Structure of current flow in the West Channel in Choctawhatchee Bay, Florida from Mar 29 to Apr 4, 2022

Website: https://www.bco-dmo.org/dataset/986754
Data Type: Other Field Results
Version: 1
Version Date: 2025-12-01

Project
» Collaborative Research: Megaripples as biocatalytical filters (Megaripples)

Contributors	Affiliation	Role
Berg, Peter	University of Virginia (UVA)	Principal Investigator
Huettel, Markus	Florida State University (FSU)	Principal Investigator
Mickle, Audrey	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
The data set presents in-situ current flow measurements recorded with an upward looking acoustic Doppler profiler in the West Channel of Choctawhatchee Bay near Destin, FL (Lat: 30.3925°N, Long: -86.5233°W). The water depth within the channel ranges from 3 to 7 m and varies with the tide (diurnal tide, range ~0.5 m). The Doppler profiler was positioned near the middle of the channel at approximately 4.1 m water depth and recorded flow velocity and directions at 0.5 m vertical intervals from 0.9 m above the bottom to the water surface.

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Coverage

Location: Measurements were recorded in the West Channel of Choctawhatchee Bay near Destin, FL (Lat: 30.3925°N, Long: -86.5233°W). The channel is 130 to 180 m wide, about 2 km long and 3 to 7 m deep.
Spatial Extent: **Lat**:30.3925 **Lon**:-86.5233
Temporal Extent: 2022-03-29 - 2022-04-04

Methods & Sampling

Measurements were recorded in the West Channel of Choctawhatchee Bay near Destin, FL (Lat: 30.3925°N, Long: -86.5233°W). The channel is 130 to 180 m wide, about 2 km long and 3 to 7 m deep.

The Doppler profiler was a Nortek Acoustic Wave And Current Profiler (AWAC). The data set presents in-situ current flow measurements recorded with an upward looking acoustic Doppler profiler. The water depth within the channel ranges from 3 to 7 m and varies with the tide (diurnal tide, range 0.5 m). The Doppler profiler was positioned near the middle of the channel at approximately 4.1 m water depth and recorded flow velocity and directions at 0.5 m vertical intervals from 0.9 m above the bottom to 3.4 m above the bottom. The instrument heading was 333.9 degrees.

Data Processing Description

The AWAC records were processed using the NORTEK software AWAC-AST, Version 1.47. The data analyses provided current velocity (m/s) and current direction (degrees) for the water depth 0.9, 1.4, 1.9, 2.4, 2.9, 3.4 m above the sediment surface.

BCO-DMO Processing Description

- Imported "AWAC2022.xlsx" into the BCO-DMO system
- Converted "date" and "time" into an ISO formatted date time in EDT, "ISO_DateTime_Local"
- Converted "ISO_DateTime_Local" in to UTC field, "ISO_DateTime_UTC"
- Removed special characters and spaces from parameter names in compliance with BCO-DMO guidelines
- Removed "Speed_7", "Dir_7", "Speed_8", and "Dir_8" parameters upon submitter request
- Exported file as "986754_v1_west_channel_currents_2022.csv"

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Data Files

File	
986754_v1_west_channel_currents_2022.csv	(Comma Separated Values (.csv), 745.46 KB) MD5:7e49c8ffbee661e9ff13a185ffb446a5
Primary data file for dataset ID 986754, version 1	

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Related Datasets

IsRelatedTo

Huettel, M., Berg, P. (2025) **Structure of current flow in the West Channel in Choctawhatchee Bay, Florida from Jun 13 to Jun 19, 2020.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2025-11-18 doi:10.26008/1912/bco-dmo.986662.1 [view at BCO-DMO]
Relationship Description: Measurements taken at same study location over multiple years with the Nortek Acoustic Wave And Current Profiler (AWAC).

Huettel, M., Berg, P. (2025) **Structure of current flow in the West Channel in Choctawhatchee Bay, Florida from Nov 15 to Nov 20, 2021.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2025-12-01 doi:10.26008/1912/bco-dmo.986749.1 [view at BCO-DMO]
Relationship Description: Measurements taken at same study location over multiple years with the Nortek Acoustic Wave And Current Profiler (AWAC).

Huettel, M., Berg, P. (2025) **Structure of current flow in the West Channel in Choctawhatchee Bay, Florida from Sep 18 to Sep 24, 2024.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2025-12-01 doi:10.26008/1912/bco-dmo.986759.1 [view at BCO-DMO]
Relationship Description: Measurements taken at same study location over multiple years with the Nortek Acoustic Wave And Current Profiler (AWAC).

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Parameters

Parameter	Description	Units

Date	Date of measurement in EDT	unitless
Time	Time of measurement in EDT	unitless
Battery	Battery voltage of the instrument in Volt	Volts (V)
Heading	Heading of the instrument in degrees of the compass	Degrees
Pitch	Deviation of the instrument horizontal plane from true horizontal along the E-W axis of the instrument	Degrees
Roll	Deviation of the instrument horizontal plane from true horizontal along the N-S axis of the instrument	Degrees
Pressure	Water pressure in decibar	dbar
Temperature	Water temperature in Celsius	degrees Celsius
Speed_1	Current flow velocity in meters per second at 0.9 m above the instrument	meters per second (m/s)
Dir_1	Current direction in degrees of the compass at 0.9 m above the instrument	Degrees
Speed_2	Current flow velocity in meters per second at 1.4 m above the instrument	meters per second (m/s)
Dir_2	Current direction in degrees of the compass at 1.4 m above the instrument	Degrees
Speed_3	Current flow velocity in meters per second at 1.9 m above the instrument	meters per second (m/s)
Dir_3	Current direction in degrees of the compass at 1.9 m above the instrument	Degrees
Speed_4	Current flow velocity in meters per second at 2.4 m above the instrument	meters per second (m/s)
Dir_4	Current direction in degrees of the compass at 2.4 m above the instrument	Degrees

Speed_5	Current flow velocity in meters per second at 2.9 m above the instrument	meters per second (m/s)
Dir_5	Current direction in degrees of the compass at 2.9 m above the instrument	Degrees
Speed_6	Current flow velocity in meters per second at 3.4 m above the instrument	meters per second (m/s)
Dir_6	Current direction in degrees of the compass at 3.4 m above the instrument	Degrees
ISO_DateTime_Local	Date and time of measurement in EDT	unitless
ISO_DateTime_UTC	Date and time of measurement in UTC	unitless

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Instruments

Dataset-specific Instrument Name	Nortek Acoustic Wave And Current Profiler (AWAC)
Generic Instrument Name	Acoustic Wave And Current Profiler
Dataset-specific Description	Technical Specifications: Acoustic frequency: 600kHz Acoustic beams: 4 beams, one vertical, three slanted at 25° Vertical beam opening angle: 1.7° Operational mode: Stand-alone Current Profile Depth cell size: 0.5m (600kHz) Number of cells: 6 - 12 Velocity range: ±10 m/s horizontal, ±5 m/s along beam Accuracy: 1% of measured value ±0.5 cm/s
Generic Instrument Description	A family of instruments that simultaneously measure current profiles and wave height and direction designed for coastal monitoring.

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Project Information

Collaborative Research: Megaripples as biocatalytical filters (Megaripples)

Coverage: Northern Gulf of Mexico

NSF Award Abstract:
This project focuses on the role of large underwater sand formations, particularly at the mouths of estuaries, in the cycling of nutrients and organic materials. "Megaripples" are common features on marine sediments where bottom currents are rapid. In the northeastern Gulf of Mexico, these sand dune-like features are up to

half a meter in height, with wavelengths reaching 20 meters. The investigators propose that megaripples act as large filter systems that rapidly convert dissolved and solid organic matter into inorganic carbon and nutrients, and thus influence the biological productivity of coastal waters. They propose to use a one-kilometer long megaripple field in the inlet of Chotawhatchee Bay, in the northeastern Gulf of Mexico, as a natural laboratory for studying these processes. In addition, they will conduct laboratory experiments to investigate the filter processes at a smaller scale. By producing data on the functioning of megaripples, the project addresses a knowledge gap that has implications on our understanding of the cycles of matter in coastal waters. The project offers opportunities for both graduate and undergraduate students in learning state-of-the-art techniques. The students will gain experience in working on high frequency data acquisition and analysis of 'big data'. To enhance outreach, the researchers will develop and teach two courses on Permeable Sediment Biogeochemistry and Aquatic Eddy Covariance Studies for the Saturday at the Sea program offered by Florida State University. Results will be disseminated via scientific journals, conference presentations and public lectures, and directly to the Apalachicola-National Estuarine Research Reserve (NERR), which will make the results available to the other 28 NERR sites.

The two main project objectives are: 1) demonstrate the general function of megaripples as biocatalytical filters, and 2) demonstrate that common inlet megaripples contribute to nutrient retention in coastal bays. A 1 km long megaripple field in the inlet of Chotawhatchee Bay (wavelengths: ~20 m, amplitudes: 20 to 40 cm) in the northeastern Gulf of Mexico will be used as an in-situ laboratory. Measurements will characterize megaripple topography and the water flowing over them. Salinity and suspended particles are utilized as natural tracers to quantify solute and particle entrainment into the megaripples. This project will deploy non-invasive aquatic eddy covariance instruments equipped with newly developed robust sensors to quantify sedimentary remineralization in the flushed megaripple bed. This technique integrates the benthic oxygen flux over a large section of the megaripple field, while including the natural dynamics of currents and light. Real-time water column measurements with a boat-mounted flow-through analyzer permit rapid quantification of large horizontal gradients of key water column parameters. The in-situ measurements will be combined with laboratory column reactor experiments that quantify nutrient re-mobilization through organic carbon mineralization in flushed megaripple sand. The megaripple field in the inlet of Chotawhatchee Bay is easily accessible from shore and by small boat, expediting instrument deployments and in-situ measurements while reducing project costs. Synthesis of all data will produce a conceptual and quantitative understanding of megaripples as natural biocatalytical filters. Because transport and reaction in megaripples are governed by basic physical and biogeochemical processes, these results will reveal information on the general biogeochemical functioning of megaripples that so far is not available.

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1851290

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