although the "clear" command had been issued in Matlab, and the new file loaded, the arrays referenced for assigning valves to be output, still referenced the old file name arrays.

A new Matlab routine was generated (write\_ascii\_o275nb.m) with the corrections and run to generate new .dat ASCII files for file o275nb.mat data.

### BCO-DMO Edits

- parameter names modified to conform to BCO-DMO convention
- longitude value converted to degrees East/West using value -= 360.0
- '-99' (No data flag in original) changed to 'nd'

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## Data Files

File
<b>ADCP_NB.csv</b> (Comma Separated Values (.csv), 8.34 MB) MD5:b8bec341c3891dce25bd8bc008e4080a Primary data file for dataset ID 3221

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## Parameters

Parameter	Description	Units
lon	longitude, negative denotes West	decimal degrees
lat	latitude, negative denotes South	decimal degrees
u	East velocity component Each parameter name includes the bin number and the center depth of each bin in meters u01_33 is bin 1 with a center depth of 33 meters	m/s
v	North velocity component Each parameter name includes the bin number and the center depth of each bin in meters v01_33 is bin 1 with a center depth of 33 meters	m/s
year	Year of data	YYYY
yrday	YrDay of data	decimal days

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## Instruments

<b>Dataset-specific Instrument Name</b>	Acoustic Doppler Current Profiler
<b>Generic Instrument Name</b>	Acoustic Doppler Current Profiler
<b>Dataset-specific Description</b>	Hull mounted 75 kHz Ocean Surveyor Acoustic Doppler Current Profiler using the University of Hawaii Data Acquisition System (UHDAS).
<b>Generic Instrument Description</b>	The ADCP measures water currents with sound, using a principle of sound waves called the Doppler effect. A sound wave has a higher frequency, or pitch, when it moves to you than when it moves away. You hear the Doppler effect in action when a car speeds past with a characteristic building of sound that fades when the car passes. The ADCP works by transmitting "pings" of sound at a constant frequency into the water. (The pings are so highly pitched that humans and even dolphins can't hear them.) As the sound waves travel, they ricochet off particles suspended in the moving water, and reflect back to the instrument. Due to the Doppler effect, sound waves bounced back from a particle moving away from the profiler have a slightly lowered frequency when they return. Particles moving toward the instrument send back higher frequency waves. The difference in frequency between the waves the profiler sends out and the waves it receives is called the Doppler shift. The instrument uses this shift to calculate how fast the particle and the water around it are moving. Sound waves that hit particles far from the profiler take longer to come back than waves that strike close by. By measuring the time it takes for the waves to bounce back and the Doppler shift, the profiler can measure current speed at many different depths with each series of pings. (More from WHOI instruments listing).

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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>	<p>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.</p>

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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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