Primary particle flux data (500, 1500, and 3200m depths) of the OFP sediment trap time-series in the northern Sargasso Sea from 1978-2020

Website: https://www.bco-dmo.org/dataset/704722
Data Type: Cruise Results
Version: 3
Version Date: 2022-10-24

Project
» Time Series Particle Flux Measurements in the Sargasso Sea (OFP Sargasso Sea)

Program
» Oceanic Flux Program (OFP)

Contributors	Affiliation	Role
Conte, Maureen H.	Bermuda Institute of Ocean Sciences (BIOS)	Principal Investigator
Rauch, Shannon	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
This is primary particle flux data (500, 1500, and 3200m depths) of the Ocean Flux Program (OFP) sediment trap time-series in the northern Sargasso Sea from 1978-2020.

Table of Contents

Coverage

Spatial Extent: **N**:31.9167 **E**:-64.083 **S**:31.1667 **W**:-64.5
Temporal Extent: 1978-04-06 - 2020-05-19

Dataset Description

Primary particle flux data (500, 1500 and 3200m depths) of the OFP sediment trap time-series in the northern Sargasso Sea.

Access restrictions: Note that though these data are freely accessible, the PI requests that users contact PI regarding usage so the OFP can keep an accurate record of how OFP data has been used to discuss possible synergies/overlaps among other data users and also to ensure any questions about details of sampling, data quality, etc. are clear. Proper acknowledgement of the OFP time series is requested. See the "OFP Agreement" file (PDF) for Fair Use Policy.

Methods & Sampling

Sampling and analytical methodology are described in detail in the "2019_OFP_methodologies" Supplemental File. Please note that samples collected pre-2000 that have isotopic data were analyzed using mass spectrometry.

Conte et al. (2001) provides a description of methods employed prior to 2001.

Data Processing Description

Processing information is described in detail in the "2019_OFP_methodologies" document (see Supplemental Files).

BCO-DMO Processing
Version 1 (date 2017-06-13):
- modified parameter names: replaced % with "pcnt", > with "gt", < with "lt", and hyphens with underscores;
- replaced missing data with "nd" (no data);
- replaced commas with semi-colons in the comments.

Version 2 (date 2019-12-13):
- updated dataset with version submitted to BCO-DMO on 2019-11-22; same processing steps as above.

Version 3 (date 2022-10-24):
- updated dataset with version submitted to BCO-DMO on 2022-08-30 and 2022-10-21; processing steps:
- Concatenated 3 data sheets (one per depth) into a single dataset;
- Added the "depth" column;
- Added Start_Date column (using the separate year, month, day fields as input);
- Sorted by Depth, then Start_Date, then SeqDay;
- Replaced commas w/ semi-colons in comments column.

[table of contents | back to top]

Data Files

File	
OFP_particle_flux.csv	(Comma Separated Values (.csv), 459.99 KB) MD5:69d78531c34d1ed6af1e8b50192a93ca
Primary data file for dataset ID 704722	

[table of contents | back to top]

Supplemental Files

File	
2019 OFP methodologies filename: 2019_OFP_methodologies.pdf	(Portable Document Format (.pdf), 343.83 KB) MD5:f55e523dd54673cc38fd03aab1f4cbdc
2019 Ocean Flux Program methodologies document	
OFP_agreement.pdf	(Portable Document Format (.pdf), 42.86 KB) MD5:dcbab09cb73b83ddfc770a7fed0006e9
AGREEMENT FOR DISTRIBUTION OF OCEANIC FLUX PROGRAM SEDIMENT TRAP MATERIAL AND DATA	

[table of contents | back to top]

Related Publications

Conte, M. H., Ralph, N., & Ross, E. H. (2001). Seasonal and interannual variability in deep ocean particle fluxes at the Oceanic Flux Program (OFP)/Bermuda Atlantic Time Series (BATS) site in the western Sargasso Sea near Bermuda. Deep Sea Research Part II: Topical Studies in Oceanography, 48(8-9), 1471–1505. doi:10.1016/s0967-0645(00)00150-8 https://doi.org/10.1016/S0967-0645(00)00150-8
Methods

[table of contents | back to top]

Parameters

Parameter	Description	Units
depth	sampling depth in meters	meters (m)
SampleID	The OFP naming convention uses the month of the mooring recovery cruise, the sequential number of the trap cup, and trap depth. E.g. %11/10-4 1500 denotes the sample was recovered in Nov 2010, was the fourth trap cup in the sampling rotation during the deployment and the sediment trap was located at 1500m depth. Samples collected using the single cup trap (prior to 1989), are named by the recovery date only (Please note: The Sample ID does NOT indicate the date of sample collection!! The start date of the sample collection is provided by the sequence day (Sequence Day 1 = 4 Apr 1978) and the start calendar date.	unitless
SeqDay	Number of days since the beginning of the OFP time-series (SeqDay 1=4 April 1978). The SeqDay is the first day of the sample collection period.	unitless
midSeqDay	Sequence day of the middle of the sample collection period	unitless
StartYr	Start year for sample	unitless
StartMo	Start month for sample	unitless
StartDay	Start day for sample	unitless
MidJDay	Mid Julian Day is the Julian Day (Day of Year) of the midpoint of the sample collection period.	unitless
Duration	number of days the sample collected	unitless
Fr_gt_1000	mass of sample >1000 um size fraction, in mg	milligrams (mg)
Fr500_1000	mass of sample between 500-1000 um size fraction, in mg	milligrams (mg)
Fr125_500	mass of sample between 125-500 um size fraction, in mg	milligrams (mg)
Fr37_125	mass of sample between 37-125 um size fraction, in mg (measured 1978-1996 only)	milligrams (mg)
Fr_lt_37	mass of sample	milligrams (mg)
Fr_lt_125	mass of sample	milligrams (mg)
MassFlux	in mg per m2 per day. NOTE: The 500m and 1500m fluxes are semi-quantitative for deployments between Oct 1992 and Jan 1996 (see "2019_OFP methodologies" file)	milligrams per square meter per day (mg/m2/day)
pcnt_Carb37_125	percent carbonate by weight, 37-125 um size fraction	unitless (percent)

pcnt_Carb_lt_37	percent carbonate by weight,	unitless (percent)
pcnt_Carb_lt_125	percent carbonate by weight,	unitless (percent)
CarbFlux	total carbonate flux, in mg per m2 per day.	milligrams per square meter per day (mg/m2/day)
pcnt_Corg37_125	percent organic carbon by weight, 37-125 um size fraction	unitless (percent)
d13Corg37_125	the isotopic composition of organic carbon (in ‰), 37-125 um size fraction	per mil (‰)
pcnt_Corg_lt_37	percent organic carbon by weight,	unitless (percent)
d13Corg_lt_37	the isotopic composition of organic carbon (in ‰),	per mil (‰)
d13Corg_lt_37_A	the isotopic composition of organic carbon (in ‰),	per mil (‰)
pcnt_Corg_lt_125	percent organic carbon by weight,	unitless (percent)
d13Corg_lt_125	the isotopic composition of organic carbon (in ‰),	per mil (‰)
CorgFlux	total organic carbon flux, in mg per m2 per day.	milligrams per square meter per day (mg/m2/day)
pcnt_N37_125	percent nitrogen by weight, 37-125 um size fraction	unitless (percent)
d15N37_125	the isotopic composition of N (in ‰), in 37-125 um size fraction	per mil (‰)
pcnt_N_lt_37	percent nitrogen by weight,	unitless (percent)
d15N_lt_37	the isotopic composition of N (in ‰),	per mil (‰)
d15N_lt_37_A	the isotopic composition of N (in ‰),	per mil (‰)
pcnt_N_lt_125	percent nitrogen by weight,	unitless (percent)
d15N_lt_125	the isotopic composition of N (in ‰),	per mil (‰)
d15N_lt_125_A	the isotopic composition of N (in ‰),	per mil (‰)
Nflux	total nitrogen flux, in mg per m2 per day.	milligrams per square meter per day (mg/m2/day)
pcnt_Ppart_lt_37	the percent phosphorus by weight, in	unitless (percent)
pcnt_Ppart_lt_125	the percent phosphorus by weight, in	unitless (percent)
pcnt_Ppart_lt_1000	the percent phosphorus by weight, in the	unitless (percent)
pcnt_Psuper	the dissolved/colloidal phosphorus present in the supernatant, normalized to the sample mass.	unitless (percent)

PtotalFlux	the phosphorus flux, in ug m-2 d-1. Includes both phosphorus measured in the particle phase as well as dissolved/colloidal phosphorus measured in the trap cup supernatant.	micrograms per square meter per day (ug/m2/day)
pcnt_Opal37_125	mass percent opal, in 37-125 um size fraction. (3200m data only)	unitless (percent)
pcnt_Opal_lt_37	mass percent opal, in	unitless (percent)
pcnt_Opal_lt_1000est	estimated mass percent opal, for	unitless (percent)
OpalFlux	the opal flux, in mg per m2 per day.	milligrams per square meter per day (mg/m2/day)
pcnt_Lith_lt_1000est	estimated mass percent lithogenic material, for	unitless (percent)
LithFlux	the estimated lithogenic flux, in mg per m2 per day.	milligrams per square meter per day (mg/m2/day)
Comments	notes/comments	unitless
Start_Date	Start date in format YYYY-MM-DD	unitless

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	Olympus Q-Color 5 (5.0 MP) camera
Generic Instrument Name	Camera
Dataset-specific Description	The 500-1000um and 125- 500um fractions are rinsed into preweighed glass petri dishes using deionized water, quantitatively photographed using a Zeiss Stemi SV-11 stereomicroscope in conjunction with an Olympus Q-Color 5 (5.0 MP) camera as described in Shatova et al. (2012, J. Plankton Res. 34, 905-921). In 2016, the camera was upgraded to an Olympus DP73-1-51 (17.0 MP) camera and Olympus CELLSENS (1.13) imaging software.
Generic Instrument Description	All types of photographic equipment including stills, video, film and digital systems.

Dataset-specific Instrument Name	Perkin Elmer 240 CHN instrument
Generic Instrument Name	CHN Elemental Analyzer
Dataset-specific Description	Between 1992 and 1995, total carbon and nitrogen were determined on a Perkin Elmer 240 CHN instrument; organic carbon was calculated as the difference between total and carbonate carbon. Between 1995-2004, organic carbon and nitrogen were determined directly on pre-acidified samples using either a Carlo Erba or Perkin Elmer 240 CHN instrument.
Generic Instrument Description	A CHN Elemental Analyzer is used for the determination of carbon, hydrogen, and nitrogen content in organic and other types of materials, including solids, liquids, volatile, and viscous samples.

Dataset-specific Instrument Name	Europa 20-20 or GV Isoprime mass spectrometer
Generic Instrument Name	Mass Spectrometer
Dataset-specific Description	Since 2004, concentrations of organic carbon and nitrogen, as well as their isotopic compositions, have been analyzed by mass spectrometry using either a Europa 20-20 or GV Isoprime mass spectrometer.
Generic Instrument Description	General term for instruments used to measure the mass-to-charge ratio of ions; generally used to find the composition of a sample by generating a mass spectrum representing the masses of sample components.

Dataset-specific Instrument Name	Parflux conical sediment traps
Generic Instrument Name	McLane PARFLUX Mark 8 Sediment Trap
Dataset-specific Description	In 1989, the 1.54m2 traps were replaced by the newly introduced 0.5m2 Parflux conical sediment traps (McLane Labs, Falmouth MA) having a rotating carousel to allow for multiple samples to be collected during a single deployment. The introduction of the Parflux trap (PARFLUX Mark 7G-13, Mark 7G-21 and currently Mark 78G-21) enabled the sampling period to be reduced from a nominal two month duration to a nominal two week duration.
Generic Instrument Description	The Mark 8 Sediment Trap is a time-series instrument that autonomously collects the flux of settling particles on an operator-defined schedule. The wide top funnel accumulates particulate specimens into individual sample bottles. The cone interior is natural polyethylene. Deploys from a stand-alone mooring or a large high-tension vertical array. McLane Mark 8 Data Sheet (PDF) McLane website: http://www.mclanelabs.com/master_page/product-type/samplers/sediment-traps

Dataset-specific Instrument Name	Zeiss Stemi SV-11 stereomicroscope
Generic Instrument Name	Microscope - Optical
Dataset-specific Description	The >1000um fraction is then rinsed into a pre-weighed Teflon petri dish, swimmers removed under a stereomicroscope (Zeiss Stemi SV-11), and photographed. The 500-1000um and 125-500um fractions are rinsed into preweighed glass petri dishes using deionized water, quantitatively photographed using a Zeiss Stemi SV-11 stereomicroscope in conjunction with an Olympus Q-Color 5 (5.0 MP) camera as described in Shatova et al. (2012, J. Plankton Res. 34, 905-921).
Generic Instrument Description	Instruments that generate enlarged images of samples using the phenomena of reflection and absorption of visible light. Includes conventional and inverted instruments. Also called a "light microscope".

Dataset-specific Instrument Name	
Generic Instrument Name	Sediment Trap
Dataset-specific Description	The SCIFF mooring consisted of a single 1.54m2 conical sediment trap located at 3200m water depth (total water depth 4200m). The 1.54m2 trap had only a single collection cup under the trap funnel, and the mooring was recovered every two months to change the sample.
Generic Instrument Description	Sediment traps are specially designed containers deployed in the water column for periods of time to collect particles from the water column falling toward the sea floor. In general a sediment trap has a jar at the bottom to collect the sample and a broad funnel-shaped opening at the top with baffles to keep out very large objects and help prevent the funnel from clogging. This designation is used when the specific type of sediment trap was not specified by the contributing investigator.

[table of contents | back to top]

Deployments

OFP_Time-Series

Website	https://www.bco-dmo.org/deployment/704779
Platform	OFP_mooring
Start Date	1978-04-06
Description	The Oceanic Flux Program (OFP) time-series began in 1978 at the Hydrostation S hydrographic time-series site (32 05N, 64 15W), located approximately 45 km southeast of Bermuda. The time-series was originally called the SCIFF (Seasonal Changes in Isotopes and Flux of Foraminifera) program. Location: 1978-1984: 31deg 10min N, 64deg 30min W, 3300m (SCIFF site) 1984-2010: 31deg 50min N, 64deg 10min W, 4500m 2011-present: 31deg 55 N, 64deg 05 W, 4550m

[table of contents | back to top]

Project Information

Time Series Particle Flux Measurements in the Sargasso Sea (OFP Sargasso Sea)

Website: http://www.mbl.edu/ecosystems/conte/ofp/

Coverage: Sargasso Sea

NSF Award Abstract:
This award continues, for another three years, the Ocean Flux Program (OFP) that has been in continuous operation near Bermuda since 1978. The OFP time-series of particle fluxes in the deep Sargasso Sea has produced a unique record of the "biological pump," a term used to describe the sinking of biological material from the surface to the deep ocean. The OFP provided the first direct evidence for seasonal changes in the deep ocean and tight links between deep ocean and upper ocean processes. The OFP provides clear evidence for the intensity of biological activity throughout the ocean's interior and the roles of key processes in biogeochemical and elemental cycling. The time-series is becoming long enough to study flux variability in terms of ocean basin-scale forcing, such as the North Atlantic Oscillation. The OFP sample archives are an unparalleled resource for study of temporal trends and the biogeochemical consequences of changing ocean chemistry. Education provided by the OFP broadens the experiences and science directions of many students (high school to PhD levels) and early investigators at critical career junctures.

The OFP time-series is the longest of its kind and unique in its focus on the deep ocean. As the record lengthens, investigators are better able to put into perspective the observed flux patterns in terms of the interplay between climate and ocean functioning. Colocation of complementary time-series -- Hydrostation S, the Bermuda Atlantic Time-Series (BATS), the Bermuda Testbed Mooring (BTM, 1994-2007), the Tudor Hill atmospheric tower and other sampling conducted near the Bermuda Time-Series Site -- and continuing advances in instrumentation on the OFP mooring present unparalleled opportunities to study coupling among ocean physics, biology and chemistry and material fluxes, and flux linkages with atmospheric and climatic forcing. As ever more sophisticated analytical tools are used to probe the recovered flux materials, new data continue to reveal novel information about ocean processes.

[table of contents | back to top]

Program Information

Oceanic Flux Program (OFP)

Website: http://www.mbl.edu/ecosystems/conte/ofp/

Coverage: Sargasso Sea

(Adapted from the NSF Project Summary)

Since 1978, the Oceanic Flux Program (OFP), originally founded and managed by at the Woods Hole Oceanographic Institution and now managed by the Bermuda Institute of Ocean Science (BIOS), has continuously measured particle fluxes in the deep Sargasso Sea. The 35+ year OFP time-series is, by far, the longest of its kind and unique in its focus on the deep ocean. OFP has produced a unique, albeit "edited", record of temporal variability in the "biological pump", a term loosely applied here to material transfer from the surface to the deep ocean. The OFP provided the first direct evidence for seasonality in the deep ocean and the tight coupling between deep fluxes and upper ocean processes. It has provided clear evidence of the intensity of biological reprocessing of flux and scavenging of suspended material in mesopelagic waters. The record has documented interannual and longer variations in deep fluxes and shorter term fluctuations driven by the interactions between mesoscale physical variability, meteorological forcing and ecosystem responses.

[table of contents | back to top]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1536644

[table of contents | back to top]