

About Shoreline

news from the Florida Shore and Beach Preservation Association

January 2019

2019 National Conference on Beach Preservation Technology

February 6- 8 ♦ Embassy Suites by Hilton St. Augustine Beach

**Make plans to join us in
St. Augustine Beach
next month!**

- ♦ **Conference Program**
 - ♦ **Registration Information**
 - ♦ **Hotel Information**
- Deadlines are January 11, 2019**



In Situ Hydrodynamic and Morphodynamic Measurements During Extreme Storm Events

by Stanford J. Borrell and Jack A. Puleo
Center for Applied Coastal Research,
University of Delaware

Students at the University of Delaware conducted a field study to collect important hydrodynamic and morphodynamic data at Bethany Beach, Delaware during a large winter storm that affected the coast in early March 2018.

[Read more about their research here.](#)

Happy New Year!

The advent of a New Year is a good time to reflect back on the important events of 2018 and for the Association to express its appreciation to our members and conference patrons for their support. Read more [here](#).



FDEP Updates

Updates provided by
Division of Water Resource
Management

Happy New Year!

The advent of a New Year is a good time to reflect back on the important events of 2018 and for the Association to express its appreciation to our members and conference patrons for their support. The beach community will remember last year by a few key events, namely the U.S. Army Corps of Engineers' unprecedented funding level of \$582M for Florida's coastal program; the State Legislature's commitment of \$50M for traditional beach and inlet management projects for the 2nd consecutive year; and Hurricane Michael's unforgettable and devastating impacts to Mexico Beach, Panama City, and many other North Florida communities. As we welcome in 2019, we begin to explore and unfold the goals on the horizon for Florida's beaches, starting with FSBPA's continued support of the statewide beach management program and of the intergovernmental partnerships that define the success of the program. Our advocacy agenda this Session will include working to maintain the \$50M in traditional state funding for beach and inlet projects, and supporting critical beach recovery needs from the impacts of Hurricane Michael. FSBPA will also continue its support of the Coastal Management bill, which is expected to be filed this year. (This legislation was filed last year and previously discussed in Shoreline. [Click](#) to read more.)

FSBPA's educational agenda is shaping up in noteworthy form for 2019. We are excited about hosting the Tech and Annual Conferences at two stunning, new locations. The first of the conferences, the 32nd Annual National Conference on Beach Preservation Technology, will take place at the recently opened Embassy Suites Oceanfront Resort on St. Augustine Beach. Lisa Armbruster and the [Conference Planning Committee](#) have organized an exceptional program featuring many new presenters and research discussions. We are further pleased to announce that our student scholarship program is growing, and there are several new students joining the Conference and presenting posters on their research. The feature article in this month's Shoreline is a precursor to one of the student presenters. Please take a few minutes to read about the work being conducted by [Mr. Stanford Borrrell](#) and fellow students at the University of Delaware.



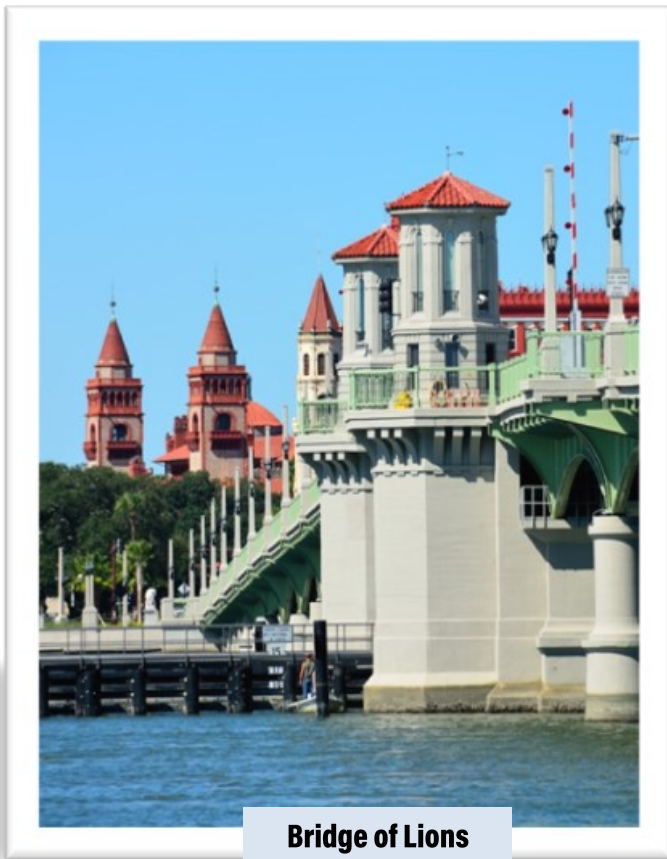
If you are attending the Tech Conference, be sure to come early and stay late! The Conference kicks-off earlier than the customary start time with a short course presented by Kevin Bodge, Wednesday, February 6th at 10:30 a.m. The course is intended for conference attendees who are new to beach management or want to better understand coastal processes. This lecture will be followed by another 22 hours of presentations and discussions by coastal engineers, scientists, academics, and government representatives. Plus, there will be numerous opportunities to collaborate with and learn from the experts on beach management and preservation issues during the professional exchange breaks and Welcome Reception sponsored by [St. Johns County!](#)

Lastly, we hope you can visit a few of the County's landmarks and natural areas while in St. Augustine. Walk along the recently restored St. Johns County Shore Protection Project and into Anastasia Island State Park. Take time to drive across the Bridge of Lions into downtown St. Augustine, known for its Spanish colonial architecture and for being the oldest continuously occupied European settlement in the United States. Visit one of the area's many attractions like the St. Augustine Lighthouse at the north end of Anastasia Island, the narrowest street in the United States (Treasury Street is just 7 feet wide), or the oldest wooden schoolhouse, the oldest wax museum in the USA (Potter's Wax Museum), the world's oldest Ripley's Believe It or Not!, the oldest masonry fort in North America - Castillo de San Marcos... and, the list of things to do is countless.



On behalf of the FSBPA team, we wish you a happy, healthy and prosperous New Year, and hope to see you in St. Augustine Beach next month!

Happy New Year



Bridge of Lions



2019 Tech Conference Program

February 6-8 ♦ Embassy Suites St. Augustine Beach Resort

Wednesday, February 6

10:30 a.m. - 11:30 a.m.

SAND 102: Introduction to Beach Management

Kevin Bodge, Ph.D., P.E, Olsen Associates, Inc., Jacksonville, FL

A brief introduction to the fundamental terminology and physical processes of sandy beaches, coastal structures, inlets and beach nourishment.

OPENING GENERAL SESSION

1:00 p.m. to 5:20 p.m.

1:00 p.m.

Welcome from Henry Dean, St. Johns County District 5, St. Augustine, FL

1:10 p.m.

Performance of Dune Reconstruction After Hurricanes Matthew and Irma, Jacksonville Beaches

Kevin Bodge, Ph.D., P.E., Patrick Cooper, and Steven Howard, P.E., Olsen Associates, Inc., Jacksonville, FL

1:30 p.m.

Brokering a Beach Management Program in St. Johns County, St. Augustine, FL

Damon Douglas and Jay Brawley, P.E., St. Johns County, FL

2:00 p.m.

Borrow Area Investigations for Two New Nourishment Projects in St. Johns County, Florida

Wendy Laurent, Taylor Engineering, Inc., Jacksonville, FL

2:10 p.m.

Coastal Armoring in Florida: South Ponte Vedra Beach – A Case Study of the Past 23 Years of Environmental Permitting of Seawalls in Florida

Tony McNeal, P.E. and Bob Brantly, P.E., Division of Water Resource Management, Florida Department of Environmental Protection, Tallahassee, FL

2:35 p.m.

Articulated Reef Mat Construction at Brevard County

Michael McGarry, Natural Resources Management Department, Brevard County, Viera, FL and Kevin Bodge, Ph.D., P.E., Olsen Associates, Inc., Jacksonville, FL

2:55 p.m.

Replacing NAVD88: Effects of Vertical Datum Modernization on Coastal Engineering

Scott Lokken, National Geodetic Survey, National Oceanic and Atmospheric Administration, Raleigh, NC

3:15 p.m.

Professional Exchange Break (25 Minutes)

3:40 p.m.

Where is the Beach Nourishment that was Placed on the Florida East Coast?

James Houston, Ph.D., U.S. Army Engineer Research and Development Center, Vicksburg, MS

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Wednesday, February 6

OPENING GENERAL SESSION *continued*

1:00 p.m. to 5:20 p.m.



4:00 p.m.

The Sebastian Inlet District's 100th Anniversary: Celebrating a Century of Coastal Inlet Management

The Sebastian Inlet District: Managing the Connection Between the Atlantic Ocean and Indian River Lagoon

Martin Smithson, Sebastian Inlet District, Indialantic, FL

Engineering and Regulatory Aspects of Sebastian Inlet Management

Michael Jenkins, Ph.D., P.E., Applied Technology and Management, Inc., West Palm Beach, FL

The State of the Inlet Annual Report: Assessments of Inlet Morphologic Processes, Shoreline Change, Sediment Budget and Project Performance

Gary Zarillo, Ph.D., P.G., Department of Ocean Engineering and Sciences, Florida Institute of Technology, Melbourne, FL

Environmental Aspects of Sebastian Inlet Management

Erin Hodel, CSA Ocean Sciences Inc., Stuart, FL

5:20 p.m.

Adjourn

6:00 p.m.

Welcome Reception

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Thursday, February 7, 2019**CONCURRENT SESSIONS****8:00 a.m. to 10:00 a.m.****SESSION A****8:00 a.m.****Low Impact Secant-Pile Seawall for Protecting SR A1A along Flagler Beach**

Steven Nolan, P.E. and Stefan Levine, Florida Department of Transportation, Tallahassee and Deland, FL and Lowry Denty, P.E., Mott MacDonald Florida LLC, Pensacola, FL

8:20 a.m.**Use of Erosion Control Structures to Improve Management of Downtide Impacts of Navigation Inlets**
Brett Moore, P.E., Humiston & Moore Engineers, Naples, FL**8:40 a.m.****Additional Stabilization of the Northern Longboat Key Shoreline**

Krista Egan, P.E. and Albert Browder, Ph.D., P.E., Olsen Associates, Inc., Jacksonville, FL

9:00 a.m.**Towards the Experimentally Based Design of an Effective and Eco-friendly Modular Shoreline Protection System for High Energy Tidal Flow**

Landolf Rhode-Barbarigos, Ph.D., Marco Rossini, Antonio Nanni, Ph.D., P.E., and Mohammad Ghiasian, Civil, Architectural and Environmental Engineering, University of Miami, Coral Gables, FL, Brian Haus, Ph.D., Rosenstiel School of Marine and Atmospheric Science, University of Miami, Miami, FL, and Steven Nolan, P.E., Florida Department of Transportation, Tallahassee, FL

9:20 a.m.**Mobility of Unexploded Ordnance using Spherical Surrogates on the Beach Face**

Benedict Gross and Jack Puleo, Ph.D., Center for Applied Coastal Research, Department of Civil and Environmental Engineering, University of Delaware, Newark, DE

9:40 a.m.**Waterfront Structures in the Face of Coastal Storms**

Jordon Cheifet, P.E., APTIM, Boca Raton, FL

10:00 a.m. Professional Exchange Break (25 Minutes)**SESSION B****8:00 a.m.****Bakers Haulover Inlet Management - Miami-Dade County, FL**

Tim Blankenship, P.E., Yong Chen, Ph.D., P.E., Nina Piccoli, Moffatt & Nichol, Miami, FL and Paul Voight, P.G., Department of Regulatory & Economic Resources, Division of Environmental Resources Management, Miami-Dade County, Miami, FL

8:20 a.m.**Management Study at Multiple Natural and Engineered Tidal Inlets, West-Central Florida, USA**

Ping Wang, Ph.D., Jun Cheng, Ph.D., Mathieu Vallee and Zachary Westfall, Coastal Research Laboratory, School of Geosciences, University of South Florida, Tampa, FL

8:40 a.m.**25 Years from Recommendation to Construction of the Upham Beach Stabilization Project**

Thomas Pierro, P.E. and Michelle Pfeiffer, P.E., APTIM, Boca Raton, FL and John Bishop, Ph.D., Environmental Management Division, Pinellas County, Clearwater, FL

9:00 a.m.**City of Delray Beach Intracoastal Waterway Water Level & Infrastructure Vulnerability Study**

Jeff Needle, P.E., Public Works Department, City of Delray Beach, FL, and Tara Brenner, P.G., P.E. and Douglas Mann, P.E., APTIM, Boca Raton, FL

9:20 a.m.**Gulf Intracoastal Waterway Dredge Readiness and Operations Plan (GIWW DROP)**

Laurel Reichold, U.S. Army Corps of Engineers, Jacksonville District, FL

9:40 a.m.**Sediment Management and Navigation Optimization at Collier Creek, Florida**

João Dobrochinski, Stephen Keehn, P.E., and Tara Brenner, P.G., P.E., APTIM, Boca Raton, FL and Gary McAlpin, P.E., Coastal Zone Management, Collier County, Naples, FL

10:00 a.m. Professional Exchange Break (25 Minutes)**Next Page**

Thursday, February 7, 2019

CONCURRENT SESSIONS

10:25 a.m. to 12:05 p.m.

SESSION C

10:25 a.m.

Jekyll Island Shoreline Restoration Program

Timothy Mason, P.E., Applied Technology and Management, Inc., St. Augustine, FL and Ben Carswell, Jekyll Island Authority, Jekyll Island, GA

10:45 a.m.

USACE ODESS – A New Tool in the Toolbox for Assessing Potential Impacts of Shore Protection Sand Mining Projects on in Water Sea Turtles

Terri Jordan-Sellers., Michael Sessions, and Dylan Davis, U.S. Army Corps of Engineers, Jacksonville District, FL, Mobile District, AL, and South Atlantic Division, Atlanta, GA

11:05 a.m.

An Analysis of Sea Turtle Nesting Before and After a Sand Placement Project in Broward County, FL

Stephanie Kedzuf and Greg Ward, Environmental Planning and Community Resilience Division, Broward County, Fort Lauderdale, FL

11:25 a.m.

Dredging Buffers Along the Gulfstream Pipeline, Petit Bois Pass, Alabama

Sean Kelley, P.E. and John Ramsey, P.E., Applied Coastal Research and Engineering, Inc., Mashpee, MA

11:45 a.m.

Using the Integrated SAND-CASM Model in Support of Sediment Management Planning and Resilient Coastal Ecosystem Restoration

Steve Bartell, Ph.D., Cardno, Inc., Greenback, TN

12:05 p.m.

Luncheon (1 Hour 15 Minutes)

SESSION D

10:25 a.m.

Nearly Forty Years of Excellence at the Center for Applied Coastal Research

Jack Puleo, Ph.D., Center for Applied Coastal Research, Department of Civil and Environmental Engineering, University of Delaware, Newark, DE

10:45 a.m.

In Situ Hydrodynamic and Morphodynamic Measurements During Extreme Storm Events

Stanford Borrell and Jack Puleo, Ph.D., Center for Applied Coastal Research, Department of Civil and Environmental Engineering, University of Delaware, Newark, DE

11:05 a.m.

Sensitivity of Occurrence Frequency of Storm Tides to Random Tide Phases

Siyu (Aaron) Chen and Jeff Tabar, P.E., and Mike Anderson, Stantec, Laurel, MD and Nashville, TN

11:25 a.m.

Modification of Long Term Wave Statistics Based on the 2017-2018 Storm Season & Impacts on Coastal Protection Design

Jacqueline Branyon, Ph.D., P.E. and Robert Sloop, P.E., Moffatt & Nichol Engineers, Miami, FL and Long Beach, CA

11:45 a.m.

Subtidal Water Level and Current Variability in a Deltaic Mississippi River Estuary during Cold Front Season

Ali Reza Payandeh, Dubravko Justic, Ph.D., Giulio Mariotti, Ph.D., Haosheng Huang, Ph.D, and Soroush Sorourian, Department of Oceanography and Coastal Sciences, College of the Coast and Environment, Louisiana State University, Baton Rouge, LA

12:05 p.m.

Luncheon (1 Hour 15 Minutes)

Thursday, February 7, 2019

CONCURRENT SESSIONS

1:20 p.m. to 3:20 p.m.

SESSION E

1:20 p.m.

Sea Level Rise Resiliency & Living Shorelines
Angela Schedel, Ph.D., P.E., Taylor Engineering,
Jacksonville, FL

1:40 p.m.

**Lessons Learned on Living Shoreline Creation with
Artificial Oyster Reefs**
Casey Connor, P.E.; Josh Carter, P.E., Arpit Agarwal, and
Craig Harter; and Katlin Walling, Mott MacDonald,
Jacksonville, FL, Austin, TX, and Freehold, NJ

2:00 p.m.

**Shoreline Resiliency and Habitat Enhancement through
Oyster Reef Restoration in Naples Bay, Florida**
Stephanie Molloy, Ph.D., Natural Resources Division,
City of Naples, FL

2:20 p.m.

**Marine Corps Air Station Cherry Point Living Shoreline
Project**
Steven Davie, P.E., Michael Barnett, P.E., and Jesse
Davis, P.E., GHD, Inc., Atlanta, GA, Mobile AL, and
Wellington, FL and Lee Gerald and Robert Warren, LG2
Environmental Solutions, Inc., Jacksonville, FL

2:40 p.m.

**City of Encinitas, CA Cardiff Beach Living Shoreline
Project**
Pete Milligan, P.E., Engineering Division, Development
Services Department, City of Encinitas, CA, Victor
Tirado, P.E., Brian Leslie, and Mitch Duran, P.E., GHD,
Inc., San Diego, CA

3:00 p.m.

**Urban Community Adaptation to Changing
Environmental Hazard: Resilience Planning and
Outreach in Broward County**
Greg Ward, Nicole Sharp, P.E., Samantha Danchuk,
Ph.D., P.E., and Jennifer Jurado, Ph.D., Environmental
Planning and Community Resilience Division, Broward
County, Fort Lauderdale, FL

3:20 p.m. **Professional Exchange Break (25 Minutes)**

SESSION F

1:20 p.m.

**Evaluation of Offshore Sediments in Palm Beach County,
Florida for a Regional Sediment Management Strategy for
Coastal Restoration Projects**
Palaparathi Jyothirmayi and Tiffany Roberts Briggs, Ph.D.,
Florida Atlantic University, Boca Raton, FL

1:40 p.m.

Southwest Florida Borrow Area Analysis
Beth Forrest, Ph.D., P.G. and Quin Robertson, Ph.D.,
APTIM, Boca Raton, FL and Jennifer Steele, Ph.D., Division
of Water Resource Management, Florida Department of
Environmental Protection, Tallahassee, FL

2:00 p.m.

**Beneficial Use of Dredge Material – Balancing Regulatory,
Private, and Public Interests in Coos Bay**
Gillian Miller and Brian Leslie, GHD, Inc., Irvine, CA, and
Mara Krinke and Casey Story, David Evans and Associates,
Inc., Portland, Oregon

2:20 p.m.

**The Canaveral Shoals Blues: How Beach Nourishment
Using the Canaveral Shoals Borrow Site Has Impacted the
Surf Breaks of Cape Canaveral and Cocoa Beach, Florida**
John Hearin, Ph.D., P.E., Jacobs Engineering Group, Cocoa
Beach, FL

2:40 p.m.

**The South Amelia Island Shore Stabilization Project:
Project Maintenance and Borrow Area Development at
Nassau Sound**
Albert Browder, Ph.D., P.E., Steven Howard, P.E., and
Patrick Cooper, Olsen Associates, Inc., Jacksonville, FL

3:00 p.m.

Rollover Pass Closure Project, Galveston County, Texas
Michael Trudnak, P.E., Taylor Engineering, Inc.,
Jacksonville, FL

3:20 p.m. **Professional Exchange Break (25 Minutes)**

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Thursday, February 7, 2019

CONCURRENT SESSIONS

3:45 p.m. to 5:25 p.m.

SESSION G

3:45 p.m.

Benthic Habitat Mapping Methods: *In Situ* Diver-Based vs. UAV-Based and Suitability of Each

Erin Hodel and Chip Baumberger, CSA Ocean Sciences Inc., Stuart, FL and Jordan Kowenski and David Graves, SurvTech Solutions, Inc., Tampa, FL

4:05 p.m.

Strategic Intervention for a Reef in Grief

Kerry Neil, Ph.D., GHD, Inc., Brisbane, Australia

4:25 p.m.

Assessment of Beach Nourishment Hardbottom Impacts

Tem Fontaine, P.E., Coastal Tech-G.E.C., Inc., Vero Beach, FL

4:45 p.m.

Florida Reef Tract Coral Disease Outbreak: Status and Response Efforts

Karen Bohnsack, Florida Coastal Office, Florida Department of Environmental Protection, Key Largo, FL

5:05 p.m.

Dredging, Storms, and Seagrass

William Precht, Dial Cordy and Associates, Inc., Miami, FL and Leaf Erickson, Coastal Design and Engineering, Ltd., Providenciales, Turks and Caicos Islands

5:25 p.m.

Adjourn

SESSION H

3:45 p.m.

Geomorphologic Change in Southeast Florida Following Multiple Tropical Weather Systems from 2016-2018

Julie Cisneros and Tiffany Roberts Briggs, Ph.D., Florida Atlantic University, Boca Raton, FL

4:05 p.m.

Hutchinson Island Shore Protection Project Planning and Data Analysis Tools

Alexandra Carvalho, Ph.D., CMar Consulting, LLC, Jacksonville, FL and Jessica Garland and Kathy Fitzpatrick, P.E., Martin County, FL

4:25 p.m.

Hutchinson Island Shore Protection Project Physical and Biological Monitoring Integrated Time Series Data Analysis

Alexandra Carvalho, Ph.D., CMar Consulting, LLC, Jacksonville, FL, Michael Trudnak, P.E., Taylor Engineering, Jacksonville, FL, and Kathy Fitzpatrick, P.E., Martin County, FL

4:45 p.m.

Acquisition of Storm Damage Reduction Easements

John Bishop, Ph.D. and Andrew Squires, Environmental Management Division, Pinellas County, Clearwater, FL

5:05 p.m.

Improving Beach Nourishment Effectiveness While Reducing Costs Through Regional Collaboration

Howard Marlowe and Dan Ginolfi, Warwick Group Consultants, LLC, Washington, D.C.

5:25 p.m.

Adjourn

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Friday, February 8**CLOSING GENERAL SESSION****8:00 a.m. to 12:00 p.m.****8:00 a.m.****Florida Red Tide: Protecting Public Health through Innovation and Citizen Science****Tracy Fanara, Ph.D., Environmental Health Program, Mote Marine Laboratory, Sarasota, FL****8:25 a.m.****An Overview of the 2017-18 Red Tide Event and New Approaches for Observing and Predicting Harmful Algal Blooms in the Gulf of Mexico****Matt Garrett, Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, St. Petersburg, FL****8:50 a.m.****Broward County Segment II Beach: Response to Hurricane Irma and Winter Storm Riley****Christopher Creed, P.E. and N. Zachary Bedell, Olsen Associates, Inc., Jacksonville, FL and Nicole Sharp, P.E., Environmental Planning and Community Resilience Division, Broward County, Fort Lauderdale, FL****9:10 a.m.****Coastal Management at Stumphole - "Everything, and Then Some"****Michael Dombrowski, P.E., MRD Associates, Inc., Destin, FL****9:30 a.m.****The Impact of Hurricane Michael on the Coast of Northwest Florida****Ralph Clark, P.E., Division of Water Resource Management, Florida Department of Environmental Protection, Tallahassee, FL****9:50 a.m.****Post-Disaster Response and Recovery - Weathering the Financial Storm of Hurricanes Joaquin, Matthew and Irma, Hilton Head, SC****Scott Liggett, P.E. and Jennifer Ray, Town of Hilton Head Island, S.C.****10:10 a.m. Professional Exchange Break****10:40 a.m.****Modeling Potential Circulation Improvements in Old Tampa Bay, Tampa, FL****Todd DeMunda, P.E. and Shayne Paynter, Ph.D., P.E., Atkins, Melbourne, FL and Tampa, FL and Bryan Flynn, P.E. and Dave Tomasko, Ph.D., ESA Associates, Tampa, FL****11:00 a.m.****Historical Analysis of Shoreline Change at the Jupiter Inlet and Adjacent Beaches****Ty Briggs, Florida Atlantic University, Boca Raton, FL****11:20 a.m.****Mapping with UAV's (unmanned aerial vehicles) and USV's (unmanned surface vehicles)****David O'Brien, Jr., SurvTech Solutions, Inc., Tampa, FL****11:40 a.m.****When Dunes Misbehave - Examples of Natural and Engineered Coast Dunes Which Have Performed with Unanticipated Results. What to do About it.****Robert Barron, Coastal Management and Consulting, Coastal Growers, Inc., Boynton Beach, FL****12:00 p.m. Adjourn****Next Page**

**2019 National Conference
on Beach Preservation Technology**
February 6-8, 2019
Embassy Suites St. Augustine Beach
Oceanfront Resort

2019 Tech Conference

Conference Registration

Register Online

For details on registration fees, go to
[www.fsbpa.com/tech-conference/
registration.html](http://www.fsbpa.com/tech-conference/registration.html)

Hotel Reservations

Hotel reservations should be made directly with the conference hotel, the Embassy Suites St. Augustine Beach. The hotel will honor the group rates as long as rooms remain in FSBPA's block or **until January 11, 2019**, whichever occurs first. The group rate is \$149 single or double, plus tax and a \$15 per day resort fee. For complete details visit, [www.fsbpa.com/tech-conference/
hotel.html](http://www.fsbpa.com/tech-conference/hotel.html).

Sponsorship and Exhibit Information

We hope you will favorably consider a sponsorship and/or exhibit booth to promote your company's services and wares. Either option is a great opportunity to meet new professionals in coastal related fields.

For complete details and to see what options are still available, [click here](#).

As the conference organizer, FSBPA would like to thank Lisa Armbruster and the Planning Committee for their hard work in preparing the conference program. We hope you can join us for this important educational and networking event and begin your year by earning up to 18 Professional Development Hours.

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Thank you to our Conference Sponsors

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Conference Pens



Welcome Reception



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Gold Luncheon Sponsors



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Silver Luncheon Sponsors



Pretzels & Candy Bar Break



Morning Beverage Breaks



Ice Cream Social



Sweets & Treats Break



Friday Breakfast Break



Friends of FSBPA with Benefits

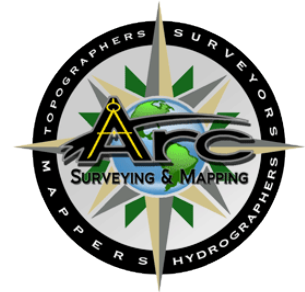
HUMISTON & MOORE ENGINEERS

COASTAL ENGINEERING AND PERMITTING
"Restoring Beaches as Natural Coastal Systems"



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32nd Annual National Conference on Beach Technology Exhibitors





In Situ Hydrodynamic and Morphodynamic Measurements During Extreme Storm Events

by Stanford J. Borrell and Jack A. Puleo

Center for Applied Coastal Research, University of Delaware

Students at the University of Delaware conducted a field study to collect important hydrodynamic and morphodynamic data at Bethany Beach, Delaware during a large winter storm that affected the coast in early March 2018. The deployment strategy adopted for this research, a description of the used sensors to collect the data, and a brief discussion about the results and future work is presented in this article. Ultimately, the goal of this research project is to collect much needed in situ field data to assist in the understanding (and predicting) of how the beach face changes **during** storm events.

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INTRODUCTION

The Delmarva Peninsula was affected by a month-long (March 2018) winter event dubbed “*The Four’easters*”, as there were four nor’easter storm events in a row. An in situ field study to collect hydrodynamic and morphodynamic data across the beach face was conducted at Bethany Beach, Delaware during the first of the four nor’easters, Nor’easter Riley (March 02 – March 05, 2018). Traditionally, the impact of a storm on the coastal morphology (i.e. erosion) is measured after the storm passes using remote sensing or other surveying techniques. However, pre- and post-storm images/measurements fail to capture the coastal response in the hours or days **during** the storm. The data collected during this field deployment can be used for the improvement of numerical models (e.g. XBeach) and coastal management decisions.



Figure 1a



Figure 1b

Figure 1a shows the geographical location of the field study site. Figure 1b is a satellite image on March 02, 2018 of Nor’easter Riley from the GOES-16 weather satellite.

METHODS

Deployment Technique

Water elevation, bed elevation, water depth, and water velocity data were collected to improve understanding of the complex dynamics and processes that occur across the beach face during a storm. Various sensors to measure the aforementioned quantities were mounted to scaffold pipes (Figure 2a) and deployed at seven deployment stations. The stations were deployed in a single cross-shore transect, extending from the dune toe to seaward of the berm, and spaced 5-10 m apart (Figure 2b). Each deployment station had a vertical monopole that was water-jet driven ~2 m below the pre-storm bed level.



Figure 2a

Single deployment station with mounted sensors. Each station had the three sensors shown in Figure 3.

Sensor Description

The sensors used during the deployment are shown in Figure 3. The Acoustic Distance Meter (ADM, Figure 3a.) uses sound waves and the known speed of sound to measure distance. In this application, the measured distance corresponds to either water or bed elevation. The Photocell Array (PA, Figure 3b.) is not yet field ready and will be used in future deployments. Electro-magnetic Current Meters (EM, Figure 3c.) were used to measure water velocity. Pressure Sensors (RBR, Figure 3d.) experienced calibration issues and were not usable.

All of the sensors are self-logging and self-powered, meaning that no cabling back to an external data logging system or power source was required. This approach was taken to ensure the deployment was in a rapid-response fashion in the interest of saving time and human energy.

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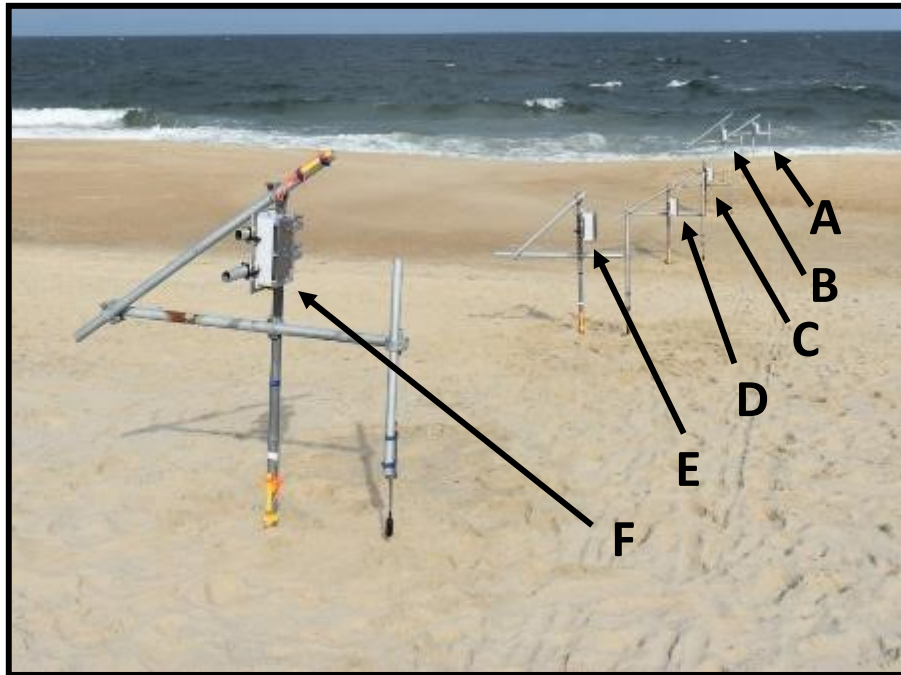


Figure 2b

Cross-shore transect of multiple stations (with identification labels) shown in Figure 2a.

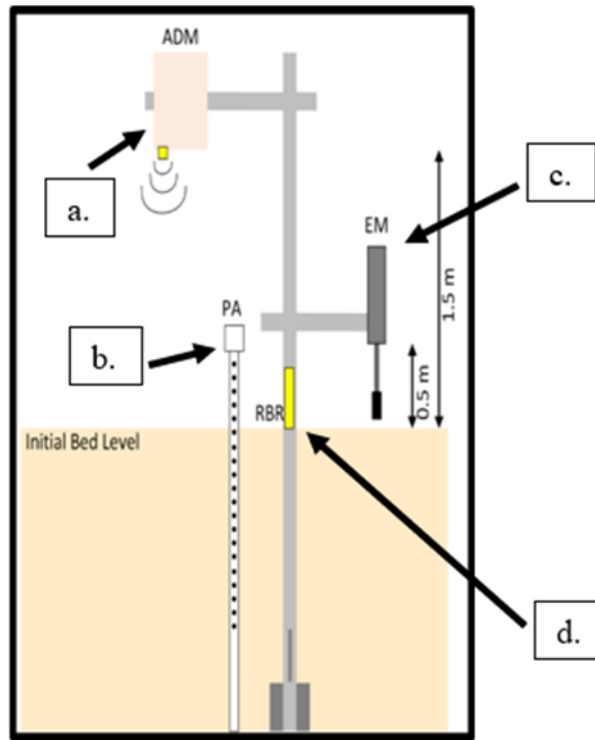


Figure 3

Schematic of deployment station.

GPS Survey Profiles

Cross-shore elevation profiles of the beach face were collected with a RTK GPS mounted to a push-cart (Figure 4). The elevation profiles were used to confirm ADM measurement accuracy as well as provide a clear, spatially continuous view of the beach face change during Nor'easter Riley. Though useful, this surveying technique only provides elevation measurements in approximately 12-hour intervals. The predominant focus of our research is to successfully measure the beach elevation change throughout the storm event.



Figure 4

University of Delaware student performing RTK GPS surveying with customized push-cart.

COLLECTED DATA

GPS Survey Profiles

The cross-shore elevation profiles described in the “Methods” section are shown in Figure 5. The location of each deployment station in the cross-shore is symbolized by the magenta circle, while the solid lines are the measured elevations.

The beach profile changed significantly from the initial profile (black line) and throughout the storm. The initial berm was completely eroded and flattened by the time the second GPS survey profile was taken. Alternatively, accretion was measured across the back beach to the dune toe.

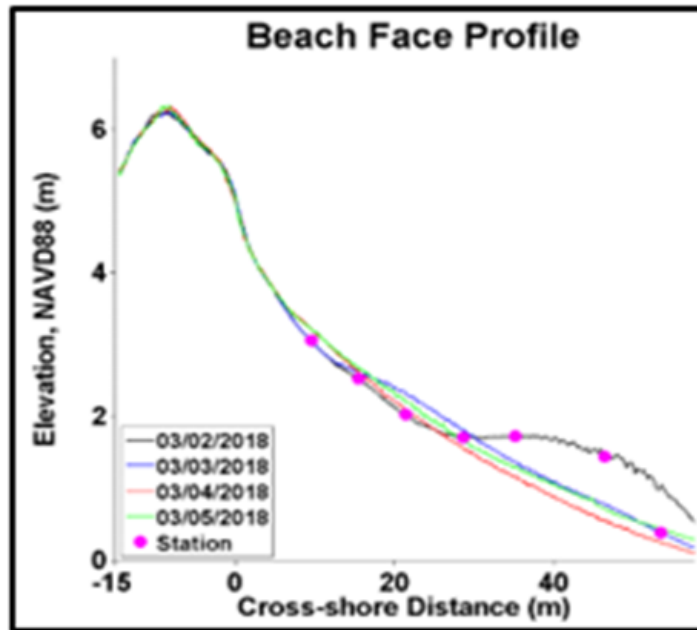


Figure 5

*Cross-shore GPS surveyed profile of the beach face during
Nov. Easter Riley.*

Bed & Water Elevations

Measurements made by the ADM (Figure 3a.) are shown in Figure 6 where the individual panels are the time-series of the bed and water elevations at each cross-shore deployment station (data from Station A was not recoverable). Water elevations are the solid blue line, identified discrete bed elevations are red circles, and a fitted curve of the discrete bed level points is the solid black line. The discrete bed elevations were identified using a modified algorithm proposed by *Turner et al. (2006)*. The algorithm was successful when the bed was exposed and could be measured by the ADM. As expected, the algorithm failed to identify any bed elevations when the bed was continuously submerged (Figure 6a.).

Continuous bed elevation change is showed in Figures 6b-6e. A variety of erosion and accretion patterns was measured at each deployment station, especially associated with rising and falling tides. An interesting morphological event took place between March 03 and March 04. Over 50 cm of erosion was measured at Station C (Figure 6b.), whereas approximately 30 cm of accretion was measured at Station E (Figure 6d.). This morphological event corresponds to the eroded and flattened berm seen in Figure 5 and suggests divergent sediment transport was a dominant littoral process.

It should be noted that Figures 6a-6c are shorter time-series due to station failure from excessive wave forcing. The vertical monopoles used to hang the sensors (Figure 3) began to tilt landward as the storm progressed and forced us to retrieve the collected data prematurely.

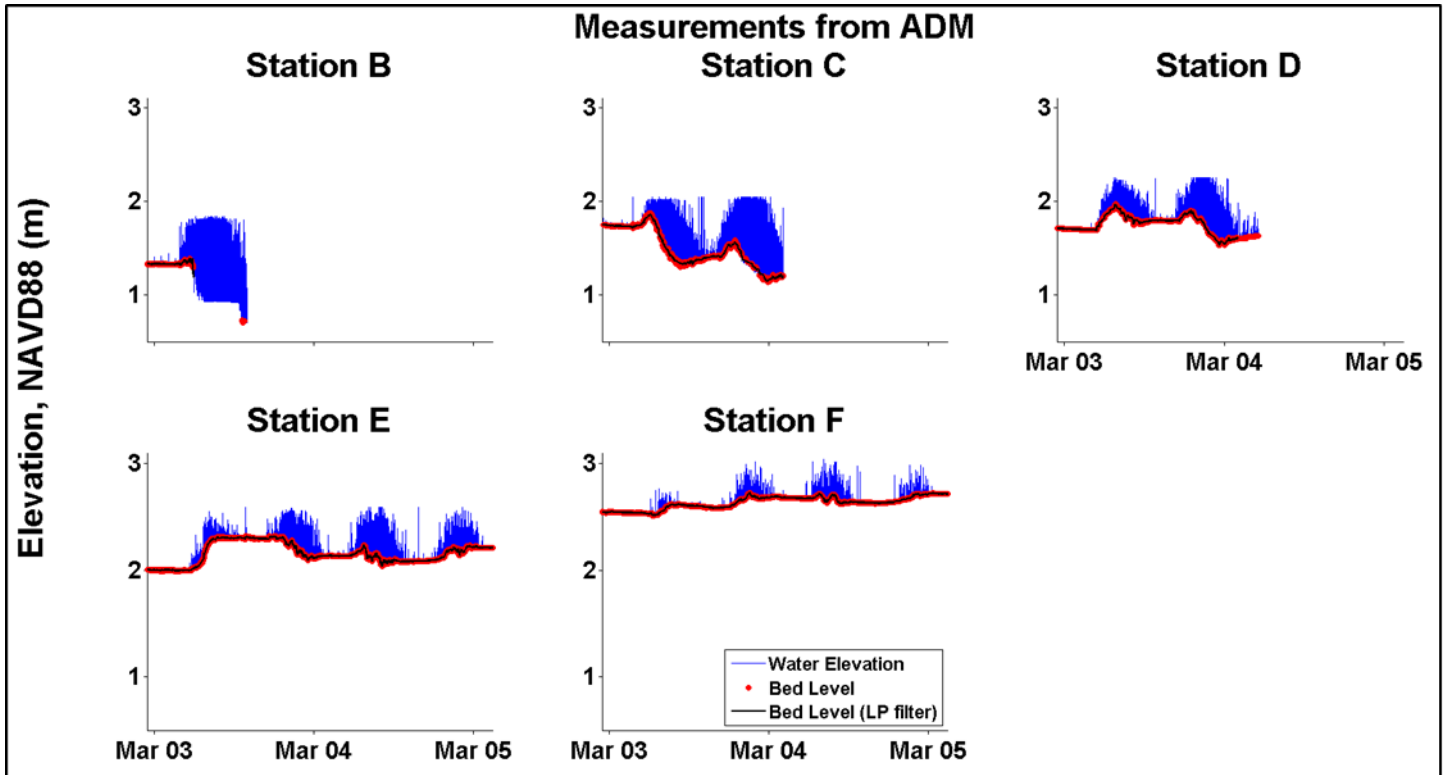


Figure 6

Time series of water (blue) and bed level (red and black) elevation at deployment stations B-F from March 03, 2018 – March 05, 2018 during Nor'easter Riley.

FUTURE WORK

More field deployment campaigns will be undertaken throughout the winter of 2019 as large nor'easters or other storm events begin to form and affect the coast. A new deployment strategy of installing a frame for the seaward-most stations will be implemented to prevent pipe bending and failure.

Numerical modeling with the popular, open-source model XBeach will be tested to replicate the hydrodynamics and morphodynamics measured during Nor'easter Riley. The model will be forced with wave data (wave height, period, direction) from the U.S. Army Corps of Engineers (USACE) offshore buoy, DE003. Wind data (speed, direction) collected from the Delaware Environmental Observing System will also be used to force the model.

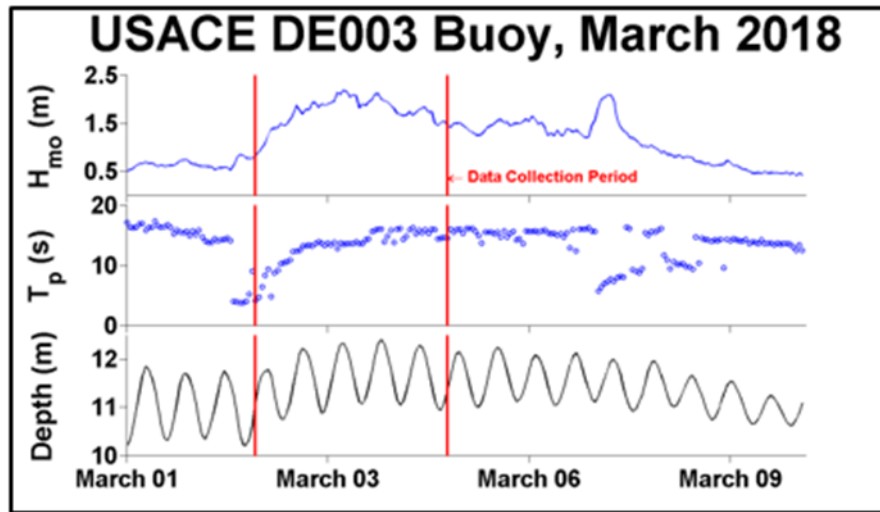


Figure 7

Wave data from USACE DE003 offshore buoy. From top to bottom, the panels are of significant wave height, peak period, and water depth.

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Florida Department of Environmental Protection AGENCY UPDATES



Goodbye and Hellos

After 33 years of service to the State of Florida, Marty Seeling retired from the Department on December 31, 2018. A longtime administrator for the Joint Coastal Permitting Program, Marty dedicated much of career to preserving and protecting the state's beaches. Most recently, Marty focused on training and consistency efforts with permit managers and District staff and has also worked diligently coordinating the Florida Beach Habitat Conservation Plan. Marty will continue to call Tallahassee home, but looks forward to traveling, writing, fishing, and teaching free fly-fishing clinics. The Division of Water Resource Management is thankful for his decades of dedicated service to the state, and will miss him greatly.

The Beaches, Inlets, and Ports Program welcomes Justin Lashley as an Environmental Specialist II. Justin has a bachelor's degree in Geology from the University of South Florida and a master's degree in Marine and Atmospheric Sciences from the State University of New York at Stony Brook. Justin is from Racine, Wisconsin. Justin will be helping the permitting team with geology and engineering coordination. In his free time, Justin has hiked 400 miles of the Appalachian Trail.

The Engineering, Hydrology and Geology Program welcomes Zach Westfall as an Engineering Specialist III. Zach earned his undergraduate and master's degrees at the University of South Florida in Coastal Geology, where Dr. Ping Wang served as his major professor. He will be assisting in the geological reviews for the Coastal Construction Control Line and Beaches, Inlets, and Ports permitting programs, and helping with inlet studies. Zach loves to be outside and is an avid golfer.

Preliminary Hurricane Michael Post-Storm Beach Conditions and Coastal Impact Report Finalized and Posted

The *Preliminary Hurricane Michael Post-Storm Beach Conditions and Coastal Impact Report* has been completed by Division of Water Resource Management (DWRM) staff from the Engineering, Hydrology, and Geology Program and the Beaches, Inlets and Ports Program.

This document is a preliminary report and the quantitative erosion effects were not yet included. In preparation for the final post-storm report, surveys of the Panama City Beaches Shore Protection Project and the St. Joseph Peninsula Beach Restoration Project were conducted to quantify the erosion losses along the western half of Bay County and the developed portion of Gulf County. In addition, the U.S. Army Corps of Engineers has provided an upland LIDAR survey of the coast, which provides data to compute upland volumetric changes due to Michael's impacts. All of this quantitative volumetric data has been reviewed by staff and will be included in the final post-storm report, which will be completed in early 2019. The final report will also include post-storm recovery strategies, and the expected costs for beach and dune recovery. To review the *Preliminary Hurricane Michael Post-Storm Beach Conditions and Coastal Impact Report*, please visit: <https://floridadep.gov/water/engineering-hydrology-geology/content/coastal-engineering-geology-group-technical-reports#storms>.

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Shoreline

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February 6-8, 2019

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September 18-20, 2019

62nd Annual Conference
Hutchinson Shores Resort & Spa
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February 22-24, 2019

22nd Annual Florida Marine Turtle Permit Holder Meeting
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