Large volume pump particulate data: 234Th, POC, PON, Si 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/3178
Version: 14 July 2008
Version Date: 2008-07-14

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

Program
» Ocean Carbon and Biogeochemistry (OCB)

Contributors	Affiliation	Role
Buesseler, Kenneth O.	Woods Hole Oceanographic Institution (WHOI)	Principal Investigator
Chandler, Cynthia L.	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

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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. Escoube, 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;

Analysis Note: Data collected using McLane style in-situ battery powered pumps;
Thorium-234 data reported in units of dpm/l filtered, with propagated error
as % and as +/- error on a dpm/L basis; Samples passed through 142mm diameter
53 micron screen followed by 1 micron nominal pore size quartz filter.

Summary of pump cast data, position and closest CTD in space and time in Table 2 of Buesseler et al. DSRII 2008

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Data Files

File
thorium_LV_WB.csv (Comma Separated Values (.csv), 18.01 KB) MD5:047e9c7c7c476541f5f788c32a3884d0 Primary data file for dataset ID 3178

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Parameters

Parameter	Description	Units
Cruise_ID	cruise designation; name	dimensionless
cast	pump cast number	dimensionless
lat	latitude, negative denotes South	decimal degrees
lon	longitude, negative denotes West	decimal degrees
vol_sample	sample volume	milliliters
POC_uM	particulate organic carbon	micromoles/liter
SiO4_uM	Silicate	micromoles/liter
depth_n	nominal depth of sample	meters
Th234	thorium-234	dpm/liter
Th234_err	thorium-234, propagated net error	dpm/liter
PON_uM	particulate organic nitrogen	micromoles/liter
filter_pore	filter pore size, either 1 or 54	microns
Th234_err_pct	Thorium-234 propagated error as percent	percent

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Instruments

Dataset-specific Instrument Name	Large Volume Pumping System
Generic Instrument Name	McLane Large Volume Pumping System WTS-LV
Generic Instrument Description	The WTS-LV is a Water Transfer System (WTS) Large Volume (LV) pumping instrument designed and manufactured by McLane Research Labs (Falmouth, MA, USA). It is a large-volume, single-event sampler that collects suspended and dissolved particulate samples in situ. Ambient water is drawn through a modular filter holder onto a 142-millimeter (mm) membrane without passing through the pump. The standard two-tier filter holder provides prefiltering and size fractioning. Collection targets include chlorophyll maximum, particulate trace metals, and phytoplankton. It features different flow rates and filter porosity to support a range of specimen collection. Sampling can be programmed to start at a scheduled time or begin with a countdown delay. It also features a dynamic pump speed algorithm that adjusts flow to protect the sample as material accumulates on the filter. Several pump options range from 0.5 to 30 liters per minute, with a max volume of 2,500 to 36,000 liters depending on the pump and battery pack used. The standard model is depth rated to 5,500 meters, with a deeper 7,000-meter option available. The operating temperature is -4 to 35 degrees Celsius. The WTS-LV is available in four different configurations: Standard, Upright, Bore Hole, and Dual Filter Sampler. The high-capacity upright WTS-LV model provides three times the battery life of the standard model. The Bore-Hole WTS-LV is designed to fit through a narrow opening such as a 30-centimeter borehole. The dual filter WTS-LV features two vertical intake 142 mm filter holders to allow simultaneous filtering using two different porosities.

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Deployments

WB0409

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

WB0413

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

WB0506

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

WB0508

Website	https://www.bco-dmo.org/deployment/57966
Platform	R/V Weatherbird II
Start Date	2005-08-17
End Date	2005-08-26
Description	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

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.

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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.

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Funding

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

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