

# Sediment trap flux data with Thorium-234 from R/V Weatherbird II WB0409, WB0413, WB0506, WB0508 cruises in the Sargasso Sea, 2004-2005 (EDDIES project)

**Website:** <https://www.bco-dmo.org/dataset/3179>

**Version:** 11 July 2008

**Version Date:** 2008-07-11

## Project

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

## Program

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

Contributors	Affiliation	Role
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## Dataset Description

**dates:** 24 June 2004 to 25 August 2005 (20040624-20050825)

**location:** N: 31.761 S: 29.779 W: -69.410 E: -64.082

**project/cruise:** EDDIES/WB0409 2004 Transect 1 (EDT1)

EDDIES/WB0413 2004 Transect 2 (EDT2)

EDDIES/WB0506 2005 Transect 1 (EDT3)

EDDIES/WB0508 2005 Transect 2 (EDT4)

**platform:** R/V Weatherbird II

**Methodology:** see [PI-NOTES file](#)

also see Chapter 20: Sediment Traps in U.S. JGOFS BATS Method Manual Version 4 (1997). Bermuda Atlantic Time-Series Study April 1997.

Anthony H. Knap, Anthony F. Michaels et al., 136 pp.

(link to [BATS Method Manual version 4](#) local copy)

Methods also detailed in Buesseler et al., DSRII 2008:

Buesseler, K.O., C. Lamborg, P. Cai, R. Escube, R. Johnson, S. Pike,

P. Masque, D. McGillicuddy and E. Verdeny (2008). Particle fluxes associated with mesoscale eddies in the Sargasso Sea. Deep-Sea Research II, 55: 1426-1444.

**Change history:** YYMMDD

080703: received original data from K. Buesseler;

080728: data prepared by Nancy copley (WHOI);

090806: added to OCB database by Cyndy Chandler, OCB DMO;

**PI notes:** Mass flux for EDT1 arrays A&B have been estimated from the weight of the bolus since these samples were compromised following a drying oven problem. Estimate was calculated by assuming 89% of total mass transfer to bolus.

Sediment trap [position data](#) is available separately.  
Both traps were within the eddy; trap locations shown in Figure 1 of  
Buesseler et al. DSRII 2008 (see above)

## Methods & Sampling

VERTEX style sediment traps (Knauer et al. 1979; Martin et al. 1987) were deployed during EDDIES to directly capture sinking particles for flux analyses.

Knauer, G. A., J. H. Martin, and K. W. Bruland. 1979. Fluxes of particulate carbon, nitrogen, and phosphorous in the upper water column of the northeast Pacific. *Deep-Sea Research A* 26: 97-108.

Martin, J. H., G. A. Knauer, D. M. Karl, and W. W. Broenkow. 1987. VERTEX: carbon cycling in the northeast Pacific. *Deep-Sea Research A* 34: 267-285.

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## Data Files

File
<b>thorium_trap_WB.csv</b> (Comma Separated Values (.csv), 1.84 KB) MD5:47b681536ccf1173a3e0cc67dcc52b25
Primary data file for dataset ID 3179

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## Parameters

Parameter	Description	Units
Cruise_ID	cruise designation; name	dimensionless
staName	name of station	dimensionless
depth_n	nominal depth of sample	meters
Th234	thorium-234	dpm/liter
Th234_err	thorium-234, propagated net error	dpm/liter
array_name	sediment trap array name	dimensionless
location	replicate trap arrays A & B	dimensionless
duration	duration of trap deployment	days
flux_mass	Mass flux	mg/m <sup>2</sup> /day
filter_ID	filter ID	dimensionless
flux_Corg	organic Carbon flux	mg/m <sup>2</sup> /day
flux_N	Nitrogen flux	mg/m <sup>2</sup> /day

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## Instruments

<b>Dataset-specific Instrument Name</b>	Sediment Trap
<b>Generic Instrument Name</b>	Sediment Trap
<b>Dataset-specific Description</b>	VERTEX style sediment traps (Knauer et al. 1979; Martin et al. 1987)
<b>Generic Instrument Description</b>	Sediment traps are specially designed containers deployed in the water column for periods of time to collect particles from the water column falling toward the sea floor. In general a sediment trap has a jar at the bottom to collect the sample and a broad funnel-shaped opening at the top with baffles to keep out very large objects and help prevent the funnel from clogging. This designation is used when the specific type of sediment trap was not specified by the contributing investigator.

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## Deployments

### WB0409

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/57955">https://www.bco-dmo.org/deployment/57955</a>
<b>Platform</b>	R/V Weatherbird II
<b>Start Date</b>	2004-06-23
<b>End Date</b>	2004-07-02
<b>Description</b>	EDT1 2004 Transect 1 cruise Funded by: NSF OCE-0241310

### WB0413

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/57960">https://www.bco-dmo.org/deployment/57960</a>
<b>Platform</b>	R/V Weatherbird II
<b>Start Date</b>	2004-08-02
<b>End Date</b>	2004-08-11
<b>Description</b>	EDT2 2004 Transect 2 cruise Funded by: NSF OCE-0241310

### WB0506

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/57963">https://www.bco-dmo.org/deployment/57963</a>
<b>Platform</b>	R/V Weatherbird II
<b>Start Date</b>	2005-07-06
<b>End Date</b>	2005-07-15
<b>Description</b>	EDT3 2005 Transect 1 cruise Funded by: NSF OCE-0241310

### WB0508

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/57966">https://www.bco-dmo.org/deployment/57966</a>
<b>Platform</b>	R/V Weatherbird II
<b>Start Date</b>	2005-08-17
<b>End Date</b>	2005-08-26
<b>Description</b>	EDT4 2005 Transect 2 Funded by: NSF OCE-0241310

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## 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., Escube, 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.

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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 <sup>3</sup>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 <sup>3</sup>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.

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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.

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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.

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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.

## 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.

## Funding

Funding Source	Award
<a href="#">NSF Division of Ocean Sciences (NSF OCE)</a>	<a href="#">OCE-0241310</a>