Hurricane Harvey impacts on biogeochemistry of water assessed using samples collected in Mission-Aransas Estuary in south Texas from June 2017 to March 2019

Website: https://www.bco-dmo.org/dataset/839385
Data Type: Other Field Results
Version: 1
Version Date: 2021-02-04

Project
» RAPID: The impact of Hurricane Harvey on water column and sediment biogeochemistry of the Mission-Aransas Estuary in south Texas (Hurricane Harvey Biogeochemistry)

Contributors	Affiliation	Role
Liu, Zhanfei	University of Texas - Marine Science Institute (UTMSI)	Principal Investigator
Hardison, Amber	University of Texas - Marine Science Institute (UTMSI)	Co-Principal Investigator
Xue, Jianhong	University of Texas - Marine Science Institute (UTMSI)	Contact
Gerlach, Dana Stuart	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager
Heyl, Taylor	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
The impact of Hurricane Harvey on the chemical composition of water was assessed using samples collected from June 2017 to March 2019 at Mission-Aransas Estuary in south Texas. Hydrographic measurements including temperature, salinity, dissolved oxygen, and pH were collected on site using a YSI sonde. Water samples were obtained from both surface and bottom depths at 19 sites, and later analyzed for dissolved nutrients, organic carbon and nitrogen, and pigments.

Table of Contents

Coverage

Spatial Extent: **N**:28.179 **E**:-96.831 **S**:27.923 **W**:-97.202
Temporal Extent: 2017-06-08 - 2019-03-07

Methods & Sampling

Water samples were collected from both surface and bottom depths at 19 sites in the Mission Aransas Estuary. Hydrographic measurements including temperature, salinity, dissolved oxygen, and pH were collected on site using a YSI sonde. Upon return to the lab on the same day, 200 to 1000 milliliters of the collected water was filtered through pre-combusted 47 mm glass fiber filters (Whatman GF/F, 0.7 µm), which were frozen immediately at -20 ºC until analysis.

Organic carbon and nitrogen

The GF/F filters were first acidified to remove inorganic carbon by acid fumigation according to Hedges and Stern (1984). The organic carbon and nitrogen content in these samples was then measured using a Thermo FLASH 2000 CHN Elemental Analyzer. Precision for the C/N content is within 5%.

Pigment analysis
The glass fiber filter was transferred into a 15 mL polypropylene centrifuge tube, to which 3 mL acetone was added for pigment extraction (Sun et al., 1991). The mixture was sonicated for 15 minutes, and then centrifuged for another 10 minutes. The acetone extract was filtered with a syringe filter (0.2 µm Nylon filter) and the procedure was repeated on the GF/F using fresh acetone. The two extracts were then combined before the high performance liquid chromatography (HPLC) analysis. Quantitative analysis of all pigments was conducted using a Shimadzu HPLC system with a reverse phase column (Agilent Eclipse XDB-C8, 3.5 µm particle size, 150-mm length × 4.6-mm diameter).

Dissolved Nutrients
Nutrient analyses (Phosphorous, Ammonia, Nitrate+Nitrite) were performed on Lachat QuikChem 8500.

Data Processing Description

BCO-DMO processing:
- Added a conventional header with dataset name, PI names, version date
- Adjusted parameter names to comply with database requirements
- Units removed and added to Parameter Description metadata section

[table of contents | back to top]

Data Files

File
water.csv (Comma Separated Values (.csv), 51.85 KB) MD5:a63777d02f53ff254d6f156229f28695 Primary data file for dataset ID 839385

[table of contents | back to top]

Related Publications

Hedges, J. I., & Stern, J. H. (1984). Carbon and nitrogen determinations of carbonate-containing solids. Limnology and Oceanography, 29(3), 657–663. doi:10.4319/lo.1984.29.3.0657
Methods

Lee, C., Wakeham, S. G., & I. Hedges, J. (2000). Composition and flux of particulate amino acids and chloropigments in equatorial Pacific seawater and sediments. Deep Sea Research Part I: Oceanographic Research Papers, 47(8), 1535–1568. doi:10.1016/s0967-0637(99)00116-8 https://doi.org/10.1016/S0967-0637(99)00116-8
Methods

Sun, M., Aller, R. C., & Lee, C. (1991). Early diagenesis of chlorophyll-a in Long Island Sound sediments: A measure of carbon flux and particle reworking. Journal of Marine Research, 49(2), 379–401. doi:10.1357/002224091784995927
Methods

[table of contents | back to top]

Related Datasets

IsRelatedTo

Liu, Z., Hardison, A., Xue, J. (2021) **Hurricane Harvey impacts on biogeochemistry of sediments assessed using samples collected in Mission-Aransas Estuary in south Texas from June 2017 to March 2019.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2021-02-04 doi:10.26008/1912/bco-dmo.839436.1 [view at BCO-DMO]

[table of contents | back to top]

Parameters

Parameter	Description	Units
Estuary	National Estuarine Research Reserve (NERR) estuary name	unitless
Station	Station Name	unitless
ISO_Date	Sampling Date (yyyy-mm-dd)	unitless
Latitude	Latitude	decimal degrees
Longitude	Longitude (West is negative)	decimal degrees
Depth	Sampling Depth	meters (m)
Temp	Temperature	degrees Celsius (°C)
Sal	Salinity	parts per thousand (ppt)
DOPCT	DO saturation	percent (%)
DO	DO concentration	miligrams per liter (mg/L)
pH	pH	unitless
NH4	Ammonium	micromolar nitrogen (µM N)
NOx	NO3+NO2	micromolar nitrogen (µM N)
PO4	Phosphate	micromolar phosphorous (µM P)
NO2	Nitrite	micromolar nitrogen (µM N)

NPOC	Non-Particulate Organic Carbon	micromolar carbon (µM C)
TDN	Total Dissolved Nitrogen	micromolar nitrogen (µM N)
Chlc2	Chlorophyll c2	nanograms per liter (ng/L)
Chlb	Chlorophyll b	nanograms per liter (ng/L)
DivChla	Divinyl Chlorophyll a	nanograms per liter (ng/L)
Chla	Chlorophyll a	nanograms per liter (ng/L)
Peridinin	Peridinin	nanograms per liter (ng/L)
Nineteen_but	19'-but-fucoxanthin	nanograms per liter (ng/L)
Fuco	Fucoxanthin	nanograms per liter (ng/L)
Prasin	Prasinoxanthin	nanograms per liter (ng/L)
Nineteen_hex	19'-hex fucoxanthin	nanograms per liter (ng/L)
Diadinoxanthin	Diadinoxanthin	nanograms per liter (ng/L)
Alloxanthin	Alloxanthin	nanograms per liter (ng/L)
Zeaxanthin	Zeaxanthin	nanograms per liter (ng/L)
Lutein	Lutein	nanograms per liter (ng/L)

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	Thermo FLASH 2000 CHN Elemental Analyzer
Generic Instrument Name	CHN Elemental Analyzer
Dataset-specific Description	The organic carbon and nitrogen content of the samples was measured using a Thermo FLASH 2000 CHN Elemental Analyzer. Precision for the C/N content is within 5%.
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	Shimadzu HPLC system
Generic Instrument Name	High-Performance Liquid Chromatograph
Dataset-specific Description	Shimadzu HPLC with reverse phase column was used for pigment analysis. Reverse phase column was Agilent Eclipse XDB-C8, 3.5 µm particle size, 150-mm length × 4.6-mm diameter
Generic Instrument Description	A High-performance liquid chromatograph (HPLC) is a type of liquid chromatography used to separate compounds that are dissolved in solution. HPLC instruments consist of a reservoir of the mobile phase, a pump, an injector, a separation column, and a detector. Compounds are separated by high pressure pumping of the sample mixture onto a column packed with microspheres coated with the stationary phase. The different components in the mixture pass through the column at different rates due to differences in their partitioning behavior between the mobile liquid phase and the stationary phase.

Dataset-specific Instrument Name	Thermo Delta V Plus isotope ratio mass spectrometer
Generic Instrument Name	Isotope-ratio Mass Spectrometer
Dataset-specific Description	Stable carbon isotopes were measured with a Thermo Delta V Plus isotope ratio mass spectrometer (coupled from a Thermo FLASH 2000 CHN Elemental Analyzer). The δ13C values were expressed relative to Vienna Pee Dee Belemnite standard, with precision within 0.2%.
Generic Instrument Description	The Isotope-ratio Mass Spectrometer is a particular type of mass spectrometer used to measure the relative abundance of isotopes in a given sample (e.g. VG Prism II Isotope Ratio Mass-Spectrometer).

Dataset-specific Instrument Name	Lachat QuikChem 8500
Generic Instrument Name	Nutrient Autoanalyzer
Generic Instrument Description	Nutrient Autoanalyzer is a generic term used when specific type, make and model were not specified. In general, a Nutrient Autoanalyzer is an automated flow-thru system for doing nutrient analysis (nitrate, ammonium, orthophosphate, and silicate) on seawater samples.

Dataset-specific Instrument Name	YSI 600XLM Sonde
Generic Instrument Name	YSI Sonde 6-Series
Dataset-specific Description	The YSI 600XLM is an economical logging system for long-term, in situ monitoring and profiling that measures eleven parameters simultaneously: DO (% and mg/L), ORP, Temperature, Depth or Level, Conductivity, Total Dissolved Solids, Specific Conductance, Resistivity, Salinity, and pH.
Generic Instrument Description	YSI 6-Series water quality sondes and sensors are instruments for environmental monitoring and long-term deployments. YSI datasondes accept multiple water quality sensors (i.e., they are multiparameter sondes). Sondes can measure temperature, conductivity, dissolved oxygen, depth, turbidity, and other water quality parameters. The 6-Series includes several models. More from YSI.

[table of contents | back to top]

Project Information

RAPID: The impact of Hurricane Harvey on water column and sediment biogeochemistry of the Mission-Aransas Estuary in south Texas (Hurricane Harvey Biogeochemistry)

Coverage: Mission-Aransas Estuary 28N 97W

NSF Award Abstract:

This project involves rapid-response research into the effects of Hurricane Harvey on the Mission-Aransas estuary system in south Texas. Hurricane Harvey passed directly over this region on August 25-26, 2017. Because these waters are the site of the Mission-Aransas National Estuarine Research Reserve (MANERR), the investigators have a history of data from before the storm with which to compare the data they will collect. They proposed to investigate the effect of the passage of the storm on carbon and nitrogen cycling, and thus the ecosystem, in the waters and sediments of Copano Bay and Aransas Bay. Their results will be important to understanding coastal processes both in general and in response to extreme events.

The investigators pose two hypotheses, which can be summarized broadly as 1) inputs of nutrients from river flooding will stimulate algal blooms in the estuary and 2) changes in sediment grain size distribution will affect sediment nitrogen cycling. They will collect water samples for nutrients, pigments, lipids, bulk carbon, and carbon isotope analyses, together with standard water quality parameters using a YSI Sonde (salinity, temperature, pH, chlorophyll a, dissolved oxygen and turbidity) at the five System Wide Monitoring Program sites of the MANERR on a biweekly to monthly basis. Sediment samples will be collected at all sites in the fall of 2017 and examined for grain size, pigments, carbon and nitrogen content, carbon isotopes, pigments, and lipids. The results will be used, in combination from data collected earlier this year, to examine physical, chemical, and biological responses to this major event. The project will support a graduate student research assistant and three undergraduate student researchers. Communication with the public will occur through well-established and effective programs at the Mission-Aransas NERR and the University of Texas Marine Science Institute.

[table of contents | back to top]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1763167

[table of contents | back to top]