CTD stations from the R/V Atlantic Explorer AE0922 in the North Atlantic, Bermuda BATS region during 2009 (TZEX project)

Website: https://www.bco-dmo.org/dataset/3457
Data Type: Cruise Results
Version: 1
Version Date: 2011-03-30

Project
» Twilight Zone EXplorer (TZEX)

Program
» Ocean Carbon and Biogeochemistry (OCB)

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Abstract
CTD stations from the R/V Atlantic Explorer AE0922 in the North Atlantic, Bermuda BATS region during 2009 (TZEX project)

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Coverage

Spatial Extent: **N**:31.96712 **E**:-63.50758 **S**:31.28012 **W**:-64.56656
Temporal Extent: 2009-09-20 - 2009-09-29

Dataset Description

Dataset Id, cast number, drop number, date, time, lat, lon for CTD stations from the R/V Atlantic Explorer AE0922 in the North Atlantic, Bermuda BATS region during 2009.

Methods & Sampling

Generated by BCO-DMO staff from .HDR files.

Data Processing Description

Generated by BCO-DMO staff from .HDR files.

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Data Files

File
CTD_Stations.csv (Comma Separated Values (.csv), 2.62 KB) MD5:bd2443f5d1fe3ef8a55767839eaaadaa Primary data file for dataset ID 3457

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Parameters

Parameter	Description	Units
drop	unique CTD drop number	integer
cast	CTD cast number	integer
date	date (GMT)	YYYYMMDD
time	time (GMT)	HHMMSS
lon	Station longitude (West is negative)	decimal degrees
lat	Station latitude (South is negative)	decimal degrees
dataset_id	CTD dataset id (X0908C01)	text

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Deployments

AE0922

Website	https://www.bco-dmo.org/deployment/58658
Platform	R/V Atlantic Explorer
Start Date	2009-09-20
End Date	2009-09-29
Description	Until 26 November 2012 this cruise was identified by BIOS and R2R as AE-X0908. On 26 November 2012, the cruise ID was corrected by BIOS and R2R to be the new cruise ID AE0922. This change was also made at BCO-DMO on 26 November 2012. Original cruise data are available from the NSF R2R data catalog

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Project Information

Twilight Zone EXplorer (TZEX)

Website: http://cafethorium.whoi.edu/website/projects/tzex.html

Coverage: Bermuda, North Atlantic, BATS

Carbon Flux Through the Twilight Zone - New Tools to Measure Change

Building upon the success of the VERTIGO project, we continue to work to improve our understanding of how materials travel from the surface to the deep ocean. This pathway is called the "Biological Pump" which refers to the combined activities that lead to a quick pathway for plant and animal debris (molts, fecal pellets, loose aggregated material) to sink as marine "snow" or a particle into the deep ocean. In the open ocean, this cycle is largely a biological one, though in some settings, transport of material delivered by dust may matter (e.g. TENATSO - Cape Verde time series project).

The "twilight zone" is a region of low light below the ocean's sunlit surface "euphotic" zone, and above the deep ocean boundary (around 1000m or 3000 feet). It is in this mysterious layer where most of the sinking particles of the world's ocean are consumed by the animals that live at depth.

In a new project starting in late 2006, we are designing an autonomous vehicle called the "Twilight Zone EXplorer" (TZEX) to sample the ocean particle flux and make remote measurements in the twilight zone. Beginning in 2007, we will be starting to sample on a monthly basis at Bermuda, as part of the BATS (Bermuda Atlantic Time-Series) program using our existing particle flux collectors, the Neutrally Buoyant Sediment trap.

The biological pump and processes regulating the flux of particles in the ocean. Carbon dioxide fixed during photosynthesis by phytoplankton in the upper ocean can be transferred below the surface mixed layer via three major processes: i) passive sinking of particles, ii) physical mixing of particulate and dissolved organic matter (DOM), and iii) active transport by zooplankton vertical migration. The sinking flux includes senescent phytoplankton, zooplankton fecal pellets, molts and mucous feeding-webs (e.g., larvacean houses) and aggregates of these materials. The sinking particle flux decreases with depth as aggregates are fragmented into smaller, non-sinking particles, decomposed by bacteria, and consumed and respired by zooplankton. This remineralization returns carbon and nutrients to dissolved forms. The structure of the planktonic community affects the composition and the sinking rates of particles. Particle size, form, density, and the content of biogenic minerals affect sinking and remineralization rates.

Funding

The TZEX project is funded as part of the NSF Carbon and Water in the Earth System crosscutting solicitation aimed at closing significant gaps in our understanding of the complex relationships between and within the global water and carbon cycles.

NSF link: http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=13651&org=OCE

References:

Dehairs, F., A. de Brauwere, M. Elskens, U. Bathmann, S. Becquevort, S. Blain, P. Boyd, K. Buesseler, E. Buitenhaus, M. Gehlen, G. Herndl, C. Klass, R. Lampitt, D. Lefevre, U. Passow, H. Plous, F. Primeau, L. Stemmann and T. Trull (2008). Controls on Organic Carbon Export and Twilight Zone Remineralization: An Overview of the EUROCEANS Workshop . Oceanography, 21(3): 92-95.

Dehairs, F., A. de Brauwere and M. Elskens (2008). Organic Carbon in the Ocean's Twilight Zone. EOS, Transactions American Geophysical Union, 89 (38): doi:10.1029/2008EO380004.

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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-0628416

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