

pCO₂, pH, salinity and temperature data collected off the coast of Oregon, USA by a SAMI-CO₂ sensor on the Shelf Break Mooring located below the National Data Buoy Center's meteorological Buoy 46050; 2007-2011 (NH10_ShelfBreak_MLR project)

Website: <https://www.bco-dmo.org/dataset/632498>

Version: 12 January 2016

Version Date: 2016-01-12

Project

» [Collaborative Research: Autonomous pH and Alkalinity Sensors: in situ Testing and Carbon Cycle Research](#)
(NH10_ShelfBreak_MLR)

| Contributors | Affiliation | Role |
|-------------------------------------|---|---------------------------------|
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| Gegg, Stephen R. | Woods Hole Oceanographic Institution (WHOI BCO-DMO) | BCO-DMO Data Manager |

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Dataset Description

pCO₂, pH, salinity & temperature collected off the coast of Oregon, USA, by a SAMI-CO₂ or SAMI-pH. Salinity data was collected by a Seabird Microcat CTD - Shelf Break and NH10

Methods & Sampling

The NH10 SAMIs sampled on a 60 minute interval. The SAMI-CO₂ ran a non-absorbing blank measurement every 3.5 days.

The Shelf Break SAMIs sampled on a 120 minute interval. The SAMI-CO₂ ran a non-absorbing blank measurement every 3.5 days.

Related files and references:

Harris, K. E., M. D. DeGrandpre, and B. Hales (2013), *Aragonite saturation state dynamics in a coastal upwelling zone*, *Geophys. Res. Lett.*, 40, 2720–2725

Evans, W., B. Hales, and P. G. Strutton (2011), *Seasonal cycle of surface ocean pCO₂ on the Oregon shelf*, *J. Geophys. Res.*, 116, C05012

Data Processing Description

Data Processing:

See DeGrandpre et al. (1995)

BCO-DMO Processing Notes

- Generated from the following list of original .xlsx files contributed by Cory Beatty

SB_Oct09-Apr10_SAMICO2.xlsx

NH10_2007_SAMICO2.xlsx

NH10_2008_SAMICO2.xlsx

NH10_2009_SAMICO2_SAMIpH.xlsx

NH10_2010_SAMICO2.xlsx

NH10_2011_SAMICO2_SAMIpH.xlsx

- Parameter names edited to conform to BCO-DMO naming convention found at [Choosing Parameter Name](#)

- Params pH and Sal added to some datasets for compatibility

- If not collected pH and Sal assigned "NaN" values

- Date reformatted to YYYYMMDD

- Time reformatted to HHMMSS

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Data Files

| File |
|--|
| NH10_SB.csv (Comma Separated Values (.csv), 1.80 MB) MD5:dbbce83989d19ef3c01643b57226107b Primary data file for dataset ID 632498 |

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Parameters

| Parameter | Description | Units |
|------------|--|-----------------|
| Site | Site | text |
| Deployment | Deployment Id | text |
| Latitude | Latitude of Deployment (South is negative) | decimal degrees |
| Longitude | 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 |
| pCO2 | Partial Pressure of Carbon Dioxide | uatm |
| pH | pH | pH Units |
| Temp | Temperature | oC |
| Sal | Salinity | psu |

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Instruments

| | |
|---|---|
| Dataset-specific Instrument Name | Seabird Microcat CTD |
| Generic Instrument Name | CTD Sea-Bird MicroCAT 37 |
| Dataset-specific Description | Salinity data was collected by a Seabird Microcat CTD |
| Generic Instrument Description | The Sea-Bird MicroCAT CTD unit is a high-accuracy conductivity and temperature recorder based on the Sea-Bird SBE 37 MicroCAT series of products. It can be configured with optional pressure sensor, internal batteries, memory, built-in Inductive Modem, integral Pump, and/or SBE-43 Integrated Dissolved Oxygen sensor. Constructed of titanium and other non-corroding materials for long life with minimal maintenance, the MicroCAT is designed for long duration on moorings. In a typical mooring, a modem module housed in the buoy communicates with underwater instruments and is interfaced to a computer or data logger via serial port. The computer or data logger is programmed to poll each instrument on the mooring for its data, and send the data to a telemetry transmitter (satellite link, cell phone, RF modem, etc.). The MicroCAT saves data in memory for upload after recovery, providing a data backup if real-time telemetry is interrupted. |

| | |
|---|--|
| Dataset-specific Instrument Name | SAMI-CO2 pCO2 |
| Generic Instrument Name | pCO2 Sensor |
| Dataset-specific Description | SAMI-CO2 pCO2 and Temperature mooring time series data collected on the Buzzards Bay mooring |
| 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 | SAMI-CO2 pCO2 and Temperature mooring time series data collected on the Buzzards Bay mooring |
| 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.sunburstensors.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 | SAMI-CO2 pCO2 and Temperature mooring time series data collected on the Buzzards Bay mooring |
| 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

SB_Oct09-Apr10_SAMICO2

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/632528 |
| Platform | NDBC46050 - Shelf Break Mooring |
| Start Date | 2009-10-24 |
| End Date | 2010-04-14 |

NH10_2007_SAMICO2

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/632483 |
| Platform | NANOOS/CMOP NH10 Buoy |
| Start Date | 2007-08-26 |
| End Date | 2007-11-06 |

NH10_2008_SAMICO2

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/632486 |
| Platform | NANOOS/CMOP NH10 Buoy |
| Start Date | 2008-04-10 |
| End Date | 2008-08-10 |

NH10_2009_SAMICO2_SAMIpH

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/632489 |
| Platform | NANOOS/CMOP NH10 Buoy |
| Start Date | 2009-03-23 |
| End Date | 2010-02-28 |

NH10_2010_SAMICO2

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/632492 |
| Platform | NANOOS/CMOP NH10 Buoy |
| Start Date | 2010-01-01 |
| End Date | 2010-10-29 |

NH10_2011_SAMICO2_SAMipH

| | |
|-------------------|---|
| Website | https://www.bco-dmo.org/deployment/632495 |
| Platform | NANOOS/CMOP NH10 Buoy |
| Start Date | 2011-04-11 |
| End Date | 2011-09-06 |

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Project Information

Collaborative Research: Autonomous pH and Alkalinity Sensors: in situ Testing and Carbon Cycle Research (NH10_ShelfBreak_MLR)

Coverage: Coastal ocean waters off the U.S. central west coast, and a shallow coral ecosystem in Puerto Rico

The earth's carbon cycle has been dramatically altered by global human industrialization. The movement of carbon from ancient fossil deposits to the atmosphere and into marine and terrestrial biospheres has many consequences, few of which are currently fully understood or predictable. Much of the needed understanding of the carbon cycle may come from better observational methods that can characterize large spans of time or space. One group of observational methods, autonomous sensors, can provide high temporal resolution data within air, earth or water systems. In this research, PIs from the University of Montana, Oregon State University and University of Miami will develop and use autonomous sensors to advance our understanding of carbon cycling within the earth's biosphere. With prior support, they have developed sensors for the partial pressure of CO₂ (pCO₂), pH and total alkalinity that can be used to quantify the amount of dissolved inorganic carbon through thermodynamic relationships. The more recently developed, currently laboratory-based sensors (pH and alkalinity) will be further refined for subsequent deployment, along with the more mature pCO₂ sensor, in two contrasting marine environments; the coastal ocean waters off the U.S. central west coast, and a shallow coral ecosystem in Puerto Rico. Field studies will begin with a short, in situ test off Oregon State University's pier in Newport, Oregon followed by deployment on the Oregon shelf to study the processes that control air-sea carbon dioxide fluxes during periods of coastal upwelling. Concurrently, the same sensors will be deployed in La Parguera Marine Reserve, Puerto Rico, a Coral Reef Early Warning System (CREWS) site operated by NOAA to focus on the relationship of calcium carbonate saturation states to calcification rates in a coral reef ecosystem.

The project will have a number of broad impacts including the technological development of rigorously tested sensors that will have a wide range of applications in marine and freshwater research. Students will be trained in the area of chemical sensor development who will subsequently become the next generation of leaders in this important research area. Outreach activities related to the grant will create awareness for contemporary carbon cycle issues such as greenhouse gas warming and ocean acidification.

PUBLICATIONS PRODUCED AS A RESULT OF THIS RESEARCH

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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

Hamme, R.C., Webley, P.W., Crawford, W.R., Whitney, F.A., DeGrandpre, M.D., Emerson, S.R., Eriksen, C.C., Giesbrecht, K.E., Gower, J.F.R., Kavanaugh, M.T., Peñã, M.A., Sabine, C.L., Batten, S.D., Coogan, L.A., Grundle, D.S., and D. Lockwood. "Volcanic ash fuels anomalous plankton bloom in subarctic Northeast Pacific," *Geophysical Research Letters*, v.37, 2010, p. L19604. doi:10.1029/2010GL044629

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," *Proceedings for Ocean Observations 2009*, 2010.

BOOKS/ONE TIME PROCEEDING

Cullison, S.E.. "MARINE APPLICATIONS OF AN AUTONOMOUS INDICATOR-BASED pH SENSOR", 10/01/2009-09/30/2010, 2010, "The University of Montana".

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Funding

| Funding Source | Award |
|--|-----------------------------|
| NSF Division of Ocean Sciences (NSF OCE) | OCE-0628569 |

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