Tidal water velocities in Groves Creek salt marsh, Skidaway Island Georgia, USA, 2013-2014

Website: https://www.bco-dmo.org/dataset/682783
Data Type: Other Field Results
Version: 2
Version Date: 2017-02-22

Project
» Tempo and mode of salt marsh exchange (GrovesCreek)

Contributors	Affiliation	Role
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Abstract
Tidal water velocities were measured at two stations in Groves Creek salt marsh, Skidaway Island Georgia, USA from August 2013 to July 2014.

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Coverage

Spatial Extent: **N**:31.97132 **E**:-81.01454 **S**:31.96751 **W**:-81.02768
Temporal Extent: 2013-08-09 - 2014-07-01

Methods & Sampling

ADP field sampling:
Nortek Aquadopp 2MHz ADPs (AQD 6204 & AQD 9331) were used to measure water velocities and tidal height in the tidal creeks at stations S0, S2, and S8. ADP transducer heads were coated with a mixture of cayenne pepper and petroleum jelly to discourage hard fouling.

Units were affixed to a concrete plate that was lowered from a small boat by hand and rope to the bottom of the creek channel. Deployments were blind: effort was made to assure that the units were oriented channel-parallel and on flat bottom, but the exact location and orientation of each deployment depended greatly on the swing of the boat’s anchor in the current. The a priori objective of each deployment was to locate a unit in the center of a straight section of creek seaward of the water quality sampling stations. Each ADP mount was fixed to a weighted line that ran to the nearest shoreline where it was anchored and marked with a buoy. Individual deployments lasted 8-10 weeks. Units were recovered by retrieving the line at the shore and hand-hauling it to the surface.

ADPs were returned to the lab for cleaning, downloading data, charging batteries and setting up the unit for the next deployment. Units were re-deployed at the next convenient opportunity. Gaps in the record were on the order of a week to a month.

Over the study, the ADP measured temperature (°C), velocity (u, v, w in m s-1), and pressure (decibars converted to water level (m) relative to Mean Sea Level) at a 10-minute interval. Velocity was measured across 18 to 20 vertical bins with each bin covering 30 to 40 cm. This bin setup allowed maximum water level (2 m above Mean Sea Level) to be captured by the ADP. To correct for minor differences in ADP positioning on the creek bed between deployments, velocity and water level records underwent alignment.

ADP data processing:
To process in situ data, ADP deployment records were linearly interpolated to the same 10-minute time grid across the study, and the start and end of individual ADP deployments were determined (first or last measurement above 0.35 m relative to channel bottom). Furthermore, out of water ADP measurements (pressure <2 decibar) were eliminated as were vertical ADP bins at depths above the water column and untrustworthy surface bins impacted by side-lobe interference. Average velocity (u, v) was calculated across the remaining bins. Using average binned velocity provided a continuous velocity record. A vertical average was an appropriate approximation for velocity in a well-mixed system such as Groves Creek (Blanton et al., 2010; Sullivan et al., 2015). Resulting velocity measurements (u, v) were converted to along and cross channel velocity by rotating velocity vectors per deployment by their respective principal axis angles.

Data Processing Description

BCO-DMO Processing notes:
- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions
- added station, lat, lon, date, time, ISO_DateTIme columns
- ISO Date format generated from date and time values
- reduced decimal places of lat and lon to 5; reduced depth to 2

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Data Files

File

ADP data for station S0, deployments #1-2, Oct. 2014 - Mar. 2015

filename: S0ADPdata.xlsx

(Microsoft Excel, 8.53 MB)

MD5:52acf1f0ff458ca42a3bab9abbd58210

1 @ 0.4m

2 @ 0.8m

3 @ 1.2m

4 @ 1.6m

5 @ 2m

6 @ 2.4m

7 @ 2.8m

8 @ 3.2m

9 @ 3.6m

10 @ 4m

11 @ 4.4m

12 @ 4.8m

13 @ 5.2m

14 @ 5.6m

15 @ 6m

16 @ 6.4m

17 @ 6.8m

18 @ 7.2m

19 @ 7.6m

20 @ 8m

File
ADP data for station S2, deployment #1, Aug. 2013 filename: S20813_mod.xlsx (Microsoft Excel, 3.08 MB) MD5:b7d3b59735386821c12eb81f2189ea8c 1 @ 0.6m 2 @ 1.0m 3 @ 1.4m 4 @ 1.8m 5 @ 2.2m 6 @ 2.6m 7 @ 3.0m 8 @ 3.4m 9 @ 3.8m 10 @ 4.2m 11 @ 4.6m 12 @ 5.0m 13 @ 5.4m 14 @ 5.8m 15 @ 6.2m 16 @ 6.6m 17 @ 7.0m 18 @ 7.4m 19 @ 7.8m 20 @ 8.2m

File	
ADP data for station S2, deployment #2, Nov. 2013 filename: S2131101_mod.xlsx	(Microsoft Excel, 3.94 MB) MD5:f1e2d45a73aaa7ff100478fa25c4f0ec

1 @ 0.6m

2 @ 1.0m

3 @ 1.4m

4 @ 1.8m

5 @ 2.2m

6 @ 2.6m

7 @ 3.0m

8 @ 3.4m

9 @ 3.8m

10 @ 4.2m

11 @ 4.6m

12 @ 5.0m

13 @ 5.4m

14 @ 5.8m

15 @ 6.2m

16 @ 6.6m

17 @ 7.0m

18 @ 7.4m

19 @ 7.8m

20 @ 8.2m

File
ADP data for station S2, deployment #3, Feb. 2014 filename: S20214.xlsx (Microsoft Excel, 3.43 MB) MD5:556a3ac0ad3fb71e0acac32fdb14aae0 1 @ 0.6m 2 @ 1.0m 3 @ 1.4m 4 @ 1.8m 5 @ 2.2m 6 @ 2.6m 7 @ 3.0m 8 @ 3.4m 9 @ 3.8m 10 @ 4.2m 11 @ 4.6m 12 @ 5.0m 13 @ 5.4m 14 @ 5.8m 15 @ 6.2m 16 @ 6.6m 17 @ 7.0m 18 @ 7.4m 19 @ 7.8m 20 @ 8.2m

File
ADP data for station S2, deployment #4, Apr. 2014 filename: S20414.xlsx (Microsoft Excel, 3.29 MB) MD5:32b6e76da635d4cf93742a38d8b0042f 1 @ 0.5m 2 @ 0.8m 3 @ 1.1m 4 @ 1.4m 5 @ 1.7m 6 @ 2.0m 7 @ 2.3m 8 @ 2.6m 9 @ 2.9m 10 @ 3.2m 11 @ 3.5m 12 @ 3.8m 13 @ 4.1m 14 @ 4.4m 15 @ 4.7m 16 @ 5.0m 17 @ 5.3m 18 @ 5.6m
ADP data for station S8, deployments #1-5, Aug. 2013 - Sept. 2014 filename: S8ADPdata.xls (Microsoft Excel, 36.14 MB) MD5:d803ed6f6a14806e5e13013edb264687 1 @ 0.52m 2 @ 0.82m 3 @ 1.11m 4 @ 1.41m 5 @ 1.71m 6 @ 2.01m 7 @ 2.31m 8 @ 2.61m 9 @ 2.91m 10 @ 3.21m 11 @ ? m
ADP data for stations S0, S2, S8, Aug. 2013 - Mar. 2015 (flat .csv files) filename: Groves_Creek_ADP_data_2013-2015.csv.zip (ZIP Archive (ZIP), 4.87 MB) MD5:92365c285f9261223154590fef57d09c The data from the .xlsx files have been 'flattened' and converted to .csv files. Note: S8 lat and lon revised from originally submitted file. [2021-04-05]

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Supplemental Files

File
ADP log file: deployment S01410 filename: S01410.log (Comma Separated Values (.csv), 3.23 KB) MD5:d624a695ceb430dda396cc5b0f36cbc4 Groves Creek Station 0, October 2014 deployment, 20 levs @ .35m
ADP log file: deployment S01412 filename: S01412.log (Comma Separated Values (.csv), 1.62 KB) MD5:78164d09c93cc354360e5079318b1a75 Groves Creek Station 0, December 2014 deployment, 20 levs @ .35m
ADP log file: deployment S21308 filename: S21308.log (Comma Separated Values (.csv), 4.79 KB) MD5:3eda6b81a4095cdd868d071c46124810 Groves Creek Station 82, August 2013, SN 9331
ADP log file: deployment S21404 filename: S21404.log (Comma Separated Values (.csv), 1.60 KB) MD5:14f55ea36c4c9844c7dad32cb41f5dda Groves Creek Station 2, April 2014 deployment, 20 levs @ .4m

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Related Publications

Blanton, J. O., Garrett, A. J., Bollinger, J. S., Hayes, D. W., Koffman, L. D., Amft, J., & Moore, T. (2010). Transport and retention of a conservative tracer in an isolated creek–marsh system. Estuarine, Coastal and Shelf Science, 87(2), 333–345. doi:10.1016/j.ecss.2010.01.010
Methods

Codden, C. 2020. Dissolved Organic Carbon Dynamics in a Salt Marsh Creek. PhD. Dissertation. Northeastern University
Methods

Sullivan, J. C., Torres, R., Garrett, A., Blanton, J., Alexander, C., Robinson, M., … Hayes, D. (2015). Complexity in salt marsh circulation for a semienclosed basin. Journal of Geophysical Research: Earth Surface, 120(10), 1973–1989. doi:10.1002/2014jf003365 https://doi.org/10.1002/2014JF003365
Methods

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Related Datasets

IsSupplementedBy

Savidge, W. (2021) **Cross-channel geometry of Groves Creek salt marsh, Skidaway Island Georgia, USA, Aug. 2013 to March 2015.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2021-03-17 http://lod.bco-dmo.org/id/dataset/845216 [view at BCO-DMO]

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Parameters

Parameter	Description	Units
station	station identifier	unitless
deployment	deployment number	unitless
lat	latitude; north is positive	decimal degrees
lon	longitude; east is positive	decimal degrees
date	UTC date formatted as yyyy-mm-dd	unitless
time	UTC time; formatted as hh:mm	unitless
ISO_DateTime_UTC	Date/Time (UTC) ISO formatted based on ISO 8601:2004(E) with format YYYY-mm-ddTHH:MM:SS[.xx]Z	unitless
datenum_matlab	MATLAB formatted datenum	unitless
pitch	orientation (pitch) of measurement platform by inclinometer	degrees
roll	orientation (roll angle) of measurement platform by inclinometer	degrees
heading	compass direction (0 being north, 90 being east, etc.)	degrees
pressure	pressure	decibars
depth	depth	meters
soundspeed	speed of sound through water	meters/second?
temp	temperature	degrees Celsius
blanking_distance	Blanking distance for the ADCP instrument: the region immediately in front of the transducer where no measurements can be made while the transducers recover from the transmit pulse.	meters(?)
bin_height	ADCP bin height	centimeters(?)

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Instruments

Dataset-specific Instrument Name	Nortek ADP
Generic Instrument Name	Acoustic Doppler Current Profiler
Generic Instrument Description	The ADCP measures water currents with sound, using a principle of sound waves called the Doppler effect. A sound wave has a higher frequency, or pitch, when it moves to you than when it moves away. You hear the Doppler effect in action when a car speeds past with a characteristic building of sound that fades when the car passes. The ADCP works by transmitting "pings" of sound at a constant frequency into the water. (The pings are so highly pitched that humans and even dolphins can't hear them.) As the sound waves travel, they ricochet off particles suspended in the moving water, and reflect back to the instrument. Due to the Doppler effect, sound waves bounced back from a particle moving away from the profiler have a slightly lowered frequency when they return. Particles moving toward the instrument send back higher frequency waves. The difference in frequency between the waves the profiler sends out and the waves it receives is called the Doppler shift. The instrument uses this shift to calculate how fast the particle and the water around it are moving. Sound waves that hit particles far from the profiler take longer to come back than waves that strike close by. By measuring the time it takes for the waves to bounce back and the Doppler shift, the profiler can measure current speed at many different depths with each series of pings. (More from WHOI instruments listing).

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Deployments

Groves_Creek_2013-2015

Website	https://www.bco-dmo.org/deployment/682763
Platform	Groves Creek - SkIO
Start Date	2013-07-26
End Date	2015-03-11
Description	Studies of temporal and compositional changes in exported material in a saltmarsh, both the quantity and quality of dissolved organic matter (DOM) and particulate organic matter (POM) exported from Groves Creek.

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Project Information

Tempo and mode of salt marsh exchange (GrovesCreek)

Website: http://www.skio.uga.edu

Coverage: Salt marsh east of Savannah, Georgia, USA.

Description from NSF award abstract:
Salt marshes are critical mediators of the flux of material between the terrestrial and marine realms. The balance of material import, export, and transformation affects both the marsh itself and the surrounding estuary. Previous efforts to understand the role of marshes have concentrated either on examining temporal changes (often at low resolution) of bulk exports, or compositional changes in exported material with little regard for its temporal variability. Researchers working at the Skidaway Institute of Oceanography contend that both the quantity and quality of materials exchanged between marsh and estuary in tidally-dominated systems along the southeastern US coast vary significantly in response to semidiurnal, diurnal, tidal, meteorological and seasonal forcing, and that this variability must be included when considering the total contributions of marshes to carbon cycling along the land-ocean boundary. This study will utilize a three-pronged strategy to assess both the quantity and quality of dissolved organic matter (DOM) and particulate organic matter (POM) exported from Groves Creek, a well-characterized meso-tidal salt marsh in coastal Georgia. In particular, by evaluating how marsh function responds to a full spectrum of present environmental conditions, this project will provide tangible insight into how carbon cycling in these critical regions will respond to anticipated changes in those conditions.

This project is related to the project "Marine priming effect - molecular mechanisms for the biomineralization of terrigenous dissolved organic matter in the ocean" found at https://www.bco-dmo.org/project/554157.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1234704

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