

# Nutrient measurements from Niskin bottle samples from R/V Oceanus OC415-02, OC415-04 cruises in the Sargasso Sea in 2005 (EDDIES project)

Website: <https://www.bco-dmo.org/dataset/3049>

Version: 13 March 2007

Version Date: 2007-03-13

## Project

» [Eddies Dynamics, Mixing, Export, and Species composition](#) (EDDIES)

## Program

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

Contributors	Affiliation	Role
<a href="#">Ledwell, James R.</a>	Woods Hole Oceanographic Institution (WHOI)	Principal Investigator
<a href="#">Henderson, Paul B.</a>	Woods Hole Oceanographic Institution (WHOI)	Technician
<a href="#">Chandler, Cynthia L.</a>	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

---

## Table of Contents

- [Dataset Description](#)
- [Parameters](#)
- [Instruments](#)
- [Deployments](#)
- [Project Information](#)
- [Program Information](#)

---

## Dataset Description

Methodology: none provided with data. Analyses performed by Paul Henderson ([phenderson@whoi.edu](mailto:phenderson@whoi.edu)) at WHOI Nutrients Facility.

DMO note: The SiO<sub>4</sub> silicate data were originally called SiO<sub>2</sub>; Paul Henderson in the nutrients facility confirmed the data are SiO<sub>4</sub>. Cast number was matched in the Niskin bottle data to retrieve event, date, time, lon and lat, as well as depth\_n, press and depth.

[ [table of contents](#) | [back to top](#) ]

---

## Parameters

Parameter	Description	Units
event	unique sampling event number from cruise event log	YYYYMMDDhhmm
date	date of cast (UTC)	YYYYMMDD
time	time of cast (UTC)	hhmm
lon	longitude, negative denotes West	decimal degrees
lat	latitude, negative denotes South	decimal degrees
cast	CTD cast number	dimensionless
Nis	Niskin bottle order number	dimensionless
depth_n	nominal depth	meters
press	pressure, from CTD	decibars
depth	depth, calculated from CTD pressure	meters
SiO4	Silicate	micromoles/liter
PO4	Phosphate	micromoles/liter
NO2_NO3	Nitrite plus Nitrate (NO2 in this region is essentially non-detectable)	micromoles/liter
bot	Niskin bottle number	dimensionless
SID_nuts	sample ID; Nutrients	alphanumeric

[ [table of contents](#) | [back to top](#) ]

---

## Instruments

<b>Dataset-specific Instrument Name</b>	Niskin bottle
<b>Generic Instrument Name</b>	Niskin bottle
<b>Generic Instrument Description</b>	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

**OC415-02**

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/57964">https://www.bco-dmo.org/deployment/57964</a>
<b>Platform</b>	R/V Oceanus
<b>Start Date</b>	2005-07-18
<b>End Date</b>	2005-08-04
<b>Description</b>	<p>EDDIES project 2005 Tracer 1 cruise Funded by: NSF OCE-0241310 Original cruise data are available from the NSF R2R data catalog</p> <p><b>Methods &amp; Sampling</b>  PI: James Ledwell of: Woods Hole Oceanographic Institution dataset: Nutrient measurements from Niskin bottle samples dates: 19 July 2005 to 01 August 2005 (20050719-20050801) location: N: 30.785 S: 28.406 W: -67.681 E: -66.577 project/cruise: EDDIES/OC415-2 2005 Tracer 1 platform: R/V Oceanus Methodology: none provided with data. Analyses performed by Paul Henderson (<a href="mailto:phenderson@whoi.edu">phenderson@whoi.edu</a>) at WHOI Nutrients Facility. Change history: 070305: original data contributed by email from Larry Anderson; /eddies/data/2005_data/oc415-2/nutrients/EddiesOC415-2.txt.1 070309: prepared for OCB database by Nancy Copley (OCB DMO) and Cyndy Chandler (OCB DMO) 070529: data is considered final; no change from preliminary version; data identical to EddiesOC415-2.txt.1 DMO note: The SiO<sub>4</sub> silicate data were originally called SiO<sub>2</sub>; Paul Henderson in the nutrients facility confirmed the data are SiO<sub>4</sub>. Cast number was matched in the Niskin bottle data to retrieve event, date, time, lon and lat, as well as depth_n, press and depth.</p>

#### OC415-04

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/57967">https://www.bco-dmo.org/deployment/57967</a>
<b>Platform</b>	R/V Oceanus
<b>Report</b>	<a href="http://ocb.whoi.edu/EDDIES/CRUISES/2005/OC415-4_cruise_report.pdf">http://ocb.whoi.edu/EDDIES/CRUISES/2005/OC415-4_cruise_report.pdf</a>
<b>Start Date</b>	2005-08-29
<b>End Date</b>	2005-09-15
<b>Description</b>	<p>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</p> <p><b>Methods &amp; Sampling</b>  PI: James Ledwell of: Woods Hole Oceanographic Institution dataset: Nutrient measurements from Niskin bottle samples dates: 01 September 2005 to 11 September 2005 (20050901-20050911) location: N: 30.460 S: 29.558 W: -70.374 E: -69.236 project/cruise: EDDIES/OC415-4 2005 Tracer 2 platform: R/V Oceanus Methodology: none provided with data. Analyses performed by Paul Henderson (<a href="mailto:phenderson@whoi.edu">phenderson@whoi.edu</a>) at WHOI Nutrients Facility. Change history: 070305: original data contributed by email from Larry Anderson; /eddies/data/2005_data/oc415-4/nutrients/EddiesOC415-4.txt.1 070309: prepared for OCB database by Nancy Copley (OCB DMO) and Cyndy Chandler (OCB DMO) 070313: changed bot param name and reordered depths to match Niskin data 070529: data is considered final; no change from preliminary version; data identical to EddiesOC415-4.txt.1 DMO note: The SiO<sub>4</sub> silicate data were originally called SiO<sub>2</sub>; Paul Henderson in the nutrients facility confirmed the data are SiO<sub>4</sub>. Cast number was matched in the Niskin bottle data to retrieve event, date, time, lon and lat, as well as press and depth. Cast 5 data originally recorded on nutrient sample log sheet as cast 6, but this was corrected after Chief Scientist checked the original CTD cast log sheets.</p>

[ [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](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 N<sub>2</sub>-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  $^3\text{He}$  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  $^3\text{He}$  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 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.

[ [table of contents](#) | [back to top](#) ]