

# Mesozooplankton community grazing for 5 size classes and total for samples collected by ring net tows on R/V Melville cruise MV1008 in the Costa Rica Dome in 2010 (CRD FLUZiE project)

**Website:** <https://www.bco-dmo.org/dataset/516670>

**Data Type:** Cruise Results

**Version:** 1

**Version Date:** 2014-06-11

## Project

» [Costa Rica Dome FLUX and Zinc Experiments](#) (CRD FLUZiE)

## Programs

» [Integrated Marine Biogeochemistry and Ecosystem Research -US](#) (IMBER-US)

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

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## Abstract

Mesozooplankton community grazing, expressed as ug pigment m-2 h-1, for 5 size classes (2-0.5, 0.5-1, 1-2, 2-5, and >5 mm) and total. Samples were collected during ring net tows on the MV1008 cruise in the Costa Rica Dome (CRD) region of the Eastern Tropical Pacific Ocean.

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## Coverage

**Spatial Extent:** N:10.3 E:-86.735 S:6.628 W:-92.987

**Temporal Extent:** 2010-06-23 - 2010-07-23

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## Dataset Description

Mesozooplankton community grazing, expressed as ug pigment m<sup>-2</sup> h<sup>-1</sup>, for 5 size classes (2-0.5, 0.5-1, 1-2, 2-5, and >5 mm) and total. Samples were collected during ring net tows on the MV1008 cruise in the Costa Rica Dome (CRD) region of the Eastern Tropical Pacific Ocean.

## Acquisition Description

### Mesozooplankton net collections

Mesozooplankton sampling was conducted using a standard 1-m<sup>2</sup> ring net with 202-um Nitex mesh, towed obliquely for 20 min at a ship speed of 1-2 kts. A General Oceanics flowmeter was attached across the net mouth to record volume filtered, and a Vemco depth meter was fastened to the net frame to record tow depth and duration. The target depth of tows was 150m. Once on deck, the net was washed down with seawater and the contents of the cod end placed in a bucket with carbonated water to prevent gut evacuation. Separate splits (each of typically 1/8th of the sample) were used for biomass and gut-fluorescence determinations, with the latter done first to minimize pigment degradation. Each of these subsample splits was wet sieved into five size classes of 0.2-0.5, 0.5-1, 1-2, 2-5, and >5 mm.

### Gut pigment and grazing estimates

Each size-fractioned sample for gut pigment analysis was concentrated onto a 47-mm 202-um Nitex filter and immediately frozen in liquid nitrogen for processing on shipboard or in the lab. The filters were subsampled for the three smallest size classes, by placing the frozen filters centered under a plastic template and sectioning into 8 pie-shaped fractions with a thin knife blade. Analyses were carried out in duplicate. The replicate 1/8th samples were ground in 90% acetone using a sonicator to extract pigments, and the homogenate was centrifuged to remove particulates. For the 2-5 mm size class, typically the whole sample was processed, although if very dense a smaller subsample was taken. The >5 mm size class was always processed in its entirety. Concentrations of chlorophyll a (Chl a) and phaeopigments (Phaeo) were then measured using a Turner 10AU fluorometer.

For each size-fraction analyzed, the investigators computed the depth-integrated grazing rate (GR) using phaeopigments only to obtain conservative rates. The GR was calculated in the euphotic zone as:

$$GR = [ (pig * D) / (vol * f) ] * K$$

where  $GR$  is the grazing rate ( $\mu\text{g m}^{-2} \text{h}^{-1}$ ),  $pig$  is the measured pigment value ( $\mu\text{g}$ , based on phaeopigments),  $f$  is fraction of sample analyzed,  $D$  is depth of tow (m),  $vol$  is the volume of water filtered ( $\text{m}^3$ ), and  $K$  is the gut evacuation rate constant. For  $K$ , the investigators used the rate constant of  $2.1 \text{ h}^{-1}$  derived from shipboard gut evacuation experiments at  $140^\circ\text{W}$  during the JGOFS EqPac program, which had similar temperatures as those encountered in the CRD.

## Processing Description

BCO-DMO transposed size\_class columns into rows.

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## Parameters

Parameter	Description	Units
event	Number referring to the particular activity (event) on the FluZiE cruise.	integer
tow	Tow number.	integer
cycle	Type and number of cruise sampling event. Either "Stn_n" or "Cycle_n". A transect of stations was sampled from 29 June to 03 July. Five quasi-Lagrangian experiments called "cycles" were conducted during the remainder of the cruise.	text
time_of_day	Time of day. 1 = day; 2= night.	code
date_local	Date of tow (local time zone of UTC -6).	mmddyyyy
time_local	Time at start of tow (local time zone of UTC -6).	HHMM
lat	Latitude in degrees North.	decimal degrees
lon	Longitude in degrees East.	decimal degrees
depth_tow	Depth of the tow.	meters
size_class	Mesozooplankton size class. 0.2_to_0.5 = 02.-0.5 mm; 0.5_to_1 = 0.5-1 mm; 1_to_2 = 1-2 mm; 2_to_5 = 2-5 mm; gt5 = greater than 5 mm; total = total for all size classes.	millimeters (mm)
grazing_rate	Clearance rate of water column Chl a for mesozooplankton size classes based on the gut fluorescence method.	micrograms chlorophyll-a equivalents per square meter per hour ( $\mu\text{g Chl a equiv m}^{-2} \text{ h}^{-1}$ )

## Instruments

<b>Dataset-specific Instrument Name</b>	Ring Net
<b>Generic Instrument Name</b>	Ring Net
<b>Dataset-specific Description</b>	Mesozooplankton sampling was conducted using a standard 1-m <sup>2</sup> ring net with 202-um Nitex mesh, towed obliquely for 20 min at a ship speed of 1-2 kts.
<b>Generic Instrument Description</b>	A Ring Net is a generic plankton net, made by attaching a net of any mesh size to a metal ring of any diameter. There are 1 meter, .75 meter, .25 meter and .5 meter nets that are used regularly. The most common zooplankton ring net is 1 meter in diameter and of mesh size .333mm, also known as a 'meter net' (see Meter Net).

<b>Dataset-specific Instrument Name</b>	Turner Fluorometer -10AU
<b>Generic Instrument Name</b>	Turner Designs Fluorometer -10-AU
<b>Dataset-specific Description</b>	Concentrations of chlorophyll a and phaeopigments were measured using a Turner 10AU fluorometer.
<b>Generic Instrument Description</b>	The Turner Designs 10-AU Field Fluorometer is used to measure Chlorophyll fluorescence. The 10AU Fluorometer can be set up for continuous-flow monitoring or discrete sample analyses. A variety of compounds can be measured using application-specific optical filters available from the manufacturer. (read more from Turner Designs, turnerdesigns.com, Sunnyvale, CA, USA)

<b>Dataset-specific Instrument Name</b>	General Oceanics flowmeter
<b>Generic Instrument Name</b>	Flow Meter
<b>Dataset-specific Description</b>	A General Oceanics flowmeter was attached across the ring net mouth to record volume filtered.
<b>Generic Instrument Description</b>	General term for a sensor that quantifies the rate at which fluids (e.g. water or air) pass through sensor packages, instruments, or sampling devices. A flow meter may be mechanical, optical, electromagnetic, etc.

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## Deployments

### MV1008

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/58834">https://www.bco-dmo.org/deployment/58834</a>
<b>Platform</b>	R/V Melville
<b>Report</b>	<a href="http://dmoserv3.whoi.edu/data_docs/CRD_FLUZiE/CRUISE_REPORT_Melville1008.pdf">http://dmoserv3.whoi.edu/data_docs/CRD_FLUZiE/CRUISE_REPORT_Melville1008.pdf</a>
<b>Start Date</b>	2010-06-22
<b>End Date</b>	2010-07-25
<b>Description</b>	<p>Research on the cruise was aimed at acquiring a better understanding of plankton dynamics, carbon and nutrient fluxes, and potential trace element limitation in the Costa Rica Dome region of the eastern tropical Pacific. The specific science objectives were: 1) to assess grazing and trace metal/nutrient controls on primary production and phytoplankton standing stocks; 2) to quantify carbon and elemental fluxes and export rates from the euphotic zone; and 3) to measure microbial population, processes, stable isotope abundances associated with the OMZ and nitrite maxima. Operations included: 4-day sediment trap deployments, daily process experiments conducted on satellite-tracked drifters, CTD and trace-metal rosette sampling, shipboard grow-out experiments, net sampling for zooplankton biomass and grazing assessments, and MOCNESS stratified tows to 1000 m. BCO-DMO Note: March 2013 (CLC): The original CTD profile data (85 casts) have been submitted by R2R to NODC. Jim Moffett (USC) was a participant on this cruise and is interested in getting a copy of the full set of CTD cast data (deep and shallow casts). He plans to contact SIO ODF group or Mike Landry (Chief Scientist). Original cruise data are available from the NSF R2R data catalog.</p>

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## Project Information

### Costa Rica Dome FLUX and Zinc Experiments (CRD FLUZiE)

**Coverage:** Costa Rica Dome, Eastern Tropical Pacific Ocean

Research was aimed at improved understanding of plankton dynamics, carbon and nutrient fluxes, and potential trace element limitation in the Costa Rica Dome region of the eastern tropical Pacific. The specific science objectives of the 2010 R/V Melville cruise (MV1008) were: 1) to assess grazing and trace metal/nutrient controls on primary production and phytoplankton standing stocks; 2) to quantify carbon and elemental fluxes and export rates from the euphotic zone; and 3) to measure microbial population, processes, stable isotope abundances associated with the OMZ and nitrite maxima. Additional information about MV1008 can be found in the cruise report (PDF). NOTE: The original proposal and award abstract are not relevant. The project was originally funded by NSF as experimental tests of phytoplankton controls in the Arabian Sea. Piracy concerns in the region led to

the cancellation of the research cruise in 2009, and a Change of Scope request was approved to focus the project on related issues in the Costa Rica Dome (CRD). Though this project is not formally affiliated with any large program, it aligns with IMBER's emphasis on community ecology and biogeochemistry, and the OCB focus on carbon-based measurements of production, grazing and export processes.

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## Program Information

### **Integrated Marine Biogeochemistry and Ecosystem Research -US (IMBER-US)**

**Website:** <http://www.imber.info/>

**Coverage:** global

The BCO-DMO database includes data from IMBER endorsed projects lead by US funded investigators. There is no dedicated US IMBER project or data management office. Those functions are provided by US-OCB and BCO-DMO respectively. The information in this program description pertains to the Internationally coordinated IMBER research program. The projects contributing data to the BCO-DMO database are those funded by US NSF only. The full IMBER data catalog is hosted at the Global Change Master Directory (GCMD). IMBER Data Portal: The IMBER project has chosen to create a metadata portal hosted by the NASA's Global Change Master Directory (GCMD). The GCMD IMBER data catalog provides an overview of all IMBER endorsed and related projects and links to datasets, and can be found at URL <http://gcmd.nasa.gov/portals/imber/>. IMBER research will seek to identify the mechanisms by which marine life influences marine biogeochemical cycles, and how these, in turn, influence marine ecosystems. Central to the IMBER goal is the development of a predictive understanding of how marine biogeochemical cycles and ecosystems respond to complex forcings, such as large-scale climatic variations, changing physical dynamics, carbon cycle chemistry and nutrient fluxes, and the impacts of marine harvesting. Changes in marine biogeochemical cycles and ecosystems due to global change will also have consequences for the broader Earth System. An even greater challenge will be drawing together the natural and social science communities to study some of the key impacts and feedbacks between the marine and human systems. To address the IMBER goal, four scientific themes, each including several issues, have been identified for the IMBER project: Theme 1 - Interactions between Biogeochemical Cycles and Marine Food Webs; Theme 2 - Sensitivity to Global Change: How will key marine biogeochemical cycles, ecosystems and their interactions, respond to global change?; Theme 3 - Feedback to the Earth System: What are the roles of the ocean biogeochemistry and ecosystems in regulating climate?; and Theme 4 - Responses of Society: What are the relationships between marine biogeochemical cycles, ecosystems, and the human system?

## 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-0826626</a>

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