Bio-optical spar data from R/V Oceanus OC404-01, OC404-04, OC415-01, OC415-03 cruises in the Sargasso Sea, 2004-2005 (EDDIES project)

Website: https://www.bco-dmo.org/dataset/3060
Version: 12 March 2008
Version Date: 2008-03-12

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

Program
» Ocean Carbon and Biogeochemistry (OCB)

Contributors	Affiliation	Role
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Dataset Description

Bio-optical spar buoy data collected from the UCSB SPAR buoy configured with ECO-FLNTU Chlorophyll a and Optical Backscatter sensors. Data from both sensor types (chl a and optical backscatter) were compared with data from other sensors measuring similar data and the offsets were determined to be unacceptably large, combined with too short a sampling interval. Therefore, the data will not be published.

A schematic of the UCSB SPAR buoy configuration (as deployed during OC404-1 cruise) is available as a PDF file.

Methods & Sampling

Please refer to descriptions for each cruise (deployment).

Calibration of instruments:
SBE-39s and SBE-37 were calibrated by SeaBird.

ECO-FLNTU Chl a and Optical Backscatter sensors were compared to the Oceanus CTD fluorometer during comparison casts for each cruise.

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Parameters

Parameters for this dataset have not yet been identified

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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) **Methods & Sampling** Details of the UCSB Spar buoy deployed during EDDIES 2004 Survey 1. Due to the cancellation of the EDDIES Tracer 1 cruise, the mooring was recovered at the end of Survey 1. Calibration of instruments: SBE-39s and SBE-37 were calibrated by SeaBird. ECO-FLNTU Chl a and Optical Backscatter sensors were compared to the Oceanus CTD fluorometer during a comparison cast (oc404-4 053) during EDDIES 2004 Survey 2. Using the factory Chl a slope values, yielded Chl a values that were about twice that of the CTD fluorometer. The comparison of the extracted Chl a and Phae a samples to the CTD fluorometer also showed the CTD fluorometer to be reading too low. Therefore, the ECO-FLNTU readings of all 3 profiles were matched with corrected CTD fluorometer values rather than factory calibrated CTD fluorometer values for oc404-4 053. There was significant differences in the Chl offset count for all 3 ECO-FLNTU sensors. The ECO-FL sensor failed to log during the comparison cast, so no adjustment to the factory calibration factors could be determined for this sensor. The Optical Backscatter channel of the ECO-FLNTU was too insensitive for optimal use in these clean waters. Therefore these data are not reported in the final report. Drogue Mooring details: Date GMT Latitude Longitude Launch: 25-Jun-04 1526 30 30.17 N 64 54.96 W Recovery: 30-Jun-04 1338 30 57.00 N 65 25.99 W Buoy Instruments Depth Sampling interval Data Recovery s/n Surface ARGOS/GPS positions every hour 100% 10 temp, pressure 1min 100% SBE39-376 40 temp 1min 100% SBE39-497 70 temp 1min 100% SBE39-499 80 temp 1min 100% SBE39-500 80 Chl fl, turbidity 4min 100% ECO-FLNTU 085 90 temp 1min 100% SBE39-501 90 Chl fl, turbidity 4min 100% ECO-FLNTU 086 100 temp, cond, pressure 1min 100% SBE37SM-406 100 Chl fl, turbidity 4min 100% ECO-FLNTU 087 110 temp 1min 100% SBE39-502 110 Chl fl 4min 100% ECO-FL 055 120-138 Holey Sock Drogue none

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 **Methods & Sampling** Details of the UCSB Spar buoy deployed during EDDIES 2004 Survey 2. Due to the cancellation of the EDDIES Tracer 1 cruise, the deployment during the Survey 1 leg was recovered prior to the end of Survey 1. During Survey 2 (oc404-4), the UCSB spar bouy was again deployed after determination of the eddy center position. The second mooring was recovered near the end of Survey 2. Calibration of instruments: SBE-39s and SBE-37 were calibrated by SeaBird. ECO-FLNTU Chl a and Optical Backscatter sensors were compared to the Oceanus CTD fluorometer during a comparison cast (oc404-4 053) during EDDIES 2004 Survey 2. Using the facory Chl a slope values, yielded Chl a values that were about twice that of the CTD fluorometer. The comparison of the extracted Chl a and Phae a samples to the CTD fluorometer also showed the CTD fluorometer to be reading too low. Therefore, the ECO-FLNTU readings of all 3 profiles were matched with corrected CTD fluorometer values rather than factory calibrated CTD fluorometer values for oc404-4 053. There was significant differences in the Chl offset count for all 3 ECO-FLNTU sensors. The ECO-FL sensor failed to log during the comparison cast, so no adjustment to the factory calibration factors could be determined for this sensor. The Optical Backscatter channel of the ECO-FLNTU was too insensitive for optimal use in these clean waters. Therefore the data is not reported in our report. Drogue Mooring details: Date GMT Latitude Longitude Launch: 26-Jul-04 1016 30 40.57 N 65 20.56 W Recovery: 4-Aug-04 2028 30 46.23 N 65 46.92 W Buoy Instruments: Depth: Sampling interval Data Recovery s/n Surface ARGOS/GPS positions every hour 82% 10 temp, pressure 1min 100% SBE39-376 40 temp 1min 100% SBE39-497 70 temp 1min 100% SBE39-499 80 temp 1min 100% SBE39-500 80 Chl fl, turbidity 4min 100% ECO-FLNTU 085 90 temp 1min 100% SBE39-501 90 Chl fl, turbidity 4min 100% ECO-FLNTU 086 100 temp, cond, pressure 1min 100% SBE37SM-406 100 Chl fl, turbidity 4min 100% ECO-FLNTU 087 110 temp 1min 100% SBE39-502 110 Chl fl 4min 100% ECO-FL 055 120-138 Holey Sock Drogue none

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 **Methods & Sampling** Details of the UCSB Spar buoy deployed during EDDIES 2005 Survey 1. The Spar buoy was deployed at the center of eddy A4 just before ending science work and heading for Bermuda. It was intended to stay deployed throughout the Tracer 1 cruise and to be recovered early in Survey 2 cruise. However, due to the threat of Tropical Storm Franklin bearing down on the area, the Tracer people pulled the array prior to leaving the area. Some instruments were stopped, or made safe by the Oceanus Science Tech, and data was downloaded at the start of Survey 2. It was determined that the ECO-FL sensor had jammed just prior to deployment. Therefore, no Chl a data was obtained at 80 meters. Calibration of instruments: SBE-39s and SBE-37 were calibrated by SeaBird. Between the EDDIES 2004 and 2005 deployments, the ECO-FLNTU units were returned to WETLabs and the sensitivity greatly increased in both the Chl a and Optical Backscatter channels. The borrowed ECO-FL unit did not have the sensitivity changed. ECO-FLNTU Chl a and Optical Backscatter sensors were compared to the Oceanus CTD fluorometer during a comparison cast (oc415-1 062) during EDDIES 2005 Survey 1. The ECO-FLNTU and ECO-FL readings of all 4 time records were matched with the new WETLabs CTD fluorometer factory calibration values for the cast. There was significant differences in the Chl offset count for all 4 ECO sensors. One of the 4 ECO Chl a factory calibration slopes agreed well with the new CTD fluorometer (calibrated also by WETLabs) but the other 3 sensor chl calibrations were off by +32%, +46%, and -44%. Without determining this matchup of sensitivities, the mooring data would have been very misleading. If the comparison of the extracted Chl a and Phaeo a descrete samples against the new CTD fluorometer readings determine that it is reading significantly different from reality, the moored data can be adjusted by using the same scaling factor being applied to the CTD data. The Optical Backscatter channel of the ECO-FLNTU was more sensitive, but still showed mostly noise and sudden shifts that were unrelated to changes in Chl fluorescence. Therefore the data are not reported in our report. Drogue Mooring details: Date GMT Latitude Longitude Launch: 14-Jul-05 1401 30 41.45 N 66 41.47 W Recovery: 23-Jul-05 1338 30 19.87 N 67 19.29 W Buoy Instruments: Depth: Sampling interval Data Recovery s/n Surface ARGOS/GPS positions every 30 min 96% 10 temp, pressure 1min 100% SBE39-376 50 temp 1min 100% SBE39-497 70 temp 1min 100% SBE39-499 80 temp 1min 100% SBE39-500 80 Chl fl 4min 0% ECO-FL 055 93 temp 1min 100% SBE39-501 93 Chl fl, turbidity 4min 100% ECO-FLNTU 085 106 temp, cond, pressure 1min 100% SBE37SM-406 106 Chl fl, turbidity 4min 100% ECO-FLNTU 086 120 temp 1min 100% SBE39-502 120 Chl fl, turbidity 4min 100% ECO-FLNTU 087 125-143 Holey Sock Drogue none

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 **Methods & Sampling** see documentation for OC415-1 cruise data

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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.

Publications

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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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