

# Scientific sampling event log from R/V Cape Hatteras, R/V Endeavor, R/V Oceanus cruises CH0511, EN494, OC471-04 from the Atlantic Ocean, off the Outer Banks near Bermuda (LatMix project)

**Website:** <https://www.bco-dmo.org/dataset/3509>

**Version:** 29 July 2011

**Version Date:** 2011-06-29

## Project

» [LIDAR Studies of Lateral Dispersion in the Seasonal Pycnocline](#) (LatMix)

## Program

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

| Contributors                         | Affiliation   | Role                 |
|--------------------------------------|---|----------------------|
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## Dataset Description

These scientific sampling event logs from the 2011 LatMix project cruises include a record of all sampling events from the cruises. Some of the instrumentation is described in the Oceanus [ship operations report](#).

Sampling gear included: Acrobat; ADCP150 (Acoustic Doppler Current Profiler 150); calFluorometer; CTD911 (SeaBird 911plus CTD); dyeInjectionSled; Echosounder12 (12 KHz Knutsen); EM-APEX; gatewayBuoy; Glider; Hammerhead (towed profiler); lagrangianFloat; Navigation; osuMVP; Other (miscellaneous events); profileAOP; profileOP; Ship (ship events); svpdDrifter; tREMUS (AUV); Triaxus (towed profiler); umassDrogue and uvicMVP.

## Methods & Sampling

The event logs from the 2011 LatMix project cruises were created using version 1 of the Rolling Deck to Repository (R2R) event log application (ELOG with cruise-specific custom configuration files). Each cruise used a separate installation of ELOG with a custom configuration file. The ELOG configuration were designed to be compatible so the logs could be combined after the cruise. The three logs can be combined and then sorted on event number to list all LatMix events in chronological order regardless of vessel.

## Data Processing Description

Minimal post-cruise processing for the event logs was done by Cyndy Chandler (BCO-DMO). Duplicate event numbers were adjusted so all event numbers are unique (.001 incremented to .002 for a few events). Text was modified in a few free text comment fields to make very long comments shorter and some comments that had been entered in the station number column were moved to the Comment field.

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## Data Files

| File  |
|---|
| <b>event_log.csv</b> (Comma Separated Values (.csv), 123.62 KB)<br>MD5:fdc3438d3a6bc3cad69a18bc5416a308 |
| Primary data file for dataset ID 3509   |

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## Parameters

| Parameter       | Description  | Units           |
|-----------------|--|-----------------|
| Cruise_ID       | Cruise_ID  | dimensionless   |
| Event           | unique sampling event number derived from local YYYYMMDD.HHMM                                    | dimensionless   |
| date            | date (UTC) as YYYYMMDD   | dimensionless   |
| time            | time (UTC) using 24 hour clock HHMM format   | dimensionless   |
| Latitude        | latitude (North is positive; South is negative)  | decimal degrees |
| Longitude       | longitude (East is positive; West is negative)   | decimal degrees |
| Instrument      | name of sampling device or activity  | dimensionless   |
| Action          | activity performed with the instrument   | dimensionless   |
| Transect        | transect number  | dimensionless   |
| Station         | station number   | dimensionless   |
| Cast            | cast number  | dimensionless   |
| Author          | name of person entering the event  | dimensionless   |
| Comment         | free text comment  | dimensionless   |
| year            | year that sampling was done  | dimensionless   |
| chief_scientist | Name of the Chief Scientist of the cruise.   | dimensionless   |
| ship            | name of research vessel  | dimensionless   |
| start_date      | start date of cruise   | dimensionless   |
| end_date        | end date of cruise   | dimensionless   |
| GPS_Time        | UTC time that GPS data was recorded in ELOG for latitude and longitude.                          | dimensionless   |
| R2R_Event       | event number from R2R ELOG that includes vessel ID so it is unique across the US academic fleet. | dimensionless   |

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## Deployments

### CH0511

|                    |   |
|--------------------|---|
| <b>Website</b>     | <a href="https://www.bco-dmo.org/deployment/58718">https://www.bco-dmo.org/deployment/58718</a> |
| <b>Platform</b>    | R/V Cape Hatteras   |
| <b>Start Date</b>  | 2011-06-01  |
| <b>End Date</b>    | 2011-06-21  |
| <b>Description</b> | LatMix project cruise Original cruise data are available from the NSF R2R data catalog          |

### EN494

|                    |   |
|--------------------|---|
| <b>Website</b>     | <a href="https://www.bco-dmo.org/deployment/58716">https://www.bco-dmo.org/deployment/58716</a> |
| <b>Platform</b>    | R/V Endeavor  |
| <b>Start Date</b>  | 2011-06-01  |
| <b>End Date</b>    | 2011-06-21  |
| <b>Description</b> | LatMix project cruise Original cruise data are available from the NSF R2R data catalog          |

### OC471-04

|                    |  |
|--------------------|--|
| <b>Website</b>     | <a href="https://www.bco-dmo.org/deployment/58717">https://www.bco-dmo.org/deployment/58717</a>        |
| <b>Platform</b>    | R/V Oceanus  |
| <b>Start Date</b>  | 2011-06-01   |
| <b>End Date</b>    | 2011-06-21   |
| <b>Description</b> | LatMix project cruise Cruise information and original data are available from the NSF R2R data catalog |

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## Project Information

### LIDAR Studies of Lateral Dispersion in the Seasonal Pycnocline (LatMix)

**Coverage:** Bermuda

The "LIDAR Studies of Lateral Dispersion in the Seasonal Pycnocline" project is part of a larger collaborative research project called LatMix. The LatMix project researchers were funded primarily by research grants from the Office of Naval Research (ONR) with some additional work funded by the National Science Foundation. The ONR Department Research Initiative (DRI) project name is "Scalable Lateral Mixing and Coherent Turbulence DRI".

Lateral stirring and mixing in the stratified ocean at scales of 30 m to 3 km are poorly understood. Yet mixing at these scales is an important aspect of marine ecology. Also, mixing at these scales must usually be parameterized in numerical models of ocean circulation and ocean biogeochemistry, since such small scales are not explicitly resolved in most models. The aim of the proposed work is to visualize and to understand the processes governing lateral stirring and mixing at these small scales. One hypothesis to test is that lateral stirring is driven by the relaxation of patches of weakly stratified water created by vertical mixing events. Another is that it is due to the combined action of vertical mixing and vertical shear in the horizontal velocities. There may also be stirring processes independent of vertical mixing. Drs. Ledwell and Sundermeyer will test these hypotheses and ideas and be prepared to formulate others on the basis of their experiments.

The approach is to release patches of fluorescent dye in the stratified upper ocean off Bermuda, where the water is very clear. Rapid surveys of the evolving dye patches will be made with a scanning LIDAR (Light Detecting and Ranging) system carried by a low-flying aircraft. Profiles made by a small boat in the patches will provide calibration data for the airborne measurements and would sample hydrographic structures of interests within the patches. The small boat will be tended by a research vessel, from which measurements will be made of inherent optical properties of the water, water velocity profiles, ambient radiation and meteorological conditions near the patches. The airborne LIDAR system will be a modification of a topographic mapping system operated by the NAVAIR Flight Facility. It will have a depth resolution of 1 m and a lateral resolution of 2 to 3 meters, and will sense dye to depths of 30 meters. Navigation and mapping of the dye patches will be relative to a set of drifting buoys with drogues set at the depth of the releases, and with GPS receivers and radio transmitters for communication with the ship, the small boat, and the aircraft. The experiments will be conducted during the month of July when the water is usually the clearest and when the wind-mixed layer is the thinnest. The releases will be between 10 and 20 meters below the surface, and each experiment will last on the order of 24 hours. The dye distribution will be inferred from sophisticated inversions of the returned signal in both the transmitted and fluoresced frequency bands.

Understanding of the physical processes at work in small scale lateral mixing in the ocean will be of direct benefit to those trying to study ocean ecosystems and hence to those working to protect the health of the ocean, as well as those trying to develop numerical models of the ocean for this and a great variety of other practical purposes. Development of the NASA LIDAR system at Wallops Flight Facility into one that can effectively see into the upper ocean, whether dye is used or not, will be a substantial addition to the research tools available to oceanographers.

The scientific sampling event log dataset is available from each of the three cruises and provides an idea of the types of sampling events that were conducted during the cruises. The data from the predominantly ONR-funded LatMix project are not being managed by BCO-DMO but are expected to be archived at NODC.

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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 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.

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## Funding

| Funding Source   | Award                            |
|--|----------------------------------|
| <a href="#">NSF Division of Ocean Sciences (NSF OCE)</a> | <a href="#">OCE-0751653</a>      |
| <a href="#">NSF Division of Ocean Sciences (NSF OCE)</a> | <a href="#">OCE-0751734</a>      |
| Office of Naval Research (ONR)                           | <a href="#">N00014-09-1-0266</a> |

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