Met/Flux data - Revision 2 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/3448
Version: 11 March 2011
Version Date: 2011-03-11

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 Met/Flux data - **Revision 2** (See MetFlux Revision 1, v.18 February 2009 for earlier data)

The values represent 10 minute means and include interpolated data to fill in data gaps.
There is a period at the end of the cruise with no radiative flux data.
The missing data are flagged with -999.

In all cases, the fluxes use the convention that positive implies upwards.
The fluxes and wind speeds are computed relative to fixed earth,
i.e., they have not been corrected for currents.

Updates in Revision 2:
- Additional decimal point included for wind speeds and temperatures.

- Radiative flux data and improved SST data for transit back to Uruguay now included.

- CO2 fluxes are now included using the COAREG algorithm. The algorithm has been tuned to best match the direct covariances fluxes measured duirng GasEx 98 and SO Gasex.

- Also included are the delta CO2 measurement provided by NOAA/AOML and the Schmidt number and solubility provided by the COAREG algorithm. The Schmidt number is used to compute K660 = wCO2/delCO2*sqrt(ScCO2/660)

- The solubility is included for those who want to convert delCO2 units to uatm.

Additional Parameters in Revision 2:
- wCO2 (umol/m2/s): CO2 flux computed from COAREG (umol=micromole)
- delCO2 (mmol/m3): delta CO2 with corrections applied for solubility
- K660 (cm/hr): Transfer velocity for CO2 from COAREG adjusted to Sc=660
- Solubility (mole/m^3/atm): Solubility of CO2 at sea surface
- ScCO2: Schmidt number of CO2 under ambient conditions

Methods & Sampling

The values represent 10 minute means and include interpolated data to fill in data gaps.
There is a period at the end of the cruise with no radiative flux data.
The missing data are flagged with -999.

In all cases, the fluxes use the convention that positive implies upwards.
The fluxes and wind speeds are computed relative to fixed earth,
i.e., they have not been corrected for currents.

Data Processing Description

BCO-DMO Processing Notes
- Generated from original file GASEX08.r2

BCO-DMO Edits
- Original space delimited data file reformatted to BCO-DMO convention and output as csv file

- Minor edits to parameter names to conform to BCO-DMO/JGOFS object standards
- No changes to the data

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Data Files

File
MetFlux_Revision2.csv (Comma Separated Values (.csv), 806.55 KB) MD5:e310db8612fd245ed7b86920e76b92c4 Primary data file for dataset ID 3448

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Parameters

Parameter	Description	Units
Yday	Yearday 2008 = 1.5 on January 1 at noon (UTC)	dd.xxxxx
lon	Latitude from ship log (South is negative)	decimal degrees

lat	Longitude from ship log (West is negative)	decimal degrees
U10	Wind speed 10 m above surface from sonics	m/s
U10N	Wind speed 10 m above surface adjusted to neutral conditions	m/s
WDir	Wind Direction from (meteorological convention)	deg
Tsea	Sea Surface Temperature from sea snake	degrees celcius
T10	Air Temperature 10 m above surface from Vaisala PTU	degrees celcius
RH10	Relative Humidity 10 m above surface from Vaisala PTU	percentage
Pair	Atmospheric Pressure from Vaisala PTU	mb
SolarUp	Upwelling Solar Radiation using Payne (1972) albedo formulation	W/m2
SolarDn	Downwelling Solar Radiation from Eppley pyranometer	W/m2
IRUp	Upwelling Infrared Radiation using Tsea	W/m2
IRDn	Downwelling Infrared Radiation from Eppley purgeometer	W/m2
StressBK	Wind Stress computed from TOGA COARE 3.0 bulk algorithm	N/m2
ustBK	Friction Velocity computed from TOGA COARE 3.0 bulk algorithm	m/s
SHFBK	Sensible Heat Flux computed from TC 3.0 bulk algorithm	W/m2
LHFBK	Latent Heat Flux computed from TC 3.0 bulk algorithm	W/m2
Rain	Accumulated Rainfall from optical rain gauge	cm
RainRate	Rainfall Rate from optical rain gauge	cm/hr
wCO2BK	CO2 flux computed from COAREG (umol=micromole)	umol/m2/s

delCO2	delta CO2 with corrections applied for solubility	mmol/m3
K660	Transfer velocity for CO2 from COAREG adjusted to Sc=660	cm/hr
Solubility	Solubility of CO2 at sea surface	mole/m^3/atm
ScCO2	Schmidt number of CO2 under ambient conditions	nd

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Deployments

RB-08-02

Website	https://www.bco-dmo.org/deployment/57846
Platform	NOAA Ship Ronald H. Brown
Report	http://bcodata.whoi.edu/SO-GasEx/SO_GasEx_Cruise_Report.pdf
Start Date	2008-02-29
End Date	2008-04-12
Description	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 CO2 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 pCO2 and DMS levels affect the air-sea CO2 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, pCO2, and other relevant biochemical and physical parameters?
- How do biological processes influence pCO2 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 CO2 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 CO2 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.

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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 CO2, 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)	unknown SO_GasEx NOAA
National Aeronautics & Space Administration (NASA)	unknown SO_GasEx NASA
National Science Foundation (NSF)	unknown SO_GasEx NSF

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