# Niskin bottle basic CTD hydrographic data from R/V Oceanus OC404-01, OC404-04, OC415-01, OC415-02, OC415-03, OC415-04 in the Sargasso Sea, 2004-2005 (EDDIES project)

**Website**: https://www.bco-dmo.org/dataset/3037
**Version**: 1 November 2007
**Version Date**: 2007-11-01

**Project**
» Eddies Dynamics, Mixing, Export, and Species composition (EDDIES)

**Program**
» Ocean Carbon and Biogeochemistry (OCB)


| Contributors | Affiliation | Role |
|---|---|---|
| Ledwell, James R. | Woods Hole Oceanographic Institution (WHOI) | Principal Investigator |
| McGillicuddy, Dennis J. | Woods Hole Oceanographic Institution (WHOI) | Principal Investigator |
| Kosnyrev, Olga | Woods Hole Oceanographic Institution (WHOI) | Contact |
| Chandler, Cynthia L. | Woods Hole Oceanographic Institution (WHOI BCO-DMO) | BCO-DMO Data Manager |


## Table of Contents



## Dataset Description

**PI:** Dennis McGillicuddy
**of:** Woods Hole Oceanographic Institution (WHOI)
**dataset:** Niskin bottle basic CTD hydrographic data
**platform:** R/V Oceanus

[ table of contents | back to top ]

## Parameters

| Parameter | Description | Units |
|---|---|---|
| event | unique sampling event number | YYYYMMDDhhmm |
| date | start date of event (GMT) | YYYYMMDD |
| time | start time of event (GMT) | hhmm |
| lon | longitude, negative denotes West | decimal degrees |
| lat | latitude, negative denotes South | decimal degrees |
| sta | station number | dimensionless |
| bot | Niskin bottle number | dimensionless |
| Nis | Niskin bottle order number | dimensionless |
| depth_n | depth, nominal bottle firing | meters |
| depth | depth, calculated from pressure | meters |
| press | pressure, from CTD | decibars |
| temp | temperature, from CTD, ITS-90 | degrees Celsius |
| sal_CTD | salinity, from CTD, PSS-78 (PSU) (from primary T0,C0 sensors) | dimensionless |
| sal_bot | salinity, bottle sample PSU | dimensionless |
| sigma_0 | sigma theta (potential density) | kilograms/meter^3 |
| fluor_chla | fluorescence, (WET Labs eco) | micrograms/liter |
| cast | cast number for event | dimensionless |
| potemp | potential temperature, ITS-90 (from primary T0,C0 sensors) | degrees Celsius |
| O2_mg_L | oxygen, dissolved from SBE 43 | milligrams/liter |
| PAR | irradiance, Biospherical/Licor | microEinsteins/meter^2/second |
| fluor | fluorescence, (wetlabs eco) | micrograms/liter |
| O2_ml_L | oxygen, dissolved from SBE 43 | milliliters/liter |
| O2_ml_L_S | oxygen, dissolved (secondary) | milliliters/liter |
| SPAR | surface irradiance | microEinsteins/meter^2/second |
| trans | light transmission Chelsea/Seatech/Wetlab CStar | percent/100 |
| cond | conductivity, from CTD (from primary C0 sensor) | Siemens/meter |
| temp_S | temperature, from CTD, ITS-90 (from secondary T1 sensor) | degrees Celsius |
| sal_CTD_S | salinity, from CTD, PSS-78 (PSU) (from secondary T1,C1 sensors) | dimensionless |
| potemp_S | potential temperature, ITS-90 (from secondary T1,C1 sensors) | degrees Celsius |
| sigma_0_S | sigma theta (potential density) (from secondary T1,C1 sensors) | kilograms/meter^3 |
| cond_S | conductivity, from CTD (from secondary C1 sensor) | Siemens/meter |

[ table of contents | back to top ]

## Instruments

| | |
|---|---|
| **Dataset-specific Instrument Name** | SeaBird 911+ CTD |
| **Generic Instrument Name** | CTD Sea-Bird 911 |
| **Dataset-specific Description** | SeaBird SBE 911/917 plus CTD |
| **Generic Instrument Description** | The Sea-Bird SBE 911 is a type of CTD instrument package. The SBE 911 includes the SBE 9 Underwater Unit and the SBE 11 Deck Unit (for real-time readout using conductive wire) for deployment from a vessel. The combination of the SBE 9 and SBE 11 is called a SBE 911. The SBE 9 uses Sea-Bird's standard modular temperature and conductivity sensors (SBE 3 and SBE 4). The SBE 9 CTD can be configured with auxiliary sensors to measure other parameters including dissolved oxygen, pH, turbidity, fluorescence, light (PAR), light transmission, etc.). More information from Sea-Bird Electronics. |

| | |
|---|---|
| **Dataset-specific Instrument Name** | Niskin Bottle |
| **Generic Instrument Name** | Niskin bottle |
| **Generic Instrument Description** | A Niskin bottle (a next generation water sampler based on the Nansen bottle) is a cylindrical, non-metallic water collection device with stoppers at both ends. The bottles can be attached individually on a hydrowire or deployed in 12, 24, or 36 bottle Rosette systems mounted on a frame and combined with a CTD. Niskin bottles are used to collect discrete water samples for a range of measurements including pigments, nutrients, plankton, etc. |

[ table of contents | back to top ]

## Deployments

### OC404-01

| | |
|---|---|
| **Website** | https://www.bco-dmo.org/deployment/57956 |
| **Platform** | R/V Oceanus |
| **Report** | http://ocb.whoi.edu/EDDIES/CRUISES/2004/OC404-1_Draft_Cruise_Report.pdf |
| **Start Date** | 2004-06-11 |
| **End Date** | 2004-07-03 |
| **Description** | EDDIES 2004 Survey 1 cruise Funded by: NSF OCE-0241310 Original cruise data are available from the NSF R2R data catalog (Cruise DOI: 10.7284/900337)<br><br>**Methods & Sampling**<br>PI: Dennis McGillicuddy of: Woods Hole Oceanographic Institution (WHOI) dataset: Niskin bottle basic CTD hydrographic data dates: 12 June 2004 to 03 July 2004 (20040612-20040703) location: N: 37.934 S: 29.777 W: -68.703 E: -58.754 project/cruise: EDDIES/OC404-1 2004 Survey 1 platform: R/V Oceanus Methodology Change history: YYMMDD 050621: downloaded original data from EDDIES data web site; added to OCB database by Cyndy Chandler, OCB DMO; 060314: add bottle sample salinity measurements 060322: add V1 data from BTL files (fluor_chla) 071101: downloaded June 2007 reprocessed *.BTL files from EDDIES data web site; compute and add depth and depth_n; this version includes data from station 65; added to OCB database by Cyndy Chandler (BCO-DMO, WHOI) DMO Note: data were recovered from Seabird *.BTL bottle files; and only data from the primary sensors were retained; Niskin bottle number is that which was reported by SeaBird, and not the N# recorded on the CTD cast log sheets. The Nis Niskin bottle order number should match the number recorded on the CTD cast log sheets. |

**OC404-04**

| | |
|---|---|
| **Website** | https://www.bco-dmo.org/deployment/57961 |
| **Platform** | R/V Oceanus |
| **Report** | http://ocb.whoi.edu/EDDIES/CRUISES/2004/OC404-4_Draft_Cruise_Report.pdf |
| **Start Date** | 2004-07-25 |
| **End Date** | 2004-08-12 |
| **Description** | EDDIES project 2004 Survey 2 cruise Funded by: NSF OCE-0241310 Original cruise data are available from the NSF R2R data catalog<br><br>**Methods & Sampling**<br>PI: Dennis McGillicuddy of: Woods Hole Oceanographic Institution (WHOI) dataset: Niskin bottle basic CTD hydrographic data (68 stations) dates: 26 July 2004 to 11 August 2004 (20040726-20040811) location: N: 31.942 S: 29.958 W: -66.603 E: -59.450 project/cruise: EDDIES/OC404-4 2004 Survey 2 platform: R/V Oceanus Methodology Change history: YYMMDD 050621: downloaded original *.BTL data from EDDIES data web site; added to OCB database by Cyndy Chandler, OCB DMO; 060105. Depth was calculated from pressure and depth_n also added. 060314: add bottle sample salinity measurements 060322: add V1 data from BTL files (fluor_chla) 060627: add Niskin order number (Nis) 071101: downloaded June 2007 reprocessed *.BTL files from EDDIES data web site; compute and add depth and depth_n; added to OCB database by Cyndy Chandler (BCO-DMO, WHOI) DMO Note: data were recovered from Seabird *.BTL bottle files; and only data from the primary sensors were retained; Niskin bottle number is that which was reported by SeaBird, and not the N# recorded on the CTD cast log sheets. The Nis Niskin bottle order number should match the number recorded on the CTD cast log sheets. |

**OC415-01**

| | |
|---|---|
| **Website** | https://www.bco-dmo.org/deployment/57962 |
| **Platform** | R/V Oceanus |
| **Report** | http://ocb.whoi.edu/EDDIES/CRUISES/2005/OC415_Draft_Cruise_Report_050722.pdf |
| **Start Date** | 2005-06-20 |
| **End Date** | 2005-07-15 |
| **Description** | EDDIES project 2005 Survey 1 cruise Funded by: NSF OCE-0241310 Original cruise data are available from the NSF R2R data catalog<br><br>**Methods & Sampling**<br>PI: Dennis McGillicuddy of: Woods Hole Oceanographic Institution (WHOI) dataset: Niskin bottle basic CTD hydrographic data dates: 20 June 2005 to 15 July 2005 location: N: 40.753 S: 28.733 W: -70.546 E: -61.920 project/cruise: EDDIES/OC415-1 2005 Survey 1 platform: R/V Oceanus Methodology Change history: YYMMDD 051220: downloaded original data from EDDIES data web site; added to OCB database by Cyndy Chandler, OCB DMO 060627. add Niskin bottle number (bot) DMO Note: data were recovered from Seabird *.BTL bottle files; and only data from the primary sensors were retained; Depth was calculated from pressure (see DMO note); Niskin bottle number is that which was reported by SeaBird, and not the N# recorded on the CTD cast log sheets. The Nis Niskin bottle order number should match the number recorded on the CTD cast log sheets. |

**OC415-02**

| | |
|---|---|
| **Website** | https://www.bco-dmo.org/deployment/57964 |
| **Platform** | R/V Oceanus |
| **Start Date** | 2005-07-18 |
| **End Date** | 2005-08-04 |
| **Description** | EDDIES project 2005 Tracer 1 cruise Funded by: NSF OCE-0241310 Original cruise data are available from the NSF R2R data catalog<br><br>**Methods & Sampling**<br>PI: Jim Ledwell (Chief Scientist) of: Woods Hole Oceanographic Institution (WHOI) dataset: Niskin bottle basic CTD hydrographic data dates: 19 July 2005 to 01 August 2005 (20050719-20050801) location: N: 30.785 S: 28.306 W: -67.826 E: -66.576 project/cruise: EDDIES/OC415-2 2005 Tracer 1 platform: R/V Oceanus Methodology: see CTD methodology for this cruise Change history: YYMMDD 050906: downloaded original data from EDDIES data web site; added to OCB database by Cyndy Chandler, OCB DMO 070302: added depth_n (matlab) and Nis to enable data merge 070309: OCB DMO corrected bottle numbers (bot, Nis) for cast 1 070524: units confirmed via email by Larry Anderson (WHOI) DMO Note: data were recovered from Seabird *.btl bottle files; and only data from the primary sensors were retained; Niskin bottle number is that which was reported by SeaBird, and not the N# recorded on the CTD cast log sheets. The Nis Niskin bottle order number should match the number recorded on the CTD cast log sheets. |

**OC415-03**

| | |
|---|---|
| **Website** | https://www.bco-dmo.org/deployment/57965 |
| **Platform** | R/V Oceanus |
| **Report** | http://ocb.whoi.edu/EDDIES/CRUISES/2005/OC415-3_CrRptDraft_091405.pdf |
| **Start Date** | 2005-08-07 |
| **End Date** | 2005-08-26 |
| **Description** | EDDIES project 2005 Survey 2 cruise Funded by: NSF OCE-0241310 Original cruise data are available from the NSF R2R data catalog<br><br>**Methods & Sampling**<br>PI: Dennis McGillicuddy of: Woods Hole Oceanographic Institution (WHOI) dataset: Niskin bottle basic CTD hydrographic data dates: 07 August 2005 to 25 August 2005 (20050807-20050825) location: N: 33.064 S: 29.279 W: -69.409 E: -63.165 project/cruise: EDDIES/OC415-3 2005 Survey 2 platform: R/V Oceanus Methodology Change history: YYMMDD 051221: downloaded original data from EDDIES data web site; 060217: added to OCB database by Cyndy Chandler, OCB DMO 060627. add Niskin bottle number (bot) 070524: units confirmed via email by Larry Anderson (WHOI) DMO Note: Data were recovered from Seabird *.BTL files. Data from both primary and secondary oxygen sensors are included. Secondary sensor parameter names all end in "_S". |

**OC415-04**

| | |
|---|---|
| **Website** | https://www.bco-dmo.org/deployment/57967 |
| **Platform** | R/V Oceanus |
| **Report** | http://ocb.whoi.edu/EDDIES/CRUISES/2005/OC415-4_cruise_report.pdf |
| **Start Date** | 2005-08-29 |
| **End Date** | 2005-09-15 |
| **Description** | EDDIES project 2005 Tracer 2 cruise Funded by: NSF OCE-0241310 The cruise end date was originally entered as 9/14/2005 (source: UNOLS final ship schedule), but this was changed in February 2015 to end date 9/15/2005. The official record from the vessel operator shows the end date being 9/15/2015. Original cruise data are available from the NSF R2R data catalog<br><br>**Methods & Sampling**<br>PI: Jim Ledwell (Chief Scientist) of: Woods Hole Oceanographic Institution (WHOI) dataset: Niskin bottle basic CTD hydrographic data dates: 31 August 2005 to 11 September 2005 (20050831-20050911) location: N: 30.460 S: 29.558 W: -70.374 E: -69.200 project/cruise: EDDIES/OC415-4 2005 Tracer 2 platform: R/V Oceanus Methodology Change history: YYMMDD 051221: downloaded original CTD/Niskin data files from EDDIES data web site; 060228: added to OCB database by Cyndy Chandler, OCB DMO 070302: replaced with new data from Olga Kosnyreva (WHOI); revised oxygen calibrations applied and new data for SPAR and light transmission 070524: units confirmed via email by Larry Anderson (WHOI) DMO Note: data were recovered from Seabird *.btl bottle files; Data are reported for primary and secondary (_S) sensors; Niskin bottle number is that which was reported by SeaBird, and not the N# recorded on the CTD cast log sheets. The Nis Niskin bottle order number should match the number recorded on the CTD cast log sheets; PAR irradiance data (Biospherical/Licor) were recorded during acquisition, but all values were 2.2802e-01, so those data were not loaded into this database; |

[ table of contents | back to top ]

## Project Information

**Eddies Dynamics, Mixing, Export, and Species composition (EDDIES)**

**Website**: http://science.whoi.edu/users/olga/eddies/EDDIES_Project.html

**Coverage**: Sargasso Sea

The original title of this project from the NSF award is: Collaborative Research: Impacts of Eddies and Mixing on Plankton Community Structure and Biogeochemical Cycling in the Sargasso Sea".

Prior results have documented eddy-driven transport of nutrients into the euphotic zone and the associated accumulation of chlorophyll. However, several key aspects of mesoscale upwelling events remain unresolved by the extant database, including: (1) phytoplankton physiological response, (2) changes in community structure, (3) impact on export out of the euphotic zone, (4) rates of mixing between the surface mixed layer and the base of the euphotic zone, and (5) implications for biogeochemistry and differential cycling of carbon and associated bioactive elements. This leads to the following hypotheses concerning the complex, non-linear biological regulation of elemental cycling in the ocean:

H1: Eddy-induced upwelling, in combination with diapycnal mixing in the upper ocean, introduces new nutrients into the euphotic zone.

H2: The increase in inorganic nutrients stimulates a physiological response within the phytoplankton community.

H3: Differing physiological responses of the various species bring about a shift in community structure.

H4: Changes in community structure lead to increases in export from, and changes in biogeochemical cycling within, the upper ocean.

**Publications**


Andrews, J.E., Hartin, C., and Buesseler, K.O.. "7Be Analyses in Seawater by Low Background Gamma-Spectroscopy.," Journal of Radioanalytical and Nuclear Chemistry, v.277, 2008, p. 253.

Andrews, J.E., Hartin, C., Buesseler, K.O.. "7Be Analyses in Seawater by Low Background Gamma-Spectroscopy," Journal of Radioanalytical and Nuclear Chemistry, v.277, 2008, p. 253.

Benitez-Nelson, C.R. and McGillicuddy, D.J.. "Mesoscale Physical-Biological-Biogeochemical Linkages in the Open Ocean: An Introduction to the Results of the E-Flux and EDDIES Programs.," Deep Sea Research II, v.55, 2008, p. 1133.

Benitez-Nelson, C.R. and McGillicuddy, D.J.. "Mesoscale Physical-Biological-Biogeochemical Linkages in the Open Ocean: An Introduction to the Results of the E-Flux and EDDIES Programs," Deep-Sea Research II, v.55, 2008, p. 1133.

Bibby, T.S., Gorbunov, M.Y., Wyman, K.W., Falkowski, P.G.. "Photosynthetic community responses to upwelling in mesoscale eddies in the subtropical North Atlantic and Pacific Oceans," Deep-Sea Research Part II: Topical Studies in Oceanography, v.55, 2008, p. 1310.

Buesseler, K.O., Lamborg, C., Cai, P., Escoube, R., Johnson, R., Pike, S., Masque, P., McGillicuddy, D.J., Verdeny, E.. "Particle Fluxes Associated with Mesoscale Eddies in the Sargasso Sea," Deep Sea Research II, v.55, 2008, p. 1426.

Carlson, C.A., del Giorgio, P., Herdl, G.. "Microbes and the dissipation of energy and respiration: From cells to ecosystems," Oceanography, v.20, 2007, p. 89.

Davis, C.S., and McGillicuddy, D.J.. "Transatlantic Abundance of the N2-Fixing Colonial Cyanobacterium Trichodesmium," Science, v.312, 2006, p. 1517.

Ewart, C.S., Meyers, M.K., Wallner, E., McGillicuddy, D.J., Carlson, C.A.. "Microbial Dynamics in Cyclonic and Anticyclonic Mode-Water Eddies in the Northwestern Sargasso Sea," Deep Sea Research II, v.55, 2008, p. 1334.

Ewart, C.S., Meyers, M.K., Wallner, E., McGillicuddy, D.J., Carlson, C.A.. "Microbial Dynamics in Cyclonic and Anticyclonic Mode-Water Eddies in the Northwestern Sargasso Sea," Deep-Sea Research II, v.55, 2008, p. 1334.

Goldthwait, S.A. and Steinberg, D.K.. "Elevated biomass of mesozooplankton and enhanced fecal pellet flux in cyclonic and mode-water eddies in the Sargasso Sea," Deep-Sea Research Part II: Topical Studies in Oceanography, v.55, 2008, p. 1360.

Greenan, B.J.W.. "Shear and Richardson number in a mode-water eddy," Deep-Sea Research Part II: Topical Studies in Oceanography, v.55, 2008, p. 1161.

Jenkins, W.J., McGillicuddy, D.J., and Lott III, D.E.. "The Distributions of, and Relationship Between 3 He and Nitrate in Eddies," Deep Sea Research II, v.55, 2008, p. 1389.

Jenkins, W.J., McGillicuddy, D.J., Lott III, D.E.. "The Distributions of, and Relationship Between 3 He and Nitrate in Eddies," Deep-Sea Research II, v.55, 2008, p. 1389.

Ledwell, J.R., McGillicuddy, D.J., and Anderson, L.A.. "Nutrient Flux into an Intense Deep Chlorophyll Layer in a Mode-water Eddy.," Deep Sea Research II, v.55, 2008, p. 1139.

Ledwell, J.R., McGillicuddy, D.J., Anderson, L.A.. "Nutrient Flux into an Intense Deep Chlorophyll Layer in a Mode-water Eddy," Deep-Sea Research II, v.55, 2008, p. 1139.

Li, Q.P. and Hansell, D.A.. "Intercomparison and coupling of MAGIC and LWCC techniques for trace analysis of phosphate in seawater," Analytical Chemica Acta, v.611, 2008, p. 68.

Li, Q.P., Hansell, D.A., McGillicuddy, D.J., Bates, N.R., Johnson, R.J.. "Tracer-based assessment of the origin and biogeochemical transformation of a cyclonic eddy in the Sargasso Sea," Journal of Geophysical Research, v.113, 2008, p. 10006.

Li, Q.P., Hansell, D.A., Zhang, J.-Z.. "Underway monitoring of nanomolar nitrate plus nitrite and phosphate in oligotrophic seawater," Limnology and Oceanography: Methods, v.6, 2008, p. 319.

Li, Q.P., Zhang, J.-Z., Millero, F.J., Hansell, D.A.. "Continuous colorimetric determination of trace ammonium in seawater with a long-path liquid waveguide capillary cell," Marine Chemistry, v.96, 2005, p. 73.

McGillicuddy, D.J., et. al.. "Eddy/Wind Interactions Stimulate Extraordinary Mid-Ocean Plankton Blooms," Science, v.316, 2007, p. 1021.

McGillicuddy, D.J., Ledwell, J.R., and Anderson, L.A.. "Response to Comment on "Eddy/Wind Interactions Stimulate Extraordinary Mid-Ocean Plankton Bloom"," Science, v.320, 2008.

McGillicuddy, D.J., Ledwell, J.R., Anderson, L.A.. "Response to Comment on "Eddy/Wind Interactions Stimulate Extraordinary Mid-Ocean Plankton Bloom"," Science, v.320, 2008.

McGillicuddy, et. al.. "Eddy/Wind Interactions Stimulate Extraordinary Mid-Ocean Plankton Blooms.," Science, v.316, 2007, p. 1021.

Mourino B., and McGillicuddy, D.J.. "Mesoscale Variability in the Metabolic Balance of the Sargasso Sea," Limnology & Oceanography, v.51, 2006, p. 2675.

[ table of contents | back to top ]

## 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.

[ table of contents | back to top ]

## Funding


| Funding Source | Award |
|---|---|
| NSF Division of Ocean Sciences (NSF OCE) | OCE-0241310 |


[ table of contents | back to top ]