SAMI-CO2 pCO2 temperature and oxygen time series dataset from multiple buoys in the NE Atlantic Ocean, west of Iberian Peninsula and Ireland from June to July 2007 (DOGEE-II project)

Website: https://www.bco-dmo.org/dataset/630565
Version: 06 January 2016
Version Date: 2016-01-06

Project
» Collaborative Research: Near-Surface controls of Air-Sea CO2 Exchange: A Contribution to the UK-SOLAS "Deep Ocean Gas Exchange Experiment" (DOGEE-II)

Program
» UK Surface Ocean - Lower Atmosphere Study (UK SOLAS)

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Dataset Description

SAMI-CO2 pCO2 Temperature and Oxygen Time series dataset collected by ASIS spar buoys during RRS DISCOVERY Cruise D320 (DOGEE-II)

North Atlantic, ASIS-1 deployed at 43°41.5'N, 18°8.5'W, ASIS-2 deployed at 43°22.4'N, 17°51.4'W. ASIS-1 was recovered at 42°29.6'N, 15°55.3'W, ASIS-2 was recovered at 42°45.6'N, 15°55.8'W.

Methods & Sampling

North Atlantic, ASIS-1 deployed at 43°41.5'N, 18°8.5'W, ASIS-2 deployed at 43°22.4'N, 17°51.4'W. ASIS-1 was recovered at 42°29.6'N, 15°55.3'W, ASIS-2 was recovered at 42°45.6'N, 15°55.8'W.

Sampling and Analytical Methodology:
During the deployment 2 separate ASIS Buoys were deployed, ASIS-1 & ASIS-2, upon each of which 2 SAMIs were attached. Each buoy had 1 SAMI-CO2 attached at 1 meter and 1 SAMI-CO2 attached at 5 meters depth. The SAMI-CO2 sampled on a 30 minute interval and a non-absorbing blank measurement was taken every 3.5 days. PAR was measured by a Li-COR LI-192 underwater quantum sensor (not calibrated). Oxygen data was obtained using a calibrated Aanderaa O_2 sensor (model 4175). Both the PAR and O2 sensors were attached to a SAMI-CO2 sensor. There is no pCO2 record at 1 meter on ASIS-2.

Data Processing Description

Data Processing:
The data were interpolated to a 30 minute interval

BCO-DMO Processing Notes
- Generated from the following list of original .xlsx files contributed by Cory Beatty
DOGEE_ASIS1_1m_SAMICO2.xlsx
DOGEE_ASIS1_5m_SAMICO2.xlsx
DOGEE_ASIS2_1m_SAMICO2.xlsx
DOGEE_ASIS2_5m_SAMICO2.xlsx
- Parameter names edited to conform to BCO-DMO naming convention found at Choosing Parameter Name
- Date reformatted to YYYYMMDD
- Time reformatted to HHMMSS

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Data Files

File
DOGEE-II.csv (Comma Separated Values (.csv), 513.83 KB) MD5:a0626b590d9a82efe748561dbf78ef5c Primary data file for dataset ID 630565

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Parameters

Parameter	Description	Units
CruiseId	Cruise Id	text
Expedition	Expedition Name	text
Dataset_Id	Dataset/Deployment Id	text
Date_Start	Start Date of Dataset/Deployment (UTC)	YYYYMMDD
Time_Start	Start Time of Dataset/Deployment (UTC)	HHMMSS
Lat_Start	Start Latitude of Dataset/Deployment (South is negative)	decimal degrees
Lon_Start	Start Longitude of Deployment (West is negative)	decimal degrees
Date_End	End Date of Dataset/Deployment (UTC)	YYYYMMDD

Time_End	End Time of Dataset/Deployment (UTC)	HHMMSS
Lat_End	End Latitude of Dataset/Deployment (South is negative)	decimal degrees
Lon_End	End Longitude of Deployment (West is negative)	decimal degrees
Excel_Date	Excel Date	xxxxx.xxxx
Year_Day	Jan 1 = YD1	xxx.xxxx
Date	Date (UTC)	YYYYMMDD
Time	Time (UTC)	HHMMSS
Temp	Temperature	oC
pCO2	Partial Pressure of Carbon Dioxide	uatm
PAR	PAR	uE m-2 sec-1
O2	O2	uM
ASIS_Lat	Latitude Position of ASIS Buoy at time of measurement (South is negative)	decimal degrees
ASIS_Lon	Longitude Position of ASIS Buoy at time of measurement (West is negative)	decimal degrees

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Instruments

Dataset-specific Instrument Name	Aanderaa O2 sensor (model 4175)
Generic Instrument Name	Aanderaa Oxygen Optodes
Dataset-specific Description	During the deployment 2 separate ASIS Buoys were deployed, ASIS-1 & ASIS-2, upon each of which 2 SAMIs were attached. Each buoy had 1 SAMI-CO2 attached at 1 meter and 1 SAMI-CO2 attached at 5 meters depth. The SAMI-CO2 sampled on a 30 minute interval and a non-absorbing blank measurement was taken every 3.5 days. PAR was measured by a Li-COR LI-192 underwater quantum sensor (not calibrated). Oxygen data was obtained using a calibrated Aanderaa O2 sensor (model 4175). Both the PAR and O2 sensors were attached to a SAMI-CO2 sensor. There is no pCO2 record at 1 meter on ASIS-2.
Generic Instrument Description	Aanderaa Oxygen Optodes are instrument for monitoring oxygen in the environment. For instrument information see the Aanderaa Oxygen Optodes Product Brochure.

Dataset-specific Instrument Name	ASIS-1, ASIS-2
Generic Instrument Name	Air-Sea Interaction Spar (ASIS) Buoy
Dataset-specific Description	During the deployment 2 separate ASIS Buoys were deployed, ASIS-1 & ASIS-2, upon each of which 2 SAMIs were attached. Each buoy had 1 SAMI-CO2 attached at 1 meter and 1 SAMI-CO2 attached at 5 meters depth. The SAMI-CO2 sampled on a 30 minute interval and a non-absorbing blank measurement was taken every 3.5 days. PAR was measured by a Li-COR LI-192 underwater quantum sensor (not calibrated). Oxygen data was obtained using a calibrated Aanderaa O2 sensor (model 4175). Both the PAR and O2 sensors were attached to a SAMI-CO2 sensor. There is no pCO2 record at 1 meter on ASIS-2.
Generic Instrument Description	See: Air-Sea Interaction Spar (ASIS) Buoy

Dataset-specific Instrument Name	Li-COR LI-192 underwater quantum sensor
Generic Instrument Name	LI-COR LI-192 PAR Sensor
Dataset-specific Description	During the deployment 2 separate ASIS Buoys were deployed, ASIS-1 & ASIS-2, upon each of which 2 SAMIs were attached. Each buoy had 1 SAMI-CO2 attached at 1 meter and 1 SAMI-CO2 attached at 5 meters depth. The SAMI-CO2 sampled on a 30 minute interval and a non-absorbing blank measurement was taken every 3.5 days. PAR was measured by a Li-COR LI-192 underwater quantum sensor (not calibrated). Oxygen data was obtained using a calibrated Aanderaa O2 sensor (model 4175). Both the PAR and O2 sensors were attached to a SAMI-CO2 sensor. There is no pCO2 record at 1 meter on ASIS-2.
Generic Instrument Description	The LI-192 Underwater Quantum Sensor (UWQ) measures underwater or atmospheric Photon Flux Density (PPFD) (Photosynthetically Available Radiation from 360 degrees) using a Silicon Photodiode and glass filters encased in a waterproof housing. The LI-192 is cosine corrected and features corrosion resistant, rugged construction for use in freshwater or saltwater and pressures up to 800 psi (5500 kPa, 560 meters depth). Typical output is in um s-1 m-2. The LI-192 uses computer-tailored filter glass to achieve the desired quantum response. Calibration is traceable to NIST. The LI-192 serial numbers begin with UWQ-XXXXX. LI-COR has been producing Underwater Quantum Sensors since 1973. These LI-192 sensors are typically listed as LI-192SA to designate the 2-pin connector on the base of the housing and require an Underwater Cable (LI-COR part number 2222UWB) to connect to the pins on the Sensor and connect to a data recording device. The LI-192 differs from the LI-193 primarily in sensitivity and angular response. 193: Sensitivity: Typically 7 uA per 1000 umol s-1 m-2 in water. Azimuth: < ± 3% error over 360° at 90° from normal axis. Angular Response: < ± 4% error up to ± 90° from normal axis. 192: Sensitivity: Typically 4 uA per 1000 umol s-1 m-2 in water. Azimuth: < ± 1% error over 360° at 45° elevation. Cosine Correction: Optimized for underwater and atmospheric use. (www.licor.com)

Dataset-specific Instrument Name	SAMI-CO2 pCO2
Generic Instrument Name	pCO2 Sensor
Dataset-specific Description	During the deployment 2 separate ASIS Buoys were deployed, ASIS-1 & ASIS-2, upon each of which 2 SAMIs were attached. Each buoy had 1 SAMI-CO2 attached at 1 meter and 1 SAMI-CO2 attached at 5 meters depth. The SAMI-CO2 sampled on a 30 minute interval and a non-absorbing blank measurement was taken every 3.5 days. PAR was measured by a Li-COR LI-192 underwater quantum sensor (not calibrated). Oxygen data was obtained using a calibrated Aanderaa O2 sensor (model 4175). Both the PAR and O2 sensors were attached to a SAMI-CO2 sensor. There is no pCO2 record at 1 meter on ASIS-2.
Generic Instrument Description	A sensor that measures the partial pressure of CO2 in water (pCO2)

Dataset-specific Instrument Name	SAMI-CO2 pCO2
Generic Instrument Name	Submersible Autonomous Moored Instrument
Dataset-specific Description	During the deployment 2 separate ASIS Buoys were deployed, ASIS-1 & ASIS-2, upon each of which 2 SAMIs were attached. Each buoy had 1 SAMI-CO2 attached at 1 meter and 1 SAMI-CO2 attached at 5 meters depth. The SAMI-CO2 sampled on a 30 minute interval and a non-absorbing blank measurement was taken every 3.5 days. PAR was measured by a Li-COR LI-192 underwater quantum sensor (not calibrated). Oxygen data was obtained using a calibrated Aanderaa O2 sensor (model 4175). Both the PAR and O2 sensors were attached to a SAMI-CO2 sensor. There is no pCO2 record at 1 meter on ASIS-2.
Generic Instrument Description	The Submersible Autonomous Moored Instrument (SAMI) measures and logs levels of dissolved chemicals in sea and fresh water. It is a plastic cylinder about 6 inches wide and 2 feet long that is self-powered and capable of hourly measurements for up to one year. All data collected are logged to an internal memory chip to be downloaded later. SAMI sensors usually are placed a few feet underwater on permanent moorings, while others on floating drifters sample the water wherever the wind and currents carry them. The instruments have been used by researchers around the globe in a variety of studies since 1999. Dr. Mike DeGrandpre, University of Montana, developed the SAMI between 1990 and 1993 during his postdoctoral work at the Woods Hole Oceanographic Institution (Woods Hole, MA, USA). For additional information, see URL: http://www.sunburstsensors.com/ from the manufacturer, Sunburst Sensors, LLC, 1226 West Broadway, Missoula, MT 59802.

Dataset-specific Instrument Name	SAMI-CO2 pCO2 and Temperature
Generic Instrument Name	Water Temperature Sensor
Dataset-specific Description	During the deployment 2 separate ASIS Buoys were deployed, ASIS-1 & ASIS-2, upon each of which 2 SAMIs were attached. Each buoy had 1 SAMI-CO2 attached at 1 meter and 1 SAMI-CO2 attached at 5 meters depth. The SAMI-CO2 sampled on a 30 minute interval and a non-absorbing blank measurement was taken every 3.5 days. PAR was measured by a Li-COR LI-192 underwater quantum sensor (not calibrated). Oxygen data was obtained using a calibrated Aanderaa O2 sensor (model 4175). Both the PAR and O2 sensors were attached to a SAMI-CO2 sensor. There is no pCO2 record at 1 meter on ASIS-2.
Generic Instrument Description	General term for an instrument that measures the temperature of the water with which it is in contact (thermometer).

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Deployments

D320

Website	https://www.bco-dmo.org/deployment/630523
Platform	RRS Discovery
Report	https://www.bodc.ac.uk/data/information_and_inventories/cruise_inventory/report/8296/
Start Date	2007-06-16
End Date	2007-07-18
Description	Cruise summary report: RRS Discovery D320 Note: No digital navigation for D320 could be located at BODC. The locations table is populated with the deployment and recovery sites of ASIS-1 and ASIS-2 spar buoys. srg/06Jan2016

DOGEE_ASIS1_1m_SAMICO2

Website	https://www.bco-dmo.org/deployment/630553
Platform	Air-Sea Interaction Spar (ASIS) Buoy
Report	https://www.bodc.ac.uk/data/information_and_inventories/cruise_inventory/report/8296/
Start Date	2007-06-22
End Date	2007-07-11
Description	See Cruise summary report: RRS Discovery D320 (Page 53)

DOGEE_ASIS1_5m_SAMICO2

Website	https://www.bco-dmo.org/deployment/630556
Platform	Air-Sea Interaction Spar (ASIS) Buoy
Report	https://www.bodc.ac.uk/data/information_and_inventories/cruise_inventory/report/8296/
Start Date	2007-06-22
End Date	2007-07-11
Description	See Cruise summary report: RRS Discovery D320 (Page 53)

DOGEE_ASIS2_1m_SAMICO2

Website	https://www.bco-dmo.org/deployment/630559
Platform	Air-Sea Interaction Spar (ASIS) Buoy
Report	https://www.bodc.ac.uk/data/information_and_inventories/cruise_inventory/report/8296/
Start Date	2007-06-27
End Date	2007-07-11
Description	See Cruise summary report: RRS Discovery D320 (Page 53)

DOGEE_ASIS2_5m_SAMICO2

Website	https://www.bco-dmo.org/deployment/630562
Platform	Air-Sea Interaction Spar (ASIS) Buoy
Report	https://www.bodc.ac.uk/data/information_and_inventories/cruise_inventory/report/8296/
Start Date	2007-06-27
End Date	2007-07-11
Description	See Cruise summary report: RRS Discovery D320 (Page 53)

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Project Information

Collaborative Research: Near-Surface controls of Air-Sea CO2 Exchange: A Contribution to the UK-SOLAS "Deep Ocean Gas Exchange Experiment" (DOGEE-II)

Coverage: North East Atlantic Ocean (limit 40W), Atlantic west of Iberian Peninsula and Ireland

The problem of quantifying the rate of gas flux across the air-water interface is one of the central questions of oceanography and is critical in the context of greenhouse gases and ocean-atmosphere budgets. The large uncertainty surrounding the flux of carbon dioxide (CO2) between the atmosphere and ocean prevent us from determining the partitioning of the sink of anthropogenic CO2 between the ocean and the terrestrial biosphere. This uncertainty also limits the ability to realistically model future atmospheric CO2 levels. The International SOLAS (Surface Ocean - Lower Atmosphere Study) science plan and implementation strategy highlights the need for an improved understanding of gas exchange. One of the stated goal of the SOLAS program to develop quantitative understanding of processes responsible for air-sea exchange of mass, momentum and energy to permit accurate calculation of regional and global gas and aerosol fluxes. This requires establishing the dependence of these interfacial transfer mechanisms on physical, biological and chemical factors within the atmospheric and oceanic boundary layers.

The investigator in this project will participate in the recently funded UK-SOLAS "Deep Ocean Gas Exchange Experiment", DOGEE. As part of this field experiment, two deliberate dual tracer patches will be released in close proximity to each other in the North Atlantic. One will be "labeled" with a surfactant in order to mimic the role of surface organic slicks in modifying gas transfer. The funded UK ship-based efforts will be enhanced with high resolution Lagrangian measurements of the air-sea interface. Specifically two Air-Sea Interaction Spar (ASIS) buoys, one in each patch, will be deployed to measure direct fluxes along with controlling surface physical processes (wind speed, wind stress, stability, surface waves, upper ocean turbulence and mixing, and key parameters governing mixed layer CO2 dynamics). In addition, a newly developed Air-Sea Interaction Profiler will be deployed to provide thermal and shear measurements in the very near surface. With these measurements, gas transfer process related specifically to surfactant effects, and to high wind processes will be better understood.

Broader impacts: The current lack of an adequate parameterization of air-sea gas transfer rates contributes directly to our inability to predict with certainty future concentrations of CO2 and other climate relevant compounds in the atmosphere. This project will improve the accuracy of the global ocean carbon dioxide flux estimates and increase our understanding of the causes of its variability. Another broader impact is that this proposal establishes an international collaboration between research institutes in the US (RSMAS/U. Montana/ODU) and the UK. The proposed measurements employ state-of-the-art instrumentation, which will enhance the DOGEE experiment. The opportunity to participate in this experiment, and access to the data for subsequent analysis will provide for a unique dataset with which to increase our understanding of the role of air-sea CO2 exchange in influencing climate. The project will involve students as undergraduate and post-graduate research assistants. The University of Miami is a Hispanic Serving Institution and thereby fosters the participation of under-represented groups in science and engineering. The data will be made available through several data bases via WWW. The project will contribute to the active outreach activities coordinated through the RSMAS Dean's Office.

This project is a contribution to the international SOLAS program.
PUBLICATIONS PRODUCED AS A RESULT OF THIS RESEARCH

Note: *When clicking on a Digital Object Identifier (DOI) number, you will be taken to an external site maintained by the publisher. Some full text articles may not yet be available without a charge during the embargo (administrative interval).*

Some links on this page may take you to non-federal websites. Their policies may differ from this site.

Brooks, I.M. et al. (M.D. DeGrandpre 12th of 54 authors in alphabetical order). "Physical exchanges at the air-sea interface: UK-SOLAS field measurements," *Bulletin of the American Meteoroligical Society*, v.90, 2009, p. 629. doi:10.1175/2008BAMS2578.1

Byrne, R.H., DeGrandpre, M.D., Short, R.T., Martz, T.R., Merlivat, L., McNeil, C., Sayles, F.L., Bell, R. and P. Fietzek. "Sensors and systems for observation of marine CO2 system variables," *roceedings of OceanObsâ?? 09: Sustained Ocean Observations and Information for Society (Vol. 2)*, v.2, 2010. doi:doi:10.5270/OceanObs09.cwp.13

Turk, D. Malacic, V., DeGrandpre, M.D. and W. R. McGillis. "Carbon dioxide variability and air-sea fluxes in the northern Adriatic Sea," *Journal of Geophysical Research*, v.115, 2010. doi:doi:10.1029/2009JC006034

Edson, JB; Degrandpre, MD; Frew, N; McGillis, WR. "Investigations of Air-Sea Gas Exchange in the CoOP Coastal Air-Sea Chemical Exchange Project," *OCEANOGRAPHY*, v.21, 2008, p. 34. View record at Web of Science

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Program Information

UK Surface Ocean - Lower Atmosphere Study (UK SOLAS)

Website: http://www.bodc.ac.uk/projects/uk/uksolas/

Coverage: Global

The UK Surface Ocean - Lower Atmosphere Study (UK SOLAS) was devised to examine the interaction between the atmosphere and ocean. The focus was on chemical exchanges that affect marine productivity and climate. UK SOLAS was the UK's contribution to the international SOLAS programme. UK SOLAS data are managed by the UK SOLAS Data Centre (SDC), co-ordinated by the British Oceanographic Data Centre (BODC) in collaboration with the British Atmospheric Data Centre (BADC). Follow the links below, or on the side menu bar to find out more

UK SOLAS Final Report (.pdf)

International SOLAS Web site

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0623294

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