

BCO-DMO: Domain-Specific Data Management Services for the Marine Biogeochemistry and Ecology Community

Danie Kinkade

Woods Hole Oceanographic Institution

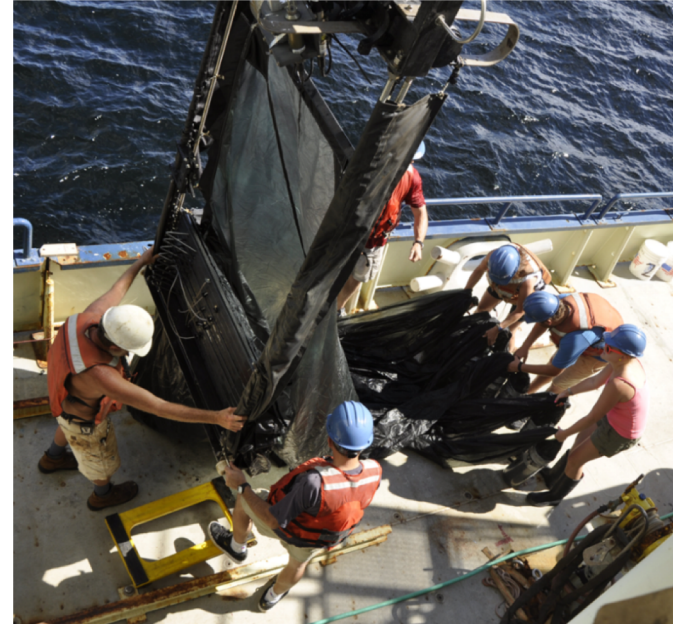
GeoDaRRS Workshop
UCAR, Boulder Co
July 7-9, 2018



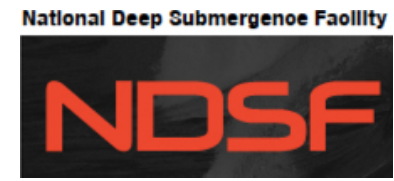
OCE-1435578

OVERVIEW

- Oceanographic Data Management Landscape
- BCO-DMO Services
- Challenges/Opportunities



OCEANOGRAPHIC REPOSITORY COMMUNITY



Institutional and Project-based



Domain

Cross-domain Organizations

bco-dmo.org

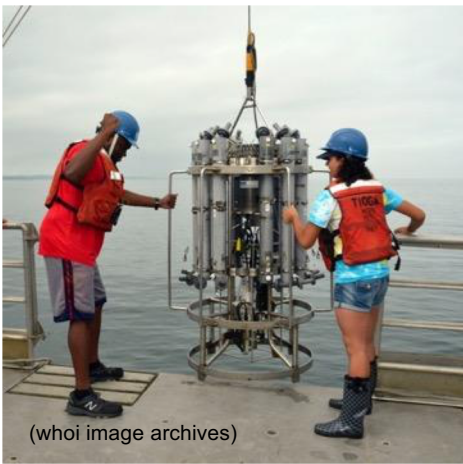
OCEANOGRAPHIC REPOSITRY COMMUNITY

- **Researchers:**
 - Support for their science / students
 - Recognition for their work
 - Satisfy funder requirements
- **Journals/publishers:**
 - Transparency (reproducibility)
- **Funders:**
 - Data reuse = new science
 - Data sharing mandate compliance (PARR)

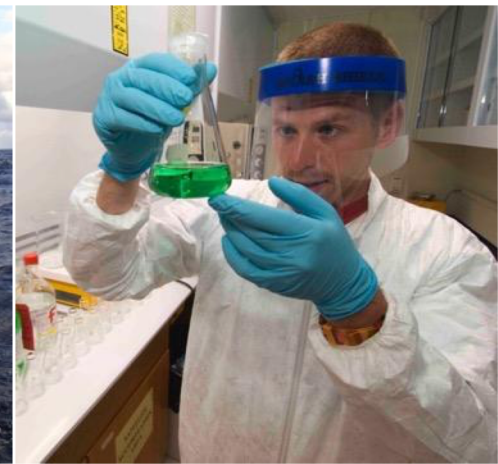
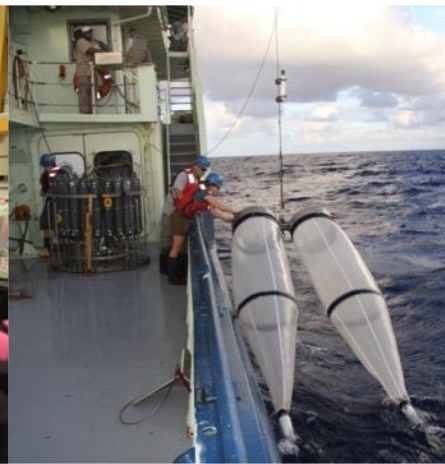
BCO-DMO'S ROLE IN THE COMMUNITY

Mission:

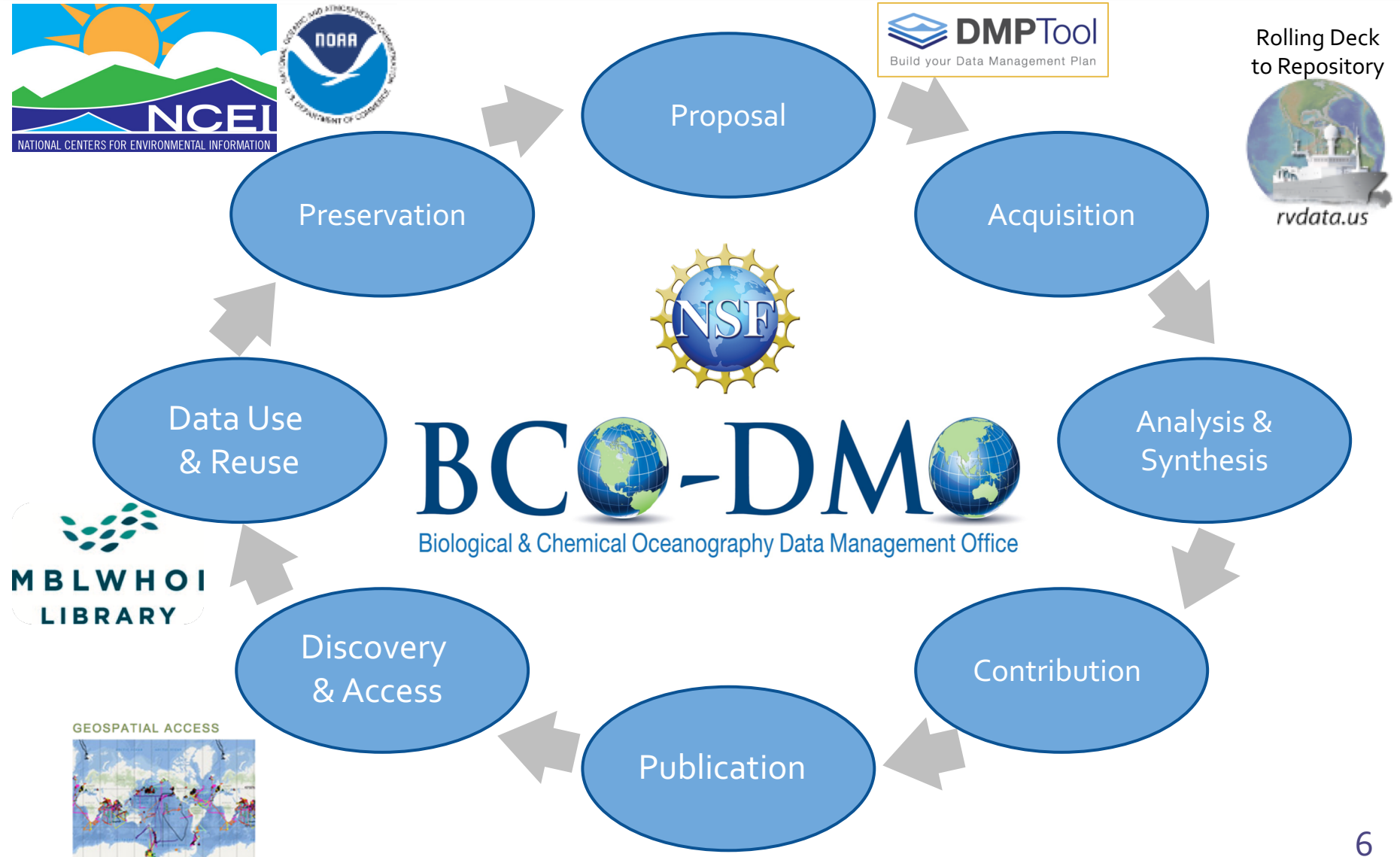
To work with principal investigators to curate and serve data and information online from research projects funded by the National Science Foundation Biological and Chemical Oceanography Sections and Division of Polar Programs Antarctic Organisms and Ecosystems.



(whoii image archives)



SUPPORTING THE DATA LIFE CYCLE



PROPOSAL: DATA PLANNING

BCO-DMO
Biological & Chemical Oceanography Data Management

DATABASE	Count
Programs	39
Projects	783
Deployments	2540
Datasets	8590
Instruments	440
Parameters	1390
People	2265
Affiliations	521
Funding	83
Awards	1506

SELECT DMP TEMPLATE

Select one of the funder DMP Templates listed to proceed to the next information you will need to provide in the following steps.

- A - F
- G - L
- M - S
- T - Z

- Alfred P. Sloan Foundation
- Department of Defense
- Department of Energy (DOE)
- Department of Transportation
- MBLWHOI Library Template
- National Aeronautics and Space Administration
- National Institute of Justice (DOJ)
- National Institutes of Health
- National Science Foundation
- BCO-DMO NSF OCE: Biological and Chemical Oceanography
- NSF-ACG: Atmospheric and Geospace Sciences
- NSF-AST: Astronomical Sciences
- NSF-BIO: Biological Sciences (2015-)
- NSF-CHE: Chemistry Division
- NSF-CISE: Computer and Information Science and Education
- NSF-DMR: Materials Research
- NSF-EAR: Earth Sciences
- NSF-EHR: Education and Human Resources

DMPTool | Welcome! Danie Kinkade

Home | My Dashboard | DMP Requirements | Public DMPs | News | Help | Contact Us | About | Log Out

Woods Hole Oceanographic Institution

Woods Hole Oceanographic Institution | Contact Audrey Mickle

My Dashboard | My DMPs | Create New DMP | My Profile

DMP Overview | DMP Details | DMP Preview

Plan was successfully created.

DMP DETAILS

BCO-DMO NSF OCE: Biological and Chemical Oceanography

Click on a section below to edit it at any time.

- ✓ = Complete
- * = Mandatory

Template Outline

- Data Policy Compliance
- Pre-Cruise Planning
- Description of Data Types *
- Data and Metadata Formats and Standards *
- Data Storage and Access During the Project *
- Mechanisms and Policies for Access, Sharing, Re-Use, and Re-Distribution *
- Plans for Archiving *
- Roles and Responsibilities

Instructions | Links | Example Response

Identify any published data policies with which the project will comply, including the NSF OCE Data and Sample Policy as well as other policies that may be relevant if the project is part of a large coordinated research program (e.g. GEOTRACES).

Cancel Changes | Save Response | Save and Next

<< Back | DMP Preview >>

By being affiliated with your institution, you may be presented with institution specific instructions and/or resource web links to help you complete your plan. You can create your own account by selecting "Not in List" as your institution upon login.

ACQUISITION

BCO-DMO

Data Management Guidelines Manual

a collection of best practice recommendations for collecting and sharing biogeochemical and ecological oceanographic data and metadata

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Rolling Deck to Repository (R2R) Supported by: [NSF](#) | [NOAA](#) | [ONR](#) | [SOI](#)

















Home | About R2R ▾ | Cruise Catalog | QA Dashboard | News | Contact Us | Internal ▾

Catalog Status
(In Service) Vessels: **26**
Cruises: **6551**
Archived Files: **25283915**
May 5, 2017

Home

Cruise Catalog

Browse by Ship (below) or [Search](#) by Term.

 Alpha Helix (retired)	 Atlantic Explorer	 Atlantis	 Blue Heron
 Cape Hatteras (retired)	 Clifford A. Barnes	 Corwith Cramer	 Endeavor
 Eltanin (retired)	 F.G. Walton Smith	 Falkor	 FLIP
 Healy	 Hugh R. Sharp	 Ka'imikai-O-Kanaloa	 Kilo Moana

News

- R2R at 2016 RVTEC Meeting
11/01/2016
- R2R at 2016 INMARTECH
10/04/2016
- R2R at 2016 Ocean Sciences Meeting
02/26/2016
- R2R at 2015 AGU Meeting
12/15/2015
- R2R at 2015 UNOLS Annual Meeting
12/04/2015

[more](#)

DATA CONTRIBUTION

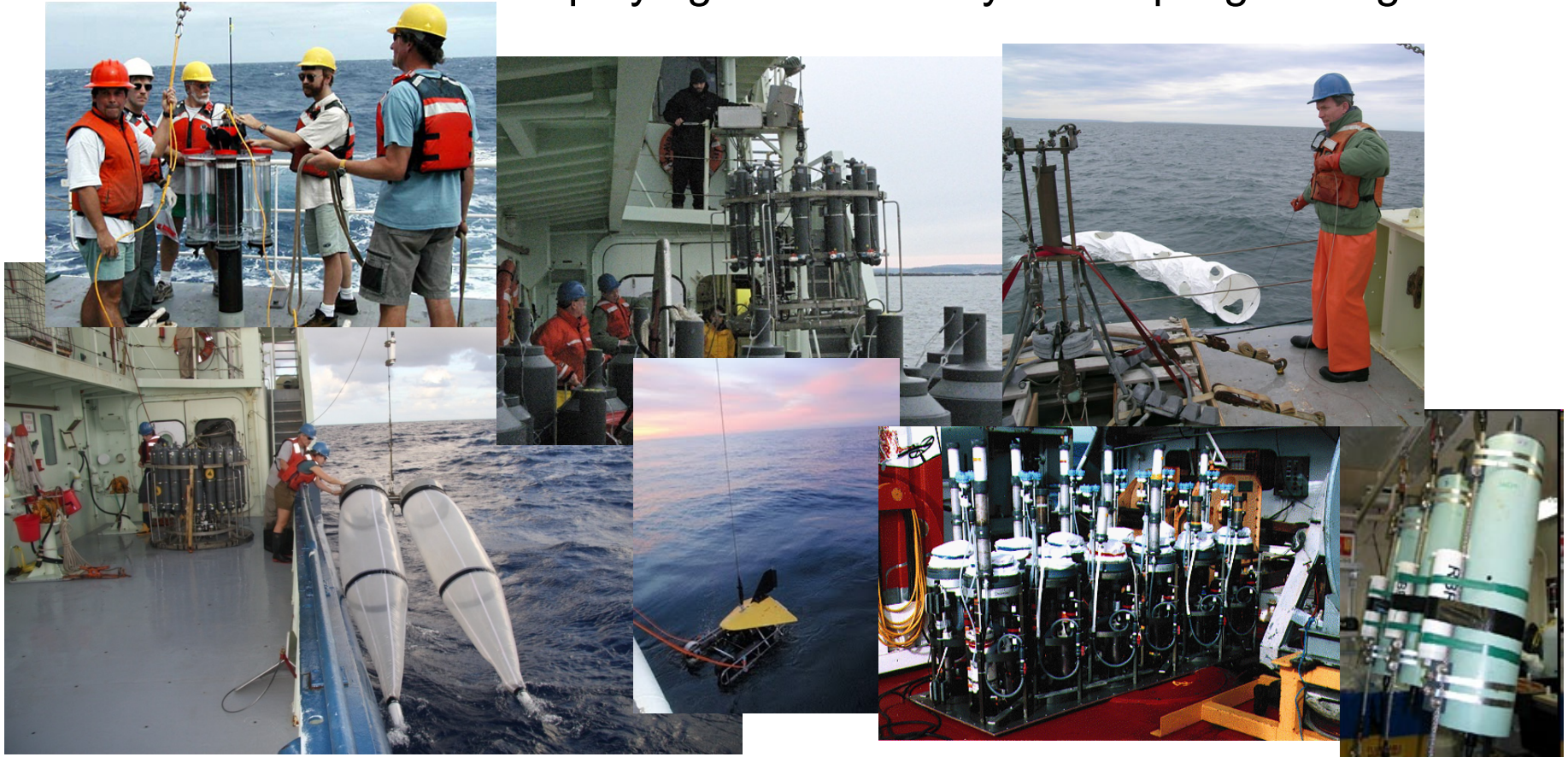
STEPS FOR DATA CONTRIBUTORS



DATA CONTRIBUTION

BCO-DMO staff work in partnership with PIs

To create well-documented, cleaned sets from diverse research projects employing a wide variety of sampling strategies



DATA PROCESSING

A	B	C	D	E	F	G	H
Video ID	Time (minute)	E	D	C.T.	C.O.		
Cnidaria species:		Moon Jellyfish (<i>Aurelia aurita</i>)					
Individual:		1					
Video ID	Time (minute)	E	D	C.T.	C.O.		
Clip015	4.06			X			
	13.04	X					
	26.23				X		
	30.17			X			
	45.09			X			
	1.34.06				X		
Clip016	10.06				X		
	27.45				X		
	32.22	X					
	50.13				X		
Clip017	10.06				X		
	27.2			X			
	25.45	X					
	30.24			X			
	36.02			X			
	39.15	XX					
	43.19			X			
	1.06.27			X			
	1.11.17	X					
	1.27.24			X			
	1.37.15	X					



AA	AB	AC	AD	AE	AF	AG
Video ID	Time (minute)	E	D	C.T.	C.O.	C.E.
Cnidaria species:		fish (<i>Aurelia aurita</i>)				
Individual:		3				
Video ID	Time (minute)	E	D	C.T.	C.O.	C.E.
Clip021	6.14	X				
	10.18			X		
	12.22				X	
	15.09				X	
	21.06			X		X
	29.1	X				
	29.1	X				
	45.05	X				
	48.26				X	
	50.13				X	
	1.08.09				X	
	1.11.16			X		X
	1.12.02	X				
	1.13.15	X				
	1.18.29	X				
	1.23.03	X				
	1.27.06			X		
	1.41.23				X	
	1.43.08				X	
	1.44.08	X				
	1.47.20	X				

AN	AO	AP	AQ	AR	AS	AT	EF	EG	EH	EI	EJ	EK	EL	EM	EN
Time (minute)	E	D	C.T.	C.O.	C.E.	notes	Time (minute)	E	D	C.T.	C.O.	C.E.	notes	encounter efficiency	capture efficiency
															X

fish (<i>Aurelia aurita</i>)							food type
4							Size
Time (minute)	E	D	C.T.	C.O.	C.E.	notes	
2.15	X						
2.13			X				
3.23	X						
4.18	X						
6	XX						
8.06	X						
9.18	X						
12.16			X				
13.11	X						
16.06	X					moved out	
15.24			X				
19.1	X						
21.05	XX						
23.08			X				
23.08	X						
25.13	X					moved out	
24.1				XX			
36.26	XXX						
40.15	X					moved out	
41.12	X						
41.12			X				
46.12	XXX						
49.13	X						
53.19			X				
54.13			X				

Moon Jellyfish (<i>Aurelia aurita</i>)							food type	<i>Parvocalanus crassirostris</i>	
10							Size	encounter efficiency	capture efficiency
Time (minute)	E	D	C.T.	C.O.	C.E.	notes			
7				X				44.11764706	41.17647055
12	X								
12			X						
14	X								
15			X						
21	X								
23			X						
23	X								
25	X								
26	X								
27							X		
31	XX								
31	XX								
31			X						
33	X								
34	X								
34			X						
35	X								
40	X								
46							X		
48				X					
52			X						
54				X					
56	X								
57			X						

DATA PROCESSING

/BCO-DMO/MedusanFeedingMechanics/medusae_interactions ---- Level 4

[Directory](#)[Documentation](#)[Download & Other Operations](#)[Level 0](#)[Next Level](#)[Flat Listing](#)

```
# Medusae Predator-Prey Interactions
# S. Colin
# Version 1 March 2017
```

```
=====
Cnidaria_species
```

```
-----
Cassiopea
```

```
=====
food_type
```

```
-----
Artemia
```

```
=====
individual
```

```
-----
7
```

```
=====
video_id
```

```
-----
Clip006
```


```
=====
time          evaded  ingested          tentacle_capture  oralArm_capture  capture_evade  encounter_effeciency  capture_effeciency  notes
-----
0:14:09      XXX     nd                nd                nd                nd                25.74257426         24.75247525         nd
0:31:18      XXX     nd                nd                nd                nd                25.74257426         24.75247525         nd
```

```
=====
video_id
```

```
-----
Clip009
```

```
=====
time          evaded  ingested          tentacle_capture  oralArm_capture  capture_evade  encounter_effeciency  capture_effeciency  notes
-----
0:13:15      nd     nd                nd                nd                nd                25.74257426         24.75247525         ruler
0:14:26      X     nd                nd                nd                nd                25.74257426         24.75247525         nd
0:20:19      XX    nd                nd                nd                nd                25.74257426         24.75247525         nd
0:21:14      X     nd                nd                nd                nd                25.74257426         24.75247525         nd
0:22:00      nd    nd                nd                X                nd                25.74257426         24.75247525         nd
0:22:29      X     nd                nd                nd                nd                25.74257426         24.75247525         nd
```

PUBLICATION



Biological & Chemical Oceanography Data Management Office


[DATA](#) [RESOURCES](#) [ABOUT US](#)

DATABASE

Programs	39
Projects	917
Deployments	2,736
Platforms	578
Datasets	9,168
Instruments	469
Parameters	1,414
People	2,493
Affiliations	557
Funding	87
Awards	1,736

Dataset: Carbon flux

[Get Data](#) [Cite This Dataset](#) DOI:10.1575/1912/bco-dmo.685952



Spatial Extent: N:24.94972 E:-80.45361 S:24.94972 W:-80.45361 Temporal Extent: 2013-05-01

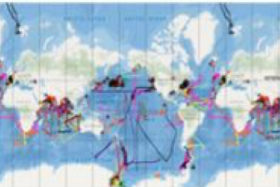
Project: Testing the sponge-loop hypothesis for Caribbean coral reefs (sponge-loop)
Principal Investigator: Christopher Finelli (University of North Carolina - Wilmington, UNC-Wilmington)
Co-Principal Investigator: Steven McMurray (University of North Carolina - Wilmington, UNC-Wilmington) Dr Joseph Pawlik (University of North Carolina - Wilmington, UNC-Wilmington)
Contact: Steven McMurray (University of North Carolina - Wilmington, UNC-Wilmington)
BCO-DMO Data Manager: Nancy Copley (Woods Hole Oceanographic Institution, WHOI BCO-DMO)
Version Date: 2017-03-27
Restricted: No
Validated: Yes
Current State: Final no updates expected
Data URL: https://www.bco-dmo.org/dataset/685783/data

Carbon flux for the Caribbean giant barrel sponge *Xestospongia muta* (Sponge-loop)

[Expand/Collapse All](#)

[Archival Copy](#)

GEOSPATIAL ACCESS



CONTRIBUTE DATA

Getting started

- » How-to Guide
- » FAQs

Metadata Forms (.rtf files)

- » Program Metadata Form
- » Project Metadata Form

PUBLICATION

The screenshot shows the BCO-DMO website interface. At the top, there is a navigation bar with 'DATA', 'RESOURCES', and 'ABOUT US' buttons, and a search bar. Below the navigation bar, a 'DATABASE' sidebar lists various categories: Programs (39), Projects (917), Deployments (2,736), Platforms (578), Datasets (9,168), and Instruments (469). The main content area displays 'Dataset: Carbon flux' with a 'Get Data' button and a 'Cite This Dataset' button. A map of the Caribbean region is visible in the background. A white popup window is overlaid on the page, containing the following text:

Data Citation:
Finelli, C., Pawlik, J., McMurray, S. (2017) Carbon flux for the Caribbean giant barrel sponge *Xestospongia muta* (Sponge-loop). Biological and Chemical Oceanography Data Management Office (BCO-DMO). Dataset version 2017-03-27 [if applicable, indicate subset use of]. doi:10.1575/1912/bco-dmo.685952 [access date]

Terms of Use
All data sets are licensed under a [Creative Commons Attribution 4.0 International License \(CC BY 4\)](#). Per the CC BY 4 license it is understood that any use of the data set will properly acknowledge the individual(s) listed above using the suggested data citation. If you wish to use this data set, it is highly recommended that you contact the original principal investigator(s) (PI). Should the relevant PI be unavailable, please contact BCO-DMO (info@bco-dmo.org) for additional guidance. For general guidance please see the BCO-DMO [Terms of Use](#) document.

Additional information visible in the background includes 'Version Date: 2017-03-27', 'Restricted: No', 'Validated: Yes', 'Current State: Final no updates expected', and 'Data URL: https://www.bco-dmo.org/dataset/685783/data'. The title of the dataset is 'Carbon flux for the Caribbean giant barrel sponge *Xestospongia muta* (Sponge-loop)'.

THE RESULT...

DATASETS = >9000

AWARDS TRACKED= >1700


CONTRIBUTORS = 2500

PARAMETERS = > 2000

Abundance and Biomass
Acoustic Backscatter
Carbonate System Parameters
Chlorophyll and Accessory Pigments
Dissolved and Particulate Nutrients
Ice Cover and Thickness
'Omics-related
Optical Properties
Primary Production
Species
Trace Element Isotopes
Temperature, Salinity, Oxygen
Zenith



DISCOVERY AND ACCESS



Biological & Chemical Oceanography Data Management Office

DATA RESOURCES ABOUT US

DATABASE


Programs	39
Projects	916
Deployments	2,737
Platforms	578
Datasets	9,168
Instruments	469
Parameters	1,414
People	2,497
Affiliations	558
Funding	87
Awards	1,737

Dataset Search


Collection Date **Status** **Validated**

Start: 1995 End: 2018

Embargoed



GEOSPATIAL ACCESS



CONTRIBUTE DATA

Getting started

- » [How-to Guide](#)
- » [FAQs](#)

Total: 137 (1 of 10)

[+] Dataset	People	Award
[+] Carbon flux for the Caribbean giant barrel sponge <i>Xestospongia muta</i>	Principal Investigator	OCE-1558580

of Results Sort by

DATA REUSE

/BCO-DMO/MedusanFeedingMechanics/medusae_interactions ---- Level 4

- Directory
 - Documentation
 - Download & Other Operations
-
- Level 0
 - Next Level
 - Flat Listing

```
# Medusae Predator-Prey Interactions
# S. Colin
# Version 1 March 2017
=====
```

Cnidaria species

Cnidaria species	food_type	individual	video_id	time	evaded	ingested	tentacle_capture	oralArm_capture	capture_evade	encounter_efficiency	capture_efficiency	notes
Cassiopea	Artemia	7	Clip006	0:14:09	XXX	nd	nd	nd	nd	25.74257426	24.75247525	nd
Cassiopea	Artemia	7	Clip006	0:31:18	XXX	nd	nd	nd	nd	25.74257426	24.75247525	nd
Cassiopea	Artemia	7	Clip009	0:13:15	nd	nd	nd	nd	nd	25.74257426	24.75247525	ruler
Cassiopea	Artemia	7	Clip009	0:14:26	X	nd	nd	nd	nd	25.74257426	24.75247525	nd
Cassiopea	Artemia	7	Clip009	0:20:19	XX	nd	nd	nd	nd	25.74257426	24.75247525	nd
Cassiopea	Artemia	7	Clip009	0:21:14	X	nd	nd	nd	nd	25.74257426	24.75247525	nd
Cassiopea	Artemia	7	Clip009	0:22:00	nd	nd	nd	X	nd	25.74257426	24.75247525	nd
Cassiopea	Artemia	7	Clip009	0:22:29	X	nd	nd	nd	nd	25.74257426	24.75247525	nd
Cassiopea	Artemia	7	Clip009	0:22:29	nd	nd	nd	X	nd	25.74257426	24.75247525	nd
Cassiopea	Artemia	7	Clip009	0:24:00	X	nd	nd	nd	nd	25.74257426	24.75247525	nd
Cassiopea	Artemia	7	Clip009	0:29:08	nd	nd	nd	X	nd	25.74257426	24.75247525	nd
Cassiopea	Artemia	7	Clip009	0:29:08	X	nd	nd	nd	nd	25.74257426	24.75247525	nd
Cassiopea	Artemia	7	Clip009	1:09:04	X	nd	nd	nd	nd	25.74257426	24.75247525	nd
Cassiopea	Artemia	7	Clip009	1:13:25	X	nd	nd	nd	nd	25.74257426	24.75247525	nd
Cassiopea	Artemia	7	Clip009	1:20:04	X	nd	nd	nd	nd	25.74257426	24.75247525	nd
Cassiopea	Artemia	7	Clip009	2:10:25	nd	nd	nd	X	nd	25.74257426	24.75247525	nd
Cassiopea	Artemia	7	Clip009	2:22:17	nd	nd	nd	X	nd	25.74257426	24.75247525	nd
Cassiopea	Artemia	7	Clip009	2:47:13	X	nd	nd	nd	nd	25.74257426	24.75247525	nd
Cassiopea	Artemia	7	Clip009	4:11:18	X	nd	nd	nd	nd	25.74257426	24.75247525	nd
Cassiopea	Artemia	7	Clip009	5:03:10	nd	nd	nd	X	nd	25.74257426	24.75247525	nd
Cassiopea	Artemia	7	Clip009	5:42:24	X	nd	nd	nd	nd	25.74257426	24.75247525	nd
Cassiopea	Artemia	7	Clip009	6:12:22	nd	nd	nd	X	nd	25.74257426	24.75247525	nd
Cassiopea	Artemia	7	Clip009	6:33:07	X	nd	nd	nd	nd	25.74257426	24.75247525	nd
Cassiopea	Artemia	7	Clip009	7:09:13	X	nd	nd	nd	nd	25.74257426	24.75247525	nd
Cassiopea	Artemia	7	Clip009	7:46:09	X	nd	nd	nd	nd	25.74257426	24.75247525	nd
Cassiopea	Artemia	7	Clip009	8:09:14	X	nd	nd	nd	nd	25.74257426	24.75247525	nd
Cassiopea	Artemia	7	Clip009	8:40:05	nd	nd	nd	X	nd	25.74257426	24.75247525	nd
Cassiopea	Artemia	7	Clip009	9:12:18	X	nd	nd	nd	nd	25.74257426	24.75247525	nd

=====
video_id

Clip009

time	evaded	ingested	tentacle_capture	oralArm_capture	capture_evade	encounter_efficiency	capture_efficiency	notes
0:13:15	nd	nd	nd	nd	nd	25.74257426	24.75247525	ruler
0:14:26	X	nd	nd	nd	nd	25.74257426	24.75247525	nd
0:20:19	XX	nd	nd	nd	nd	25.74257426	24.75247525	nd
0:21:14	X	nd	nd	nd	nd	25.74257426	24.75247525	nd
0:22:00	nd	nd	nd	X	nd	25.74257426	24.75247525	nd
0:22:29	X	nd	nd	nd	nd	25.74257426	24.75247525	nd

STRATEGIES FACILITATING OPEN SCIENCE

Community best practices, standards and technologies:

- Metadata Standards
- Controlled Vocabularies
- PIDs
- Linked Data



**British Oceanographic
Data Centre**

NATURAL ENVIRONMENT RESEARCH COUNCIL



ORCID

Connecting Research
and Researchers



CHALLENGES AND OPPORTUNITIES: COMMUNITY AT LARGE

- ❖ Actionable DMP's
 - supports PI's, Funders, and Repositories
- ❖ Data Management Capacity Building
 - Training (Minimum sample and file metadata)
 - Community data models
 - Good Habits (obtain an ORCID)
- ❖ Code/Software Curation
 - Community best practice development
- ❖ Linking Data to Related Products
 - Leveraging ORCID's to connect info
 - Encouraging PIDs for NSF and other funding awards

SUMMARY

Domain repositories relieve researchers from the difficult aspects of data management and data sharing, while simultaneously educating them in better data management practices that will streamline the process of conducting transparent research in the future.

