

Mass flux and concentrations of bulk components (Carbonate, Organic Carbon/Nitrogen, Lithogenics, Opal) and elements in the flux at 500m, 1500m and 3200m depths from the OFP sediment trap time-series in the northern Sargasso Sea

Website: <https://www.bco-dmo.org/dataset/784396>

Data Type: Other Field Results

Version: 1

Version Date: 2022-08-30

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
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Abstract

This dataset includes mass flux and concentrations of bulk components (Carbonate, Organic Carbon/Nitrogen, Lithogenics, Opal) and elements in the flux at 500m, 1500m, and 3200m depths from the Ocean Flux Program (OFP) sediment trap time-series in the northern Sargasso Sea.

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Coverage

Spatial Extent: Lat:31.9167 Lon:-64.0833

Temporal Extent: 2000-10-07 - 2015-03-31

Dataset Description

Mass flux and concentrations of bulk components (Carbonate, Organic Carbon/Nitrogen, Lithogenics, Opal) and elements in the flux at 500m, 1500m and 3200m depths from the OFP sediment trap time-series in the northern Sargasso Sea.

Access restrictions:

If you plan to use this data, please contact me, Maureen H. Conte @ mconte@mbi.edu. For the OFP time-series records, it is extremely important that we have a record of how the data are utilized, and by whom to support continued OFP funding. Also, talking with me will ensure that you are clear about the data naming conventions,

etc., and let you know if there are others using the data for similar research. I also can give you some valuable insights that should be valuable concerning the OFP flux data in general. Thank you! Maureen Conte, principal Investigator OFP time-series

Methods & Sampling

Sampling and analytical methodology for carbonate, and organic carbon/nitrogen are described in detail in the "2019_OFP_Methodologies" document (see Supplemental Files).

Analytical methodology for the element data are described in detail in Conte et al. (2019).

The LiBO2 fusion method is described in detail in Huang et al. (2007).

Briefly, the dried <1mm sediment trap material is processed by fusion with high purity lithium metaborate (LiBO2) flux at 1000 C in a dedicated combustion furnace. The sample to LiBO2 flux ratio for fusion is approximately 1:2.5. The fused sample bead is subsequently dissolved in 1M HNO3 for ICPMS analysis. From 2000 to 2004, we used 1-2 mg of flux material for analysis, but in 2005 we increased this to ~6 mg to reduce analytical variability associated with particle heterogeneity. Blank analyses of the LiBO2 flux are run with each sample set to assess contamination. The final sample solution was analyzed on a high-resolution Finnigan Element 2 ICPMS. A matrix-matching multi-element external standard solution was used for determination of the trace element concentrations.

Data Processing Description

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

BCO-DMO Processing:

- modified parameter names: replaced % with "pcnt", > with "gt", < with "lt", and hyphens with underscores;
- replaced missing data and values of "-999" with "nd" (no data).

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Data Files

File
OFP_elemental.csv (Comma Separated Values (.csv), 113.52 KB) MD5:8d4ba3ed4e33da3208b1ea9c5add6c30
Primary data file for dataset ID 784396

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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

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Related Publications

Conte, M. H., Carter, A. M., Koweek, D. A., Huang, S., & Weber, J. C. (2019). The elemental composition of the deep particle flux in the Sargasso Sea. *Chemical Geology*, 511, 279–313. doi:[10.1016/j.chemgeo.2018.11.001](https://doi.org/10.1016/j.chemgeo.2018.11.001)
Methods

Huang, S., Sholkovitz, E. R., & Conte, M. H. (2007). Application of high-temperature fusion for analysis of major and trace elements in marine sediment trap samples. *Limnology and Oceanography: Methods*, 5(1), 13–22. doi:[10.4319/lom.2007.5.13](https://doi.org/10.4319/lom.2007.5.13)
Methods

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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
MassFlux	Total mass Flux	milligrams per square meter per day (mg/m ² /day)
pcnt_Carb_lt_125	percent carbonate by weight	unitless (percent)
pcnt_Corg_lt_125	percent organic carbon by weight	unitless (percent)
pcnt_N_lt_125	percent nitrogen by weight	unitless (percent)
pcnt_Lith_lt_1000est	estimated mass percent lithogenic material	unitless (percent)
pcnt_Opal_lt_1000est	estimated mass percent opal	unitless (percent)
Mg_lt_1000	Mg concentration by weight	milligrams per kilogram
Al_lt_1000	Al concentration by weight	milligrams per kilogram

Total_Si_lt_1000	Total Si (Biogenic Si + lithogenic Si) concentration by weight	milligrams per kilogram
P_lt_1000	P concentration by weight	milligrams per kilogram
Ca_lt_1000	Ca concentration by weight	milligrams per kilogram
Sc_lt_1000	Sc concentration by weight	milligrams per kilogram
Ti_lt_1000	Ti concentration by weight	milligrams per kilogram
V_lt_1000	V concentration by weight	milligrams per kilogram
Cr_lt_1000	Cr concentration by weight	milligrams per kilogram
Mn_lt_1000	Mn concentration by weight	milligrams per kilogram
Fe_lt_1000	Fe concentration by weight	milligrams per kilogram
Co_lt_1000	Co concentration by weight	milligrams per kilogram
Ni_lt_1000	Ni concentration by weight	milligrams per kilogram
Cu_lt_1000	Cu concentration by weight	milligrams per kilogram
Zn_lt_1000	Zn concentration by weight	milligrams per kilogram
Sr_lt_1000	Sr concentration by weight	milligrams per kilogram
Cd_lt_1000	Cd concentration by weight	milligrams per kilogram
Ba_lt_1000	Ba concentration by weight	milligrams per kilogram
Pb_lt_1000	Pb concentration by weight	milligrams per kilogram
Comments	notes/comments	unitless

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	McLane PARFLUX Mark 8 Sediment Trap
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

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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

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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.

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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.

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Funding

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

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