2023 Coastal GeoTools Presentations

Monday, February 6, 2023
Special Interest Meetings

8:30 a.m. to 11:30 a.m.		
Mapping Coastal Inundation: Keeping Current with New Data, Tools, and Trends	Abstract	Presentation
High-Resolution Land Cover 101: What is it? Where is it? And how do you use it?	Abstract	Presentation
9:00 a.m. to 11:30 a.m.		
Mitigation Planning Policy Updates and How to Support Tribal Mitigation Planning	Abstract	Presentation
1:00 p.m. to 4:00 p.m.		
Coastal Flooding and Inundation Information and Services at Climate Timescales to Reduce Risk and Improve Resilience	Abstract	No Presentation Available
CMECS Updates and Application: Understanding Data, Tools, Technical Limits, and Possibilities	Abstract	Presentation
Next Gen Tribal Engagement Community of Practice	Abstract	Presentation

Only the person presenting at the conference is listed, the entire list of project partners is included with the presentation abstract.

Tuesday, February 7, 2023
10:30 a.m. to 12 p.m.

Opal Room: Bringing Tribal Community Practices to Coastal Management			**10:30 a.m. to 12 p.m.**
Coastal Geospatial Projects to Address Alaska's Environmentally Threatened Community Needs	Jacquelyn Overbeck *NOAA Office for Coastal Management*	No Abstract Provided	Presentation
Shinnecock's Changing Peninsula: Protecting the Homeland	Shavonne Smith *Shinnecock Tribe*	No Abstract Provided	Presentation
Bureau of Indian Affairs Geospatial Resources and Tribal Climate Needs	David Vogt *Bureau of Indian Affairs*	No Abstract Provided	Presentation
Emerald Salon One: Coastal Inundation Data and Modeling			**10:30 a.m. to 12 p.m.**
Flood Prediction and Inundation Mapping at Large Scales Using a Multidisciplinary Machine Learning Approach	Chris Mack *Stantec Consulting Services*	Abstract	Presentation
Study Design: Coupling Engineering Modeling and GIS Analysis Tools to Forecast Future Coastal Hazards and Mitigation	Erin Benford *AECOM North Charleston*	Abstract	Presentation
Combing Multiple Surveying Techniques and Datasets to Construct an Integrated High-Resolution Topobathymetric Digital Elevation Model for Pu'uhonua O Hōnaunau National Historical Park in Hawaii	Jeff Irwin *U.S. Geological Survey Earth Resources Observation and Science Center*	Abstract	Presentation
Creating Employment Statistics in Inundation Zones to Analyze and Communicate Risk	Ravi Chittilla *CSS, Inc. on contract with NOAA Office for Coastal Management*	Abstract	Presentation
Emerald Salon Two: Ocean Planning			**10:30 a.m. to 12 p.m.**
Modeling Protected Species Distribution and Habitats to Inform Siting and Management of Pioneering Ocean Industries	Alyssa Randall *CSS, Inc. on contract with NOAA National Centers for Coastal Ocean Science*	Abstract	No Presentation Provided
Spatial Modeling to Inform Wind Energy Siting in the Gulf of Mexico	James Morris *NOAA National Centers for Coastal Ocean Science*	Abstract	No Presentation Provided

Only the person presenting at the conference is listed, the entire list of project partners is included with the presentation abstract.

A Precision Siting Modeling Approach to Inform Ocean Energy and Offshore Aquaculture Development	Jonathan Jossart *CSS, Inc. on contract with NOAA National Centers for Coastal Ocean Science*	Abstract	Presentation
Understanding Multiuse Conflicts in the Outer Continental Shelf Using the Marine Minerals Information System (MMIS)	Alexa Ramirez *NV5 Geospatial*	Abstract	Presentation
Emerald Salon Three: Monitoring and Mapping Habitats			**10:30 a.m. to 12 p.m.**
The Next Wave in Coastal Mapping	Mark Safran *Dewberry Engineers, Inc.*	Abstract	Presentation
Leveraging Nature-Based Climate Solutions and Emerging GeoTools: Blue Carbon Inventories, Maps, and More	Adrian Laufer *Sea and Shore Solutions, LLC*	Abstract	Presentation
How Land Use and Land Cover Mapping Can Save Water	Andrew Brenner *NV5 Geospatial*	Abstract	Presentation
Updates to the Environmental Sensitivity Index (ESI) Datasets	Nicolle Rutherford *NOAA Office of Response and Restoration*	Abstract	Presentation

Only the person presenting at the conference is listed, the entire list of project partners is included with the presentation abstract.

Tuesday, February 7, 2023
1:30 p.m. to 3 p.m.

Opal Room: Storm Event Preparation and Response			**1:30 p.m. to 3 p.m.**
Collaborative Tool Development to Support Alaska Native Communities: Application during Response to Typhoon Merbok	Jacquelyn Overbeck *NOAA Office for Coastal Management*	Abstract	Presentation
ESRI ArcGIS Field Map Mobile Applications for Typhoon Merbok High Water Mark Survey in Alaska	Nathan Wardwell *JOA Surveys, LLC*	Abstract	Presentation
NOAA National Geodetic Survey's Emergency Response: Hurricane Ian	Maryellen Sault *NOAA National Geodetic Survey*	Abstract	No Presentation Provided
Empowering Communities with Sensors and Data to Prepare for Future Floods	*Jamie Carter* *NOAA Office for Coastal Management*	No Abstract Provided	Presentation
Emerald Salon One: Coastal Inundation Data and Tools			**1:30 p.m. to 3 p.m.**
Coastal Inundation Information and Services at Climate Timescales	Doug Marcy *NOAA Office for Coastal Management*	Abstract	Presentation
National Ocean Service Coastal Inundation Dashboard	Paul Fanelli *NOAA Center for Operational Oceanographic Products and Services*	Abstract	Presentation
NOAA's Experimental Potential Coastal Flood Impact Mapping for Effective Decision-Making	Matt Pendleton *Lynker Technologies on contract with NOAA Office for Coastal Management*	Abstract	Presentation
Coastal Flood Analysis Using Global Mapper	Jenna Nelson *Blue Marble Geographics*	Abstract	Presentation
Emerald Salon Two: Short and Sweet - Local Applications of Geospatial Technologies			**1:30 p.m. to 3 p.m.**
How High is that Seawall?	Robert Hauck *City of Charleston, South Carolina*	Abstract	Presentation
Tree Canopy and Heat in the City of Charleston	Casey Conrad *City of Charleston, South Carolina*	Abstract	Presentation
Incorporating Equity and Climate Change Criteria into Maryland Land Protection	Sabine Bailey *The Nature Conservancy and Maryland Department of Natural Resources*	Abstract	Presentation

Only the person presenting at the conference is listed, the entire list of project partners is included with the presentation abstract.

Geospatial Technologies Supporting Natural and Cultural Heritage Tourism along the Great Lakes in Wisconsin	David Hart *University of Wisconsin Sea Grant Institute*	Abstract	Presentation
Coastal Restoration Toolkit	Elsa Schwartz *Restore America's Estuaries*	Abstract	Presentation
Developing Digital Twin Geovisualizations for Enhanced Communication of Flood Hazard Risk	George McLeod *Old Dominion University*	Abstract	Presentation
An Interactive Map Visualizing Decadal-Scale Changes to Coastal Dunes Across North Carolina	Alexander Seymour *U.S. Geological Survey*	Abstract	Presentation
Emerald Salon Three: Case Studies of Land Cover Data Applications			**1:30 p.m. to 3 p.m.**
High-Resolution Coastal Land Cover for the Nation, the Next Generation Now	Nate Herold *NOAA Office for Coastal Management*	Abstract	Presentation
High-Resolution Land Cover for the Nation	Brandon Palin *Ecopia AI*	Abstract	Presentation
An Online Tool to Assess the Health of Small Watersheds in Connecticut Using 1 Meter CCAP Land Cover	Chester Arnold *Center for Land Use Education and Research* *University of Connecticut*	Abstract	Presentation
Critical GIS Date for Habitat Restoration and Conservation Projects in the Great Lake – Wisconsin's One Map Project	Jim Giglierano *Wisconsin Department of Administration*	Abstract	Presentation

Only the person presenting at the conference is listed, the entire list of project partners is included with the presentation abstract.

Tuesday, February 7, 2023
3 p.m. to 4:30 p.m.

Crystal DEF: Tool Showcase One		**3 p.m. to 4:30 p.m.**
Virginia's Coastal Resilience Master Plan Web Explorer	Brian Batten, Mat Mampara, Ravi Pavuluri, Seth Lawler, Siva Selvanathan, Eric King, and Alec Brazeau *Dewberry Engineers, Inc.*	Abstract
USGS Coastal Change Hazards Tools	Kara Doran, Alexander Nereson, Emily Himmelstoss, and Andrea O'Neill, *U.S. Geological Survey* Richard Snell Cherokee Nation System Solutions contracted to the *U.S. Geological Survey*	Abstract
The Northeast Ocean Data Portal: Data and Maps for Ocean Planning	Jenna Ducharme, Kelly Knee, Jeremy Fontenault, and Stephen Sontag *RPS Group* Emily Shumchenia and Nicholas Napoli *Northeast Regional Ocean Council* Peter Taylor *Waterview Consulting*	Abstract
What's Your Water Level	Nicole Elko *American Shore and Beach Preservation Association* Brian Glazer, *University of Hawai'i* Debra Hernandez *Southeast Coastal and Ocean Observing Regional Association*	Abstract
Enabling Geospatial Analysis and 3D Visualization for Raw ADCIRC Files	Jason Fleming *Seahorse Coastal Consulting*	Abstract
FEMA Region 1 Coastal Erosion Hazard Map	Carson Hauck and Marlee Newman *CDM Smith*	Abstract

Only the person presenting at the conference is listed, the entire list of project partners is included with the presentation abstract.

A Spatial Assessment of the NOAA National Water Level Observation Network	Tigist Jima *Lynker at NOAA Center for Operational Oceanographic Products and Services* Laura Rear McLaughlin, Greg Dusek, Aisha Haynes, and Caiti Guerin *NOAA Center for Operational Oceanographic Products and Services*	Abstract
High Tide Flooding Outlooks Get a Geospatial Facelift	Analise Keeney *NOAA Center for Operational Oceanographic Products and Services*	Abstract
New Methods to Understand Flood Risk and Build Equitable Community Resilience	Shelly Klose *True Flood Risk, Inc.*	Abstract
USGS Coastal Change Hazards Guided Discovery Hub	Erika Lentz, Amanda Cravens, and Emily Himmelstoss *U.S. Geological Survey* Richard Snell *Cherokee Nation System Solutions contracted to the U.S. Geological Survey*	Abstract
Strategic Conservation Assessment: A Geospatial Tool Suite for Land and Habitat Management in the Gulf of Mexico Coastal Region	Yong (Ethan) Liang, Kristine Evans, Sathish Samiappan, and Anthony Collini *Mississippi State University* Amanda Sesser, Shannon Westlake, and Todd Hopkins *U.S. Fish and Wildlife Service*	Abstract
AccessAIS – Delivering the Nation's Data in the Cloud	Ken Logsdon *Dewberry Engineers, Inc.* Dave Stein *NOAA Office for Coastal Management* Jesse Brass *CSS at NOAA Office for Coastal Management*	Abstract
Web Application for the New York State Flood Information Decision Support System	Juan Martinez, Kytt MacManus, and Gregory Yetman *Columbia Climate School*	Abstract

Only the person presenting at the conference is listed, the entire list of project partners is included with the presentation abstract.

Nearshore Management Prioritization Tool and Web Map Application	Brian McTeague *Squaxin Island Tribe's Natural Resources Department*	Abstract
U.S. Coastal Inundation Impacts Viewer	Keith VanGraafeiland and Craig McCabe *Esri* George McLeod *Old Dominion University*	Abstract

Only the person presenting at the conference is listed, the entire list of project partners is included with the presentation abstract.

Wednesday, February 8, 2023
10:30 a.m. to 12 p.m.

Opal Room: Engaging Users in Data and Tool Development			**10:30 a.m. to 12 p.m**
User Needs Assessment for Future Coastal Inundation Information and Tools	Cayla Dean *Ocean Associates, Inc. at NOAA Center for Operational Oceanographic Products and Services*	Abstract	Presentation
Filling the Gaps in Alaska: Water Level Collaboration and Advancing VDatum	Leslie Jones *Alaska Geospatial Office*	Abstract	Presentation
Using Citizen Science to Track Coastal Trash	Wes Shaw and Chris Rae *Blue Urchin, LLC*	Abstract	Presentation
Integrating and Expanding Community with ArcGIS Hub	Drew Stephens *CPC, Inc.*	Abstract	Presentation
Emerald Salon One: Prioritization Tools for Assessing and Enhancing Coastal Resilience			**10:30 a.m. to 12 p.m**
Harnessing Energy on Alaska Coastal Mapping Initiatives to Support Resilience Coastal Communities	Nadine Doiron *Alaska Geospatial Office*	Abstract	Presentation
The Alaska Coastal Mapping Strategy and a Supporting Case Study of NOAA's Coastal Mapping Program in Southeast Alaska	Colin Cooper *NV5 Geospatial*	Abstract	Presentation
A Tool for Assisting Prioritization of Nature-based Coastal Resilience Projects in the Great Lakes	Sue Hoegberg *Dewberry Engineers, Inc.*	Abstract	Presentation
Digital + Analog: Advancing the South Atlantic Salt Marsh Initiative by Blending Digital Geotools with Participatory GIS Approaches to Create Comprehensive and Inclusive Geodata on Combined Human and Natural Coastal Systems	Mike Wissner *The Pew Charitable Trusts*	Abstract	No Presentation Provided
Emerald Salon Two: Data Products for Marine Spatial Planning			**10:30 a.m. to 12 p.m**
Is there any Space Left in the Ocean? A National Exclusion Layer to Inform Siting of New Ocean Industries	James Morris *NOAA National Centers for Coastal Ocean Science*	Abstract	No Presentation Provided
Wave Climatology Summary Products from 30-year Wave Hindcast Model Data	Jeremy Fontenault *RPS Group*	Abstract	Presentation

Only the person presenting at the conference is listed, the entire list of project partners is included with the presentation abstract.

Regional Ocean Spatial Modeling for Siting Wind Energy: How NOAA is Supporting BOEM and Conserving NOAA Trust Resources	James Morris *NOAA National Centers for Coastal Ocean Science*	Abstract	No Presentation Provided
Development of Commercial Fishing Activity Data Products for the Northeast and Mid-Atlantic	Jeremy Fontenault *RPS Group*	Abstract	Presentation
Emerald Salon Three: Emerging Technologies for Elevation Data and Modeling		**10:30 a.m. to 12 p.m.**	
The USGS 3D Elevation Program Next Generation	Cindy Thatcher *U.S. Geological Survey*	Abstract	No Presentation Provided
Analysis Ready Elevation Data – USGS 3DEP and the National Map	Jason Stoker *U.S. Geological Survey*	Abstract	Presentation
Coastal National Elevation Database – Enhanced Transitional Blending between Disparate Bathymetric and Nearshore Elevation Models	W. Matthew Cushing and Dean Tyler *U.S. Geological Survey*	Abstract	No Presentation Provided
The USGS Coastal National Elevation Database: Integrated Topobathymetric Models and Applications for the U.S. Coastal Zone	Jeffrey Danielson *U.S. Geological Survey*	Abstract	No Presentation Provided

Only the person presenting at the conference is listed, the entire list of project partners is included with the presentation abstract.

Wednesday, February 8, 2023
1:30 p.m. to 3 p.m.

Opal Room: Blue Economy Panel			**1:30 p.m. to 3 p.m.**
The New Blue Economy: Application of Ocean and Coastal Data and Technology Across Sectors to Support Decision-Making – A Panel Discussion	Moderator: Paul M. Scholz, Deputy Assistant Administrator *NOAA's Ocean Service and Coastal Zone Management* Panelists: Debra Hernandez, Director *Southeast Coastal Ocean Observing Regional Association* Gerhard Kuska, Director *Mid-Atlantic Regional Association Coastal Ocean Observing System* Carl Gouldman, Director *NOAA Integrated Ocean Observing System*	Abstract	Presentation
Emerald Salon One: Assessing Coastal Inundation Impacts			**1:30 p.m. to 3 p.m.**
Assessing Sea Level Rise Vulnerabilities	Keith VanGraafeiland *Esri*	Abstract	No Presentation Provided
A Bluff Erosion Potential Index for the Pennsylvania Lake Erie Coast	Sean Rafferty *Pennsylvania Sea Grant College Program*	Abstract	Presentation
Sea Level Rise in the South Salish Sea Story Map	Brian McTeague *Squaxin Island Tribe*	Abstract	No Presentation Provided
Real-Time Model Guidance and Decision Support for Coastal Inundation	Jason Fleming *Seahorse Coastal Consulting*	Abstract	Presentation

Only the person presenting at the conference is listed, the entire list of project partners is included with the presentation abstract.

Emerald Salon Two: Short and Sweet - Data and Visualizations for Coastal Management			**1:30 p.m. to 3 p.m.**
JALBTCX Quick Response Toolbox	Ashley Elkins *U.S. Army Corps of Engineers*	Abstract	No Presentation Provided
Coastal Habitat Evolution and Sedimentation Measured with Historic Lidar and Aerial Imagery in Port Royal Sound, Beaufort County, South Carolina	Keil Schmid *Geoscience Consultants, LLC*	Abstract	Presentation
LiDAR Shoreline Extraction for Coastal Management Applications	Claire Babineaux *Northern Gulf Institute, Mississippi State University*	Abstract	Presentation
Accelerated Conservation and Restoration through Multi-Objective Targeting	John Wolf *U.S. Geological Survey*	Abstract	Presentation
A Geospatial Tool to Identify and Classify the Impacts of Sea Level Rise on Transportation Networks	Kate Grala *Northern Gulf Institute, Mississippi State University*	Abstract	Presentation
GeoVisualization for Coastal Inundation	John Cartwright *Mississippi State University*	Abstract	Presentation
Visualizing the Impacts of Sea Level Rise in 3D	Craig McCabe *Esri*	Abstract	Presentation Available by Request
Emerald Salon Three: Emerging Technologies for Real-Time Data Applications			**1:30 p.m. to 3 p.m.**
Importance of Near Real-Time Data Processing for Topo-bathymetric Lidar Operations	Nathan Hopper *Woolpert*	Abstract	Presentation
Real-Time Flood Forecasting	Mark Topping *WGI Geospatial*	Abstract	Presentation
Applying Technology to Inform Drivers of Flooded Roads in Real-Time	Kelsey McDonough *FloodMapp* Kyle Spencer *City of Norfolk, Virginia*	Abstract	No Presentation Provided
“Will Flooding Impact me Today?” TIDEeye Can Help!	Robert Hauck *City of Charleston, South Carolina*	Abstract	Presentation

Only the person presenting at the conference is listed, the entire list of project partners is included with the presentation abstract.

Wednesday, February 8, 2023
3 p.m. to 4:30 p.m.

Crystal DEF: Tool Showcase Two		3 p.m. to 4:30 p.m.
OceansMap: A Data Ecosystem Supporting Collaboration and Decision-Making	Jenna Ducharme and Kelly Knee *RPS Group*	Abstract
Disaster Management and Visualization of Spatial Data: USGS Event Support Maps and Multi-agency High Water Mark Planning Dashboard	Xan Fredericks, Lance Clampitt, Chris Cretini, Eliza Gross, and Cyndi Rachol *U.S. Geological Survey*	Abstract
Using ArcGIS GeoPlanner to Visualize the Cumulative Impact of Green Stormwater Infrastructure	David Hart and Scott McComb *University of Wisconsin Sea Grant Institute* Gabriel Wilkins *University of Wisconsin-Madison*	Abstract
Indigenous Communities in the Coastal Realm	Brandon Krumwiede *NOAA Office for Coastal Management*	No Abstract Provided
Forerunner: Resilience through Smarter Floodplain Management	Susanna Pho and Owen MacNeill *Forerunner*	Abstract
QNSPECT: A QGIS Plugin to Estimate Nonpoint Source Pollution and Erosion over a Watershed and Compare Land-Use and Climate Change Impacts on Pollution and Erosion	Abdul Raheem Siddiqui, Ian Todd, and James Parker *Dewberry Engineers, Inc.*	Abstract
BOEM's Enhanced ESPIS	Alexa Ramirez *NV5 Geospatial* Jonathan Blythe *BOEM Environmental Studies Planning*	Abstract
Tools and Visualizations for Assessing and Communicating Sea Level Rise and Coastal Flood Risk	Dan Rizza and Kelly Van Baalen *Climate Central*	Abstract
Adapting Stormwater Management for Coastal Floods	Brenna Sweetman *NOAA Office for Coastal Management*	No Abstract Provided

Only the person presenting at the conference is listed, the entire list of project partners is included with the presentation abstract.

GeoCoast Tools	John van der Zwaag and John Cartwright *Mississippi State University*	Abstract
Demonstration of the NWS Eastern Region Coastal Flood Webpage with Potential Coastal Flood Extent Overlays	Nelson Vaz, Jeff Orrock, Laurie Hogan, Donald Dumont, James Notchey, Chris Birchfield, and Kirk Lombardy *NOAA National Weather Service*	Abstract
The Mid-Atlantic Ocean Data Portal	Avalon Bristow and Nick Napoli *Mid-Atlantic Regional Council on the Ocean (MARCO)* Karl Vilacoba and Tony MacDonald *Monmouth University Urban Coast Institute* John Bognar, Richard Lathrop, and Jim Trimble Rutgers *University Center for Remote Sensing and Spatial Analysis (CRSSA)* Ryan Hodges *Ecotrust* Corrie Curtice *Duke University Marine Geospatial Ecology Lab* Jeff Herter *New York State Department of State*	No Abstract Provided
U.S. Interagency Elevation Inventory	Kirk Waters *NOAA Office for Coastal Management* Rebecca Mataosky *CSS at NOAA Office for Coastal Management*	Abstract

Only the person presenting at the conference is listed, the entire list of project partners is included with the presentation abstract.

Thursday, February 9, 2023
9 a.m. to 10:30 a.m.

Crystal AB: Preparing for Inundation in Coastal Virginia			**9 a.m. to 10:30 a.m.**
Harnessing Data to Create a Call for Action for Virginia's Coastal Master Plan	Brian Batten *Dewberry Engineers, Inc. / City of Richmond, VA*	Abstract	Presentation
Highs and Lows of Low-Relief Coastal Inundation: Hydro-correction, Topobathy Models, and Hypsometry in Hampton Roads, Virginia	Thomas Allen *Old Dominion University*	Abstract	Presentation
Resilient Design Guidelines for Hampton Roads	Benjamin McFarlane *Hampton Roads Planning District Commission*	Abstract	Presentation
Estimating the Economic Impact of Sea Level Rise in Coastal Virginia, a GIS-Based Approach	George McLeod *Old Dominion University*	Abstract	Presentation
Crystal C: Short and Sweet - Modeling and Mapping in the Coastal Zone			**9 a.m. to 10:30 a.m.**
Continuously-Updated Digital Elevation Models to Support Coastal Inundation Modeling	Christopher Amante *Cooperative Institute for Research in Environmental Sciences (CIRES) / NOAA National Centers for Environmental Information*	Abstract	Presentation
Building the United States National Bathymetry	Kyle Ward *NOAA Office of Coast Survey*	Abstract	Presentation
Coastal Mapping with PlanetScope Data	Corbin Kling *Planet Federal*	Abstract	No Presentation Provided
Database of Topo-bathy Cross-shore Profiles and Characteristics for the U.S. Atlantic and Gulf of Mexico Sandy Coastlines	Rangley Mickey *U.S. Geological Survey*	Abstract	Presentation
A GIS Database for Wastewater Facilities and Outfalls to Support Ocean Planning	Tara Franey *RPS Group*	Abstract	Presentation
Potomac River 2 Topo/Bathymetric Non-tidal Lidar Collection	Roger Barlow *U.S. Geological Survey - National Mapping Program*	Abstract	Presentation
Space-Based Coastal Profiling	Kyle Goodrich *TCarta Marine LLC*	Abstract	Presentation

Only the person presenting at the conference is listed, the entire list of project partners is included with the presentation abstract.

Crystal D: Assessment Tools for Predicting Infrastructure Impacts from Flooding			**9 a.m. to 10:30 a.m.**
FIMAN-T Surge: Predictive Statewide Coastal Inundation Mapping for Road Networks	Matthew Dudley *ESP Associates, Inc., Raleigh, NC*	Abstract	Presentation
A Tool for Probabilistic Assessment of Damage to Residential Structures from Coastal Erosion	Jeff Gangai *Dewberry Engineers, Inc.*	Abstract	Presentation
Resiliency, Climate Change, and Sea Level Rise: Success Stories from the U.S. Navy's Naval Facilities Engineering Systems Command	Paul Braun *Axim Geospatial*	Abstract	Presentation
Geiger-Mode Lidar Capabilities and How it Can Help Predict Infrastructure Impacts from Flooding	Matthew Falter *VeriDaaS Corporation*	No Abstract Provided	Presentation

Only the person presenting at the conference is listed, the entire list of project partners is included with the presentation abstract.

Thursday, February 9, 2023
11 a.m. to 12:30 p.m.

Crystal AB: Data and Tools for Assessing Coastal Resiliency			**11 a.m. to 12:30 p.m.**
Coastal Change Likelihood – A Synthesis of Factors that Drive Future Coastal Change	Erika Lentz *U.S. Geological Survey, Woods Hole Coastal and Marine Science Center*	Abstract	Presentation
A Geospatial Coastal Resilience Assessment for the United States	Greg Dobson *University of North Carolina Asheville's NEMAC*	Abstract	Presentation
The Community Resilience Guide: A Resource for Reducing Repetitive Flood Losses and Enhancing Coastal Resilience	Eleanor Rappolee *Association of State Floodplain Managers*	Abstract	Presentation
Evaluating Socioeconomic Indicators for Coastal Resilience	Brenna Sweetman *NOAA Office for Coastal Management*	Abstract	Presentation
Crystal C: Marine Spatial Planning Decision Support Tools			**11 a.m. to 12:30 p.m.**
Development and Application of Advanced Decision Support Tools for Coastal Sand Resources: A Case Study from Bogue Banks, North Carolina	Lisa Wickliffe *NV5 Geospatial, eGIS Solutions*	Abstract	Presentation
Southeast Marine Mapping Tool: Increasing Access to Regional Ecological Data to Help Inform Offshore Ocean Use Decisions	Mary Conley *The Nature Conservancy*	Abstract	Presentation
Alabama Offshore Sediment Resources Inventory	David Tidwell *Geological Survey of Alabama*	Abstract	Presentation
Who Should I Talk To? The West Coast Blue Pages Tool and Better Ocean Planning	John Hansen *West Coast Ocean Alliance*	Abstract	Presentation
Crystal D: Geospatial Tool Use Cases			**11 a.m. to 12:30 p.m.**
The Sea Level Rise Planning Guide: Fostering Local Capacity for Sea Level Rise Adaptation Planning on the Oregon Coast	Carl Hendrickson *Oregon Department of Land Conservation and Development*	Abstract	Presentation
QNSPECT: The Next Generation Nonpoint Source Pollution and Erosion Comparison Tool	Shan Burkhalter *Lynker Technologies on contract with NOAA Office for Coastal Management*	Abstract	Presentation

Only the person presenting at the conference is listed, the entire list of project partners is included with the presentation abstract.

Efficiency in Realtime GIS Project Management Tools	Dave Neff *Woolpert*	Abstract	Presentation
Linking NOAA Line Office through Web-based Geo Application Code	Jay Coady *NOAA Office of Response and Restoration*	Abstract	Presentation
Crystal EF: Habitat Conservation Using Imagery Analysis		**11 a.m. to 12:30 p.m.**	
Remote Sensing Applications to Support Large-Scale Riverine and Floodplain Assessment and Monitoring	Mischa Hey *NV5 Geospatial Corvallis, OR*	Abstract	Presentation
High-Altitude Topographic and Bathymetric Lidar Sensor Field Test Plan and Results	Nathan Hopper *Woolpert*	Abstract	No Presentation Provided
Using Hyperspectral Remote Sensing for Manoomin (Wild Rice) Habitat Mapping and Restoration in the Great Lakes	Brandon Krumwiede *NOAA Office for Coastal Management*	Abstract	Presentation

2023 GeoTools Abstracts

Bringing Tribal Community Priorities to Coastal Management

Coastal Geospatial Projects to Address Alaska's Environmentally Threatened Community Needs
Jacquelyn Overbeck, NOAA Office for Coastal Management

NO ABSTRACT AVAILABLE

Shinnecock's Changing Peninsula: Protecting the Homeland
Shavonne Smith, Shinnecock Tribe

NO ABSTRACT AVAILABLE

Bureau of Indian Affairs Geospatial Resources and Tribal Climate Needs
David Vogt, Sara Hedrick, Timothy Suto, and Caroline Rouwalk, Bureau of Indian Affairs

NO ABSTRACT AVAILABLE

2023 GeoTools Abstracts

Coastal Inundation Data and Modeling

Flood Prediction and Inundation Mapping at Large-scales using a Multidisciplinary Machine Learning Approach
Chris Mack, PE, D.CE, PMP, Stantec Consulting Services

Climate change is increasing the frequency and severity of extreme flooding events, causing challenges for land managers who lack rapid, reliable, high-resolution riverine and pluvial flood risk assessments and forecasts at scales relevant to their management region(s). In particular, managers need a common way to understand the likelihood of flooding across disparate areas with divergent physical and climatic attributes. A common approach to share this knowledge, however, is often missing, making it hard to extrapolate flood predictions to new areas and timeframes.

Here we show how physics (Buckingham Pi Theorem), hydrologic and hydraulic domain knowledge, and machine learning may be used to extrapolate flood knowledge (modeling and observations) to new areas on a rapid basis. Stantec's Digital Innovations group leveraged Buckingham Pi Theory to integrate hydrologic, climate, soil, and land use data from multiple sources (USGS, FEMA, NRCS, and NASA) into dimensionless features that capture the similarity of flooding process across different regions and climates. These dimensionless features were then used as inputs for a machine learning algorithm trained to detect flooding extent. Not only did our predictions have high agreement with HEC-RAS 2D results (80%) but when compared to satellite-derived observations of flooding extents, our model accurately predicted flooding extents over 85% of the time. This process may form the basis of an automated service that predicts pluvial and riverine flood inundation in a cost- and time-effective manner.

Return to Table

Study Design: Coupling Engineering Modeling and GIS Analysis Tools to Forecast Future Coastal Hazards and Mitigation
Erin Benford and Eric Kencel, AECOM

Risks to infrastructure due to storm impacts and sea level rise (SLR) can be complex to quantify, particularly in estuarine marsh systems. However, relatively simple modeling and GIS analysis methods can be used to determine vulnerability to SLR, shoreline change, and wave damage; both from the existing wave climate and storm-induced waves. Additionally, publicly available tools and datasets can be leveraged to enhance these analyses. With the use of the USGS DSAS tool, NOAA Sea Level Rise datasets, WHAFIS, SWAN, and a robust research assessment, a study plan was developed to assess the shoreline vulnerability of the marsh shorelines at the Kennedy Space Center, located on Merritt Island, FL. Aerial imagery datasets were employed to produce a shoreline change analysis, while 1D and 2D wave modeling analyses were used to determine current and future wave hazards and potential risk assessments due to SLR inundation. Overland wave propagation analyses were augmented with marsh migration projections and estimates of sediment accretion. The results identified risks due to inundation and wave hazards and were used to make recommendations for shoreline stabilization, storm damage mitigation, and inform decision-making for the future of the site. This presentation intends to outline the decision-making process in designing a project to determine future wave and inundation risk for communities or infrastructure in marshes.

Return to Table

2023 GeoTools Abstracts

Combining Multiple Surveying Techniques and Datasets to Construct an Integrated High-Resolution Topobathymetric Digital Elevation Model for Pu‘uhonua O Hōnaunau National Historical Park in Hawaii

Jeff Irwin, Jeff Danielson, Dean Gesch, and Monica Palaseanu-Lovejoy, U.S. Geological Survey

Pu‘uhonua O Hōnaunau National Historical Park is a culturally significant National Park on the west coast of the Big Island of Hawaii. Pu‘uhonua O Hōnaunau National Park contains several sacred sites including the pu‘uhonua, a potential place of refuge for those who violated the kapu (sacred laws), the Pā Pu‘uhonua or Great Wall, which surrounds the pu‘uhonua, and the Royal Grounds, which were a primary political center for the historic Kona area. In 2017, the state of Hawaii experienced numerous high-water events driven by record-high sea levels. Sensitive archeological areas were inundated because of these high-water events at Pu‘uhonua O Hōnaunau National Park. The U.S. Geological Survey (USGS) Coastal National Elevation Database (CoNED) partnered with the USGS National Uncrewed Systems Office (NUSO), the University of Hawaii (UH) at Mānoa, and the National Park Service (NPS) to create an integrated high-resolution topobathymetric digital elevation model (TBDEM) for Pu‘uhonua O Hōnaunau National Historical Park. This TBDEM will be used to model potential areas at inundation risk under relevant sea level rise and wave run-up scenarios and help NPS execute decision support and mitigation plans for future events. The TBDEM was generated from ground based lidar, Uncrewed Aircraft System (UAS) based lidar, and UAS structure-from-motion based on imagery collected by the USGS CoNED and NUSO teams, airborne topobathymetric lidar data obtained by the U.S. Army Corps of Engineers (USACE), and offshore bathymetric data downloaded from the National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI). Validation data were collected for the TBDEM by CoNED and UH via Real-Time Kinematic (RTK) Global Navigation Satellite Systems (GNSS) surveying. GNSS points were collected on the land surface as well as in areas where it was safe to wade. Validation results show a RMSEz of 0.0589 m with outliers removed utilizing over 18,000 GNSS points.

Return to Table

Creating Employment Statistics in Inundation Zones to Analyze and Communicate Risk

Ravi Chittilla, CSS at NOAA Office for Coastal Management

As communities plan for different types of inundation events, they will find a dearth of publicly available information on the numbers of businesses that could be affected by flooding. To fill this gap, the NOAA Office for Coastal Management partnered with Eastern Research Group and the Bureau of Labor Statistics to create an automated process for generating employment statistics in various inundation zones at a county and state level. This information can be useful for communicating the potential business interruptions or closures from inundation, as well as for various hazard mitigation planning efforts and grant proposals.

Return to Table

2023 GeoTools Abstracts

Ocean Planning

Modeling Protected Species Distribution and Habitats to Inform Siting and Management of Pioneering Ocean Industries

Alyssa Randall, CSS at NOAA National Centers for Coastal Ocean Science; Nicholas Farmer, Jessica Powell, James Morris, and Melissa Soldevilla, NOAA National Centers for Coastal Ocean Science; Lisa Wickliffe, Jonathan Jossart, Jonathan MacKay, and Gretchen Bath, CSS at NOAA National Centers for Coastal Ocean Science; Penny Ruvelas, Laura Gray, Jennifer Lee, Wendy Piniak, Lance Garrison, and Robert Hardy, NOAA National Centers for Coastal Ocean Science; Kristen Hart, U.S. Geological Survey; Chris Sasso, Lesley Stokes, and Kenneth Riley, NOAA National Centers for Coastal Ocean Science

Marine Spatial Planning (MSP) provides a process that uses spatial data and models to evaluate environmental, social, economic, cultural, and management trade-offs when siting (e.g., strategically locating) ocean industries. Aquaculture is the fastest-growing food sector in the world. The U.S. has a substantial opportunity for offshore aquaculture development given the size of its exclusive economic zone, habitat diversity, and variety of candidate species for cultivation. However, many protected species rely upon habitats that overlap with promising aquaculture areas. Siting surveys, construction, operations, and decommissioning can alter the habitat and behavior of animals in the vicinity of these activities. Vessel activity, underwater noise, and physical interactions between protected species and sites can potentially increase the risk of injury or cause direct mortality. A Presidential Executive Order identified federal waters in the U.S. Gulf of Mexico as one of the first regions for offshore aquaculture opportunities evaluation. We developed a generalized scoring model for protected species data layers that captured vulnerability using species conservation status and demographic information. We applied this approach to data layers for eight Endangered Species Act (ESA) listed species, including five sea turtle species, Rice's whale, smalltooth sawfish, and giant manta ray. We evaluated several methods for scoring (e.g., arithmetic mean, geometric mean, product, lowest scoring layer) and created a combined protected species data layer that was used within a multi-criteria decision-making modeling framework for MSP. The product approach for scoring provided the most logical ordering of, and the greatest contrast in, site suitability scores. This approach provides a transparent and repeatable method to identify site alternatives with the least conflict with protected species and habitat. These modeling methods are transferable to other regions, to other sensitive or protected species, and for spatial planning for other ocean-uses such as offshore wind.

Return to Table

Spatial Modeling to Inform Wind Energy Siting in the Gulf of Mexico

James Morris, NOAA National Centers for Coastal Ocean Science; Jessica Carlton, Rabiya Dar, Brian P. Free, Jonathan A. Jossart, Alyssa L. Randall, Jennifer L. Wright, CSS at NOAA National Centers for Coastal Ocean Science

Spatial modeling at the ocean region scale is critical to inform siting of new industries such as wind energy. Coastal ocean ecosystems are dynamic, complex, and critical to our Nation's natural security, food security, and economy. Disruption due to poor siting of new industries can result in significant impacts; therefore, it is crucial that the highest level of intelligence be used to inform siting of new industries. Over the past year, the National Oceanic and Atmospheric Administration (NOAA) has developed new spatial planning capabilities to support the siting of wind energy. NOAA is providing this support to the Bureau of Ocean Energy Management (BOEM) for incorporation in the BOEM wind planning and development process, which is a high

priority for the Biden administration and many states around the U.S. In addition to the provision of spatial data development services, NOAA is providing spatial modeling capabilities for siting call areas, wind energy areas, and cable routing, which is providing new insights and capabilities to BOEM. These efforts have been highly successful in the Gulf of Mexico with forthcoming results in other regions including the Central Atlantic, Gulf of Maine, and Oregon. This presentation will provide information on NOAA spatial modeling activities currently underway in the U.S., examples of methodologies being used, and will highlight some challenges and ideas for new directions going forward.

Return to Table

A Precision Siting Modeling Approach to Inform Ocean Energy and Offshore Aquaculture Development

Jonathan Jossart, Alyssa Randall, Jonathan MacKay, and Lisa Wickliffe, CSS at NOAA National Centers for Coastal Ocean Science; Kenneth Riley and James Morris, Jr., NOAA National Centers for Coastal Ocean Science

Marine spatial planning techniques, such as multi-criteria decision analyses, are frequently used to site ocean energy and offshore aquaculture projects. These analyses typically result in multiple suitable areas for exploration and evaluation. We developed a set of methods and custom tools that: (1) take the initial suitable areas as inputs, (2) automate identification of possible site configurations within those areas, and (3) rank the optimal locations and configurations based on relative suitability. We will present a case study that involves siting an aquaculture operation off the Alabama coast in the Gulf of Mexico. A gridded suitability analysis identified several suitable areas, after which a local indicators of spatial association analysis identified statistically significant ($p<0.05$) clusters of areas with high relative suitability. Within the identified clusters, possible site configurations were ranked using a variation of the technique for order of preference by similarities to ideal solution approach, with the highest ranked options presented for permitting and environmental review. These methods automatically identify the optimal location and configuration for a farm location without tedious manual placement or introducing human bias in site selection. Modifications of inputs and thresholds to these precision siting methods and tools may be applied to a multitude of other ocean related development activities, including planning for renewable and non-renewable energy, charting navigation and shipping lanes, leasing sand and minerals resources, and identifying marine protected areas (i.e., sanctuaries).

Return to Table

Understanding Multiuse Conflicts in the Outer Continental Shelf Using the Marine Minerals Information System (MMIS)

Alexa Ramirez, NV5 Geospatial; Kerby Dobbs and Lora Turner, BOEM

BOEM's Marine Minerals Information System (MMIS) is an Enterprise Geospatial Information System and includes a relational geodatabase, applications, and products to support Marine Minerals Program (MMP) activities. The MMIS provides a means for BOEM to gather, process, analyze, maintain, store, disseminate, and inform decisions to effectively manage the use of offshore marine minerals. BOEM populates the MMIS with historical and new information collected through a sand inventory, leasing, and study activities. In addition to understanding the biological and physical drivers associated with the resources to minimize environmental impacts from dredging, the MMIS also enables BOEM to be informed about the location and character of sand reserves to identify and manage multiple use conflicts within the OCS. This use case has become significantly more critical to BOEM recently as initiatives to develop offshore renewable energy are implemented. Wind infrastructure development has the potential

to reduce sand resource availability if not properly reviewed and coordinated. MMIS will be critical to planning these endeavors and ensuring sand resources continue to be available to coastal communities.

Return to Table

2023 GeoTools Abstracts

Monitoring and Mapping Habitats

The Next Wave in Coastal Mapping

Mark Safran and Emily Klipp, Dewberry Engineers, Inc.

Dewberry Engineers has been performing coastal mapping for NOAA and other agencies for more than 20 years and during that time has helped pioneer new methodologies to increase efficiencies and gain greater accuracies. Our recent purchase and integration of the Teledyne Optech CZMIL SuperNova topo/bathy lidar sensor has helped advance our capabilities to achieve maximum depth penetration and far greater coverage in turbid waters. We have also overhauled our processing environment to maximize the use of the CZMIL's capabilities including unique green-wavelength lidar with QL1 topography, bathymetry from seven shallow channels and one deep channel, capability of modeling ~3.5 x Secchi depth, and co-acquired imagery from a 150 megapixel RGB camera. Additionally, we are providing new client facing status and tracking dashboards to allow clients to stay up to date with acquisition status in near real-time with the ability to visualize initial coverage rasters within days of acquisition. This presentation will describe some recent coastal mapping projects Dewberry performed for the NOAA NGS, NOAA OCM, and USGS using our newest sensor in coastal, nearshore, offshore, and riverine environments. We will explore some of the challenges we overcame along with the exciting new benefits already realized using these new emerging technologies

Return to Table

Leveraging Nature-Based Climate Solutions and Emerging GeoTools: Blue Carbon Inventories, Maps, and More

Adrian Laufer, Sea and Shore Solutions, LLC

Coastal wetlands, such as seagrass, salt marsh, scrub shrub, and tidal forested wetlands, are incredibly efficient at capturing and storing greenhouse gasses, an ecosystem function known as "Blue Carbon". This natural climate solution can help advance climate goals, while also delivering significant co-benefits to people and nature. Natural resource managers may leverage several different GeoTools as they work to quantify, manage, and enhance blue carbon. Including coastal wetlands in greenhouse gas inventories is an important first step for incorporating blue carbon into management plans and strategies. These inventories provide scientifically-defensible estimates of the carbon removed from the atmosphere and stored in carbon sinks over a period of time, which in turn can facilitate setting sector-specific strategies and assessing progress. Inventories also enable the creation of interactive mapping applications and tools, assisting managers in identifying potential restoration opportunity areas and estimating blue carbon benefits associated with different coastal areas. The Pew Charitable Trusts is coordinating with resource managers in Oregon and North Carolina to create and implement a suite of state-specific GeoTools supporting blue carbon policy and management, each of which forges new innovations in GeoTool technology. In this presentation, we will introduce the technical considerations of creating GeoTools for blue carbon and showcase tools developed for each state, including a seagrass inventory in North Carolina (which happens to be the first seagrass inventory in the nation) and a blue carbon restoration mapping tool in Oregon. The audience will walk away with an understanding of blue carbon generally, how it is measured, which GeoTools may be leveraged to support management of blue carbon ecosystems, and approaches that can be applied to support your own state's blue carbon initiatives.

Return to Table

2023 GeoTools Abstracts

How Land Use and Land Cover Mapping Can Save Water
Andrew Brenner, NV5 Geospatial; Jazmine Molloy, Eagle Aerial Solutions; Tim Marcella, Kelsey Watkins, and Chris Wiggins, NV 5 Geospatial

The State of California has been facing increasing water shortages as a result of overuse of water, higher temperatures and more unreliable rainfall. To address these shortages the State passed a series of laws to increase the understanding of water use by a water supplier and require suppliers to take steps to use water efficiently. These Water Use Efficiency Standards (WUES) cover indoor and outdoor water use across residential and commercial, industrial and institutional properties. The outdoor WUES is based on the area of a parcel that is irrigable, the potential evapotranspiration rate and a factor between 0 to 1. NV5 Geospatial has mapped all 14,000 square miles of urban residential landscape in the State and working with Eagle Aerial Solutions have developed a software system that compares water demand with water use on a parcel basis allowing suppliers to identify and target inefficient water users and help reduce water for a water supplier. This presentation will discuss the methods used to map the landscape and the types of analyses that support water conservation activities.

Return to Table

Updates to the Environmental Sensitivity Index (ESI) Datasets
Nicolle Rutherford, Robb Wright, and Shane O'Neil, NOAA Office of Response and Restoration

A product of NOAA's Office of Response and Restoration, Environmental Sensitivity Index (ESI) maps provide a concise summary of coastal resources that may be at risk in a given geographic area. ESIs are a standardized, compiled data resource used to evaluate potential environmental consequences from coastal threats. Originally developed as a tool for oil and chemical spill responders, ESIs are now also used across public and private sectors to assist in activities ranging from natural resource damage assessment, restoration planning, environmental permitting and compliance, vessel traffic routing, port development, marine debris removal, hurricane response, and selection of marine sanctuary and conservation site targets. They combine information about shoreline sensitivity with biological and human-use resources, enabling planners and responders to consider all factors jointly when evaluating protection and clean-up priorities. ESIs exist for the entire U.S. coast, including the Great Lakes and the U.S. Territories, and the ESI guidelines have been used as a model in numerous countries to develop similar tools. This presentation will address updates to the ESI datasets including the most recent areas to be refreshed, upcoming documentation, and technical changes to the data.

Return to Table

2023 GeoTools Abstracts

Storm Event Preparation and Response

Collaborative Tool Development to Support Alaska Native Communities: Application During Response to Typhoon Merbok
Edward Plumb, NOAA National Weather Service; Richard Buzard, University of Alaska Fairbanks; Nicole Kinsman, Jonathan Chriest, and Scott Berg, NOAA National Weather Service; Jacquelyn Overbeck, NOAA Office for Coastal Management

On September 16-17, 2022, the remnants of typhoon Merbok caused flooding in dozens of Alaska Native Villages along over 1,000 miles of coastline. The forecast advice and interpretive services provided to emergency personnel and public safety officials adequately prepared and evacuated people and property to higher ground. Successful impact-based forecasts were the result of nearly one decade of collaboration to enhance National Weather Service (NWS) Impact-Based Decision Support Services associated with coastal flooding in Alaska. Here, we present the steps that led to these advances in Alaska's coastal flood forecast tools thus far. We also discuss planned next steps that will further enhance event-based inundation forecasting and support coastal resilience and adaptation through the development of coastal inundation products at climate timescales. Today's tools visualize modeled flood extents and identify community-specific impacts, including minor, moderate, and major flood thresholds calibrated to NWS Alaska Region-specific criteria. These products improve forecast decision making, confidence, and accuracy, allowing NWS to effectively communicate risk and were the product of state, federal, and tribal collaborations, scholarships, internships, and the NOAA Digital Coast fellowship.

Return to Table

ESRI ArcGIS Field Map Mobile Applications for Typhoon Merbok High Water Mark Survey in Alaska
Nathan Wardwell, JOA Surveys, LLC

Remanent of Typhoon Merbok developed into a historic storm that impacted more than 1000 miles of the coast in western Alaska. Flooding from this storm reached historic levels at the few National Water Level Observation Network (NWLON) stations in the region. The largest surge observed at an NWLON station was more than 9.5 feet above Mean Higher High Water (MHHW). This exceeded the previous record by more than 2 feet set in August of 2019. Observed water levels in Nome, Alaska reached almost 9 feet above MHHW. This flood stage exceeded the prior record of 8.76 feet set in October of 2004. Observations at the station in Nome date back to 1994. It is estimated this storm impacted around 40 communities. In response to impact of the storm President Biden approved a major disaster declaration for Alaska on September 24. This declaration is critical in helping the communities salvage what they can prior to the Arctic winter setting in and everything freezing up.

A collaboration of federal, state and local entities lead the largest field effort to date to collect as much field information about the flooding extents. Through this effort JOA Surveys, LLC (JOA) was contracted by the Alaska Department of Natural Resources to conduct ground surveys in three communities that were severely impacted. Prior to conducting the fieldwork JOA developed a mobile application for photo documenting the survey using ESRI tools. Photos from the application are tagged with the metadata required to complete the USGS High Water Mark form. This coastal geotool increased our efficiency in the field and office.

Return to Table

2023 GeoTools Abstracts

NOAA National Geodetic Survey's Emergency Response: Hurricane Ian
Maryellen Sault, Jason Woolard, Jon Sellars, and Mike Aslaksen, NOAA National Geodetic Survey

NOAA's National Geodetic Survey acquired approximately 13,000 images covering 16,322 square kilometers over five days after Hurricane Ian made landfall. Within hours of landing the plane, these aerial images were distributed through NOAA's Emergency Response Viewer to aid first-responders, local governments, and the public. This presentation will cover challenges encountered during this response, frequently asked questions from the public and future website enhancements.

Return to Table

Empowering Communities with Sensors and Data to Prepare for Future Floods
Jamie Carter, NOAA Office for Coastal Management; Hannah Baranes, Gayle Bowness, and David Reidmiller, Gulf of Maine Research Institute; Brandon Raymond and Sheila Warren, U.S. Army Corps of Engineers; Peter Slovinsky, Maine Geological Survey; Kevin Deneault and Julie Rosenbach, City of South Portland; Sue Baker, Maine Floodplain Management Program

NO ABSTRACT PROVIDED

2023 GeoTools Abstracts

Coastal Inundation Data and Tools

Coastal Inundation Information and Services at Climate Timescales
Doug Marcy, William Brooks, Heidi Stiller, and Jamie Carter NOAA Office for Coastal Management; William Sweet, NOAA National Ocean Service; Audra Luscher, NOAA Co-Ops; Mark Osler, NOAA National Ocean Service

U.S. states and territories are increasingly at risk of inundation from rising seas, changing Great Lakes water levels, and more frequent and intense storms in addition to other risks from a changing climate. This increased threat of inundation compels floodplain managers to plan for adaptation investments that reduce risk and improve resilience to coastal flooding events on time frames ranging from hourly, daily, and weekly (weather timescales) to sub-seasonally, seasonally, annually, decadally, and beyond (climate timescales). The National Oceanic and Atmospheric Administration (NOAA) continues to develop and improve a nationally uniform set of data, products, applications, and other information across time and communities. As part of the National Climate Assessment (NCA) update process, NOAA and other federal agencies, via a Sea Level Rise (SLR) task force, have updated critical sea level rise, high tide flooding, extreme water level, and vertical land motion information. This presentation will provide a high-level overview of the NOAA technical report that will serve as input to the 5th NCA. Updated global and regional SLR extrapolations and projections will be discussed as well as implications for increasing coastal flood risk, including high tide flooding. A companion application guide was also developed and new data has been ingested by existing agencies tools, products, and services to enable the floodplain management community map and plan for future conditions both near and long term.

Return to Table

National Ocean Service Coastal Inundation Dashboard
Paul Fanelli, NOAA Center for Operational Oceanographic Products and Services

The National Ocean Service (NOS) Center for Operational Oceanographic Products and Services (CO-OPS) maintains the Coastal Inundation Dashboard (CID), an online web mapping application providing real-time water level monitoring and historical flood data at coastal water level stations nationwide. CID highlights periods when water levels are well above average high tide, ranging from minor nuisance, or “sunny day flooding” events to storm surge inundation resulting from tropical cyclones, nor’easters, or other extreme events.

CID displays observed water level data relative to high tide, overlaid with defined thresholds to denote minor, moderate and major flood impacts along the coast. This gives decision makers time to take action when water levels rise, potentially inundating streets and communities. During coastal flood events, CID displays National Weather Service coastal flood watches and warnings alongside National Hurricane Center forecast information for tropical storms and hurricanes that threaten U.S. coasts. Following record lake levels in 2019-2020, CID was expanded to include 50 long-term water level stations in the Great Lakes.

Historical water level observations are analyzed to determine the frequency of previous coastal flooding events, most of which occur during high tide. This historical High Tide Flooding (HTF) data is presented at coastal water level stations, allowing users to visualize how the number of flood days have increased with sea level rise. CID integrates data from NOAA’s Annual High Tide Flood Outlook for almost 100 long-term coastal water level stations, allowing users to view the projected HTF days in 2030, 2040 and 2050 based on a selected sea level rise scenario.

CID will also integrate data from NOAA's quarterly High Tide Bulletin, showing which days high tide flooding is most likely to occur over the next year. These enhancements will transform CID into an all-inclusive coastal flooding product spanning historical, real-time and future timeframes.

Return to Table

NOAA's Experimental Potential Coastal Flood Impact Mapping for Effective Decision Making

Matt Pendleton, Lynker at NOAA Office for Coastal Management; Laurie Hogan, NOAA National Weather Service; Doug Marcy, NOAA Office for Coastal Management

NOAA's Office of Coastal Management (OCM) and NWS Eastern Region (ER) started a collaborative, exploratory project to use the NOAA Digital Coast information combining that information/methodology with the coastal gauge Flood Category Thresholds established by NWS offices and partners to produce "Potential Coastal Flood Impact" layers. During the extratropical storm season, NWS stakeholders and partners need coastal flood scenario maps for effective decision making. By implementing these "Potential Coastal Flood Impact" layers in the Eastern Region Coastal Flood Web pages, NWS partners and stakeholders will be able to visualize the locations that may be potentially impacted during coastal flood events - with the information coming from an authoritative source. This couples observations and forecasts with potential impacts aiding in visualization and planning for coastal flooding. The layers may be used with the coastal flood warnings text products and be included in briefings enhancing communication. This experimental product is a standardized attempt by the NWS ER and NOAA Partner OCM to spatially convey the impact areas based on coastal flood thresholds/categories and the Weather Forecast Office water level forecasts in a seamless and consistent fashion.

Return to Table

Coastal Flood Analysis using Global Mapper

Amanda Lind, Blue Marble Geographics

With the Earth's climate changing, we, as a global community, are experiencing higher tides, increased precipitation, and more frequent severe storms, all leading to more intense and frequent coastal flooding. The 2D and 3D water level visualization tools in Global Mapper, along with the terrain analysis and flood modeling techniques, allow for the modeling of past and predicted flooding events. Join us to learn how flood simulation and watershed tools can be used to model the flow of water over terrain to determine flood risk areas and damages.

Return to Table

2023 GeoTools Abstracts

Short and Sweet: Local Applications of Geospatial Technologies

How High is that Seawall?

Robert Hauck, City of Charleston, South Carolina

It's challenging to explain the elevation datums. "How High is That Seawall?" was created to illustrate to the public the differences between the reported tide height and ground elevation. This ESRI Story Map uses images, animations, and a question-and-answer format to walk people though the differences between Mean Lower Low Water, Mean Higher High Water, and NAVD88. It is important that the public has an understanding of the differences as the City explores different flood mitigation measures and strategies.

https://storymaps.arcgis.com/stories/b931809990d347ab83ab990bd7592ea9

Return to Table

Tree Canopy and Heat in the City of Charleston

Casey Conrad, City of Charleston, South Carolina

Access to tree canopy cover or "tree equity" has become a popular topic with outlets like The New York Times and National Geographic publishing articles outlining disparities in green-ness based on socioeconomic status and/or racial composition. The City of Charleston completed a subdivision level analysis of tree canopy cover using demographic data to investigate inequity in our tree canopy distribution. This analysis informed which subdivisions would benefit from tree planting efforts and even highlighted public properties with available space for planting trees. The results were reported via an ESRI Storymap and accompanying "Tree Canopy Tools" web application.

NOAA's collaborative HeatWatch campaign yielded a separate dataset on temperature variation across the City of Charleston on a hot summer day, collected by volunteers driving or biking along prescribed routes with temperature sensors mounted to their vehicles. This data was used to identify public housing properties experiencing high heat relative to the rest of the City. Morning, afternoon, and evening temperatures averaged within public housing property polygons were plotted against tree canopy coverage to identify properties that might benefit from a heat mitigation measure. A subset of 16 public housing properties with more than 40 units were selected in order to maximize public benefit. Among those, six properties stood out as having high temperatures and low tree canopy coverage and one had many more units than the rest, as well as vast available space for tree planting (or some other heat mitigation strategy). The results of this analysis were used to secure NOAA grant funding for a heat pilot study in this residential community to better understand how heat is experienced here on a microscale.

Return to Table

Incorporating Equity and Climate Change Criteria into Maryland Land Protection

Sabine Bailey, The Nature Conservancy and Maryland Department of Natural Resources/ Chesapeake Bay National Estuary Research Reserve

Sea levels in the Chesapeake Bay have risen a foot in the last century – more than twice the global average. By 2100, Maryland stands to lose 40% of its marshes to sea-level rise. Maryland's coastlines and communities need intervention now to adapt to these startling climate impacts. The state of Maryland has developed policies, including the Building Resilience to

2023 GeoTools Abstracts

Climate Change policy (2010) and Saltwater Intrusion Management Plan (2019) to integrate climate change adaptation into natural resource planning. Land protection activities, such as acquisitions and easements, support climate adaptation by protecting lands from development, providing wildlife habitat, holding space for changing landscapes, and preserving land for future generations. The state is evaluating existing state policies to reveal barriers or opportunities for improving land acquisition criteria to incorporate marsh migration and co-benefits such as carbon sequestration. The evaluation is also a great opportunity to include equity considerations by highlighting acquisition opportunities in underserved communities. This will assist the state in reviewing financial options to support these underserved communities to adapt to sea-level rise and other climate impacts. Using multiple data layers developed by the Maryland Department of Natural Resources, including parcel data, revised marsh migration data, and sea level rise projection data, an analysis of the different policies and criteria will be conducted via a mapping exercise. For instance, the state of Maryland currently has a policy in place to avoid the purchase of lands within a 0-2 feet sea-level rise scenario. It is unclear whether this policy is helping or harming marsh migration potential and equity considerations. The visualization of this data will help inform necessary policy changes or evaluation criteria for future land protection activities that incorporate equity and climate change assessments.

Return to Table

Geospatial Technologies Supporting Natural and Cultural Heritage Tourism along the Great Lakes in Wisconsin
David Hart, University of Wisconsin Sea Grant Institute

The Lake Superior and Lake Michigan coasts in Wisconsin contain many sites of sublime scenic beauty. With support from the Wisconsin Coastal Management Program, Wisconsin Sea Grant has developed an interactive map that promotes natural and cultural heritage tourism along the Great Lakes Circle Tour, enhanced the inventory of coastal public access sites; collected high quality coastal photography to attract new visitors to the coast; develop maps of coastal access sites using state-of-the-art cartographic design; and developed virtual learning activities called Great Lakes Quests in the form of ArcGIS Story Maps. This presentation will show how these activities work together to help evoke "deep travel" when everything seems suddenly fresh, vivid, intensely interesting and memorable -- the type of travel that can sustain local economies and promote stewardship of scenic and cultural coastal resources.

Return to Table

Coastal Restoration Toolkit
Elsa Schwartz, Restore America’s Estuaries

Staff at public agencies and non-profit organizations often receive phone calls or applications from individuals outside the professional restoration community (e.g. NGOs, municipalities, or individuals) who have a sincere desire to restore local habitats, but have difficulties figuring out where to begin. Restore America’s Estuaries has developed an online “Toolkit” (RestoreYourCoast.org) to support coastal residents and citizen scientists who identify problems with their local coastal environment and have an interest in transforming the idea into a project. The Toolkit enables community members who aspire to improve their local ecosystem, but who need the information and guidance to go from project idea, to design, to implementation. The Toolkit is divided into five main topic areas: Water Quality, Flooding, Coastal Erosion, Invasive Species, and Wildlife Habitats. Each topic has the tools and resources needed to start developing a restoration project in your community.

Return to Table

2023 GeoTools Abstracts

Developing Digital Twin Geovisualizations for Enhanced Communication of Flood Hazard Risk

George McLeod, Old Dominion University; Keith VanGraafeiland, Esri; Yin-Hsuen Chen, Blake Steiner, and Chris Davis, Old Dominion University

As flooding from sea level rise, storms, and extreme precipitation increasingly threatens vulnerable coastal communities, critical data and decision support systems for response and planning often remain disparate and siloed. Coastal urban centers such as Norfolk, VA, exhibit increased tidal, rainfall, and storm surge flooding while also contending with highly localized disparities leading to unmet health related social needs (HRSNs) such as access to basic resources and health care. Development of a Digital Twin approach that incorporates geospatial infrastructure data, as well as, property valuation, socio-economic, and public health data allows for increasingly integrated and impactful spatial analysis and risk communication. We will highlight progress in development of 2d and 3d geovisualizations for flood risk communication that have been developed in the inceptual phase of constructing a digital twin for southeastern coastal Virginia.

Return to Table

An Interactive Map Visualizing Decadal-Scale Changes to Coastal Dunes Across North Carolina

Alexander Seymour and Kara Doran, U.S. Geological Survey

Coastal dunes are critical landforms that protect communities from storm-driven total water levels arising from ocean waves, surge, and tide. The United States Geological Survey Coastal Change Hazards team has historically extracted lidar-based coastal dune features across Northeast, Southeast, and Gulf Coast sandy coastlines. Here, we leverage this archive by conducting spatiotemporal dune morphodynamic analysis at the mesoscale (corresponding with interannual to decadal timescales and municipal to landscape-level spatial scales). The mesoscale constitutes a gap in the applied science products available to managers and researchers, and yet remains critically relevant to coastal policy and management decision making. Additionally, the mesoscale encompasses the period over which full dune volume and elevation recovery is likely to occur, and includes the cumulative forcing and recovery from multiple storm seasons. Our analysis generated a dune condition code map classifying changes in the elevation and cross-shore position of the foredune over the last 22 years for the entire North Carolina ocean-fronted coastline. A basic application for this data is determining the magnitude and coverage of persistent dune accretion, erosion, progradation, transgression, and stability signals for a given area of interest. These condition codes are presented in an ArcGIS Pro Map Pack with datapoints provided at 500 m alongshore resolution, making data summaries at the state, island, city, and sub-neighborhood scale possible. We also include data characterizing the cross-shore distance between the dune crest and the line of first infrastructure, the average beach width, and the 98 percentile total water level. We hope to eventually move this data to a web mapping format and design the inbuilt query and display functionality based on feedback at this conference and beyond. We intend for coastal managers in North Carolina to use this map package and web interface to assess the resilience of coastal communities and the efficacy of dune management strategies.

Return to Table

2023 GeoTools Abstracts

Case Studies of Land Cover Data Applications

High Resolution Coastal Land Cover for the Nation. The Next Generation Now.
Nate Herold, NOAA Office for Coastal Management

Understanding current land cover patterns and past change trends is essential to comprehensive management, assessment, and future planning. For more than two decades, NOAA's Office for Coastal Management has been producing consistent, accurate land cover and change information for the coastal U.S through its Coastal Change Analysis Program (C-CAP). Based on Landsat imagery, these products have been updated every 5 years. Dates range back to at least 1996, with some locations that have overage for the full Landsat time series.

In recent years, NOAA has been working to establish an operational higher resolution land cover product line, bringing the national C-CAP framework to the local level and that would create data capable of supporting more site-specific applications. This work has been possible because of the wealth of available imagery, lidar, and ancillary data, as well as improvements to production flows seen in distributed or cloud based processing and more advanced artificial intelligence classification techniques. This presentation will highlight NOAA's current work to produce high resolution land cover for all coastal areas of the nation, and our goals to work in collaboration with other federal agencies, regional groups, and states to make those products available nationally. We will highlight the technical details of the data, NOAA's longer-term vision, cover appropriate use case examples, and talk about opportunities for interested partners to leverage this data.

Return to Table

High-Resolution Land Cover for the Nation
Brandon Palin, Ecopia AI

This presentation will focus on how public sector stakeholders are leveraging high resolution landcover products produced by Ecopia and distributed in partnership with NOAA's Office for Coastal Management. Specifically, how Federal, State, and Municipal level governments can take advantage of these efforts to obtain high-quality, up-to-date land cover information, at an affordable price - now and into the future. Specific examples of adoption will review how the State of Alaska is leveraging Ecopia's building footprint layer to support data equity and broadband connections, and how the Illinois Department of Transportation is leveraging Ecopia's landcover and transportation related datasets to support community planning and economic development.

Derived from 15-30cm stereo-aerial imagery, Ecopia has produced the first-of-its-kind, high-resolution Nationwide 3D Land Cover Map which will be maintained on a consistent basis. Covering over 3.2 million square miles across the country including 172 million 3D buildings, Ecopia's 3D Nationwide Landcover offers a highly-accurate digital representation of the built and natural environment across the country. The diverse range of applications benefiting from this unique dataset includes:

- Flood mapping & stormwater utility planning
- Transportation engineering and pedestrian safety
- Public safety and emergency response management
- Conservation, environmental planning, and climate change mitigation
- Property insurance underwriting, risk management, and claims

2023 GeoTools Abstracts

With increased access to resources funded by the Bipartisan Infrastructure Investment and Jobs Act, alongside the Inflation Reduction Act, it will be critical for communities to understand how to access relevant data and how it can be aligned to specific funding vehicles. A strong geospatial foundation is a catalyst to building coastal resiliency strategies, improving public infrastructure, and planning for the future.

Return to Table

An online tool to assess the health of small watersheds in Connecticut using 1 meter C-CAP land cover

Chester Arnold and Qian Lei-Parent, University of Connecticut; Paul Stacey, Footprints in the Water, LLC; Emily Wilson, David Dickson, and Cary Chadwick, University of Connecticut

Many studies across the nation have demonstrated the close relationship between watershed health and land use. Until now, statewide or other large scale examinations of this relationship have been limited to what can be determined using moderate resolution (30 meter) land cover data, often at the HUC-12 level (average area 23,000 acres) or larger. Using NOAA's new high resolution (1 meter) C-CAP land cover for Connecticut, the UConn Center for Land Use Education and Research (CLEAR) has developed an interactive online watershed health assessment tool that operates at a much finer scale, covering over 4,300 small basins averaging about 790 acres in size. The analysis combines land cover data for each basin with land cover within the 100-foot riparian corridor, and compares those metrics to long-term benthic macroinvertebrate data collected by the state. The result is the Combined Condition Index (CCI), which estimates the biointegrity, or overall health, of each basin. Also calculated is a nitrogen Enrichment Factor (EF) that estimates the ratio of expected nitrogen export from the basin to a theoretical baseline load expected from a forested watershed. An online tool has been developed with ESRI Experience Builder that incorporates several interactive applications. A Story Map explains the rationale for the project, the data used and analyses performed. The CCI Dashboard enables the user to obtain basin-wide and riparian zone land cover, CCI, and EF for any basin(s). With the Scenario Builder, the user can explore the effects of future land cover changes on CCI and EF. In the end, the goal of the project is to present land cover information and its implications for watershed health at a geographic scale that will be immediately recognizable – and therefore potentially actionable – for local land use decision makers at the municipal and individual property levels.

Return to Table

Critical GIS Data for Habitat Restoration and Conservation Projects in the Great Lakes - Wisconsin's One Map Project

Jim Giglierano, Wisconsin Department of Administration

The One Map Project, funded through the Wisconsin Coastal Management Program using a NOAA Bipartisan Infrastructure Legislation grant, will create an integrated GIS database of hydrography, wetlands and one meter land cover layers from high-resolution lidar and imagery. The project will demonstrate creation of "analysis ready data" that will be used to assess and rank candidate sites for NOAA's habitat restoration and conservation competitive funding. Three of Brown County's Green Bay coastal HUC10 watersheds will be mapped and used in the analysis. Besides the habitat assessment work funded by the grant, the One Map data should facilitate a wide range of applications, including modeling conservation practices for water quality improvements, flood storage, managing the new Green Bay National Estuarine Research Reserve, and other coastal and shoreland zoning activities. The integrated database will conform to standards for the USGS 3D Hydrography Program (update to NHD), USFWS National Wetland Inventory (NWI 3.0) data, and NOAA Coastal Change Analysis Program

(CCAP) 1 meter land cover. Besides the ability to output the federal layers, the process could also benefit production of state and local GIS base layers, including Wisconsin Department of Natural Resources 5k hydro, Wisconsin Wetlands Inventory and WISCLAND land cover products. In the past these layers were all generated separately by different state and federal agencies at different times, with different source materials and rarely with consideration of matching the same features mapped by the other products. The overall concept was developed by a working group with members from NV5, WDNR, WDOA and Brown County Planning and Land Services.

Return to Table

2023 GeoTools Abstracts

Tools Showcase One (Tuesday)

Virginia's Coastal Resilience Master Plan Web Explorer

Brian Batten, Mat Mampara, Ravi Pavuluri, Seth Lawler, Siva Selvanathan, Eric King, and Alec Brazeau, Dewberry

In 2021, Virginia completed Phase One of their Coastal Resilience Master Plan. This effort produced an array of datasets. While these products were presented in an authoritative document to building the case for sustained action, it was essential to make them accessible to stakeholders. To fulfill this goal, Dewberry created the Virginia Coastal Resilience Web Explorer – a custom ESRI-based geospatial web portal.

The Web Explorer enables users to interact data using a multi-tiered geographic area of interest approach that provides tailored geospatial views and dynamic chart summaries to state, regional, and locality areas of interest. The website presents data through a series of themed tabs to allow the user to explore data products. Flood hazards are visualized for four planning scenarios using a unique graduated multi-frequency presentation that allows users to see how flood frequency changes with future conditions. Projected impacts for community resources, critical sectors, and natural infrastructure are presented with composite summaries, or can be viewed by sub-asset types. The viewer also allows exploration of demographic data, showing distilled overlays of combined social and flood vulnerability. Coastal resilience project data is captured with a searchable project database, project footprints, and key attribute data. Project footprints can be viewed in the context of the hazard, impact, and social-demographic data. Finally, the Web Explorer displays funding opportunities and provides an overview of financing mechanisms for coastal resilience projects.

Return to Table

USGS Coastal Change Hazards Tools

Kara Doran, Alexander Nereson, Emily Himmelstoss, and Andrea O'Neill, U.S. Geological Survey; Richard Snell, Cherokee Nation System Solutions contracted to the U.S. Geological Survey

Coastal change hazards, including erosion, shoreline and dune change, and integrated hazards such as landscape change and associated flood risk, present significant challenges to the coastlines and communities across our nation. The U.S. Geological Survey (USGS) Coastal Change Hazards (CCH) program focus is engaging stakeholders and incorporating user needs into science planning and deliverables, to produce societally relevant and accessible science products addressing coastal change hazard issues across the Nation. Three examples of CCH co-developed efforts include the USGS' CCH data portal, the Total Water-Level and Coastal Change Forecast Viewer (TWL&CC), and the USGS Hazard Exposure Reporting & Analytics (HERA) web tool.

The CCH data portal is the USGS' current data visualization platform for assessments and products on coastal change including extreme storms, shoreline change, and sea-level rise. The CCH portal provides an online web mapping tool that can be used to showcase the breadth of our scientific research related to coastal change hazards and creates a user experience for visualizing, aggregating, querying, and downloading data to meet their needs.

2023 GeoTools Abstracts

The TWL&CC forecast is a collaboration with NOAA that provides estimates of coastal water elevation including wave-induced setup and runup. TWL&CC forecasts are accessible for sites along open- ocean sandy beaches in the Gulf and Atlantic through an interactive web-based portal providing: 1) TWL forecast; 2) interaction of TWL with beach and dune profiles, 3) threats to dune erosion, overwash, and flooding, and 4) programmatic data access.

The HERA web tool translates USGS coastal hazards projections across the landscape into socioeconomic impacts at the city-block scale. HERA's unique output shows future hazards from changes in climate, storms, sea-level rise, and erosion in conjunction with impacts to residents, businesses, and transportation, allowing communities to better understand their risk through the lens of impacts to lives and livelihoods.

Return to Table

The Northeast Ocean Data Portal: Data and Maps for Ocean Planning

Jenna Ducharme, RPS; Emily Shumchenia and Nicholas Napoli, Northeast Regional Ocean Council; Kelly Knee, Jeremy Fontenault, and Stephen Sontag, RPS; Peter Taylor, Waterview Consulting

The Northeast Ocean Data Portal was established in 2009 as a centralized, peer-reviewed source of data and maps of the ocean ecosystem and ocean-related human activities. For nearly 13 years, the Portal has been used to support regulatory, management and business decisions, stakeholder engagement, and educational and research activities. Recent updates to the portal provide examples of the partnerships that result in authoritative spatial data products and information including:

- New "Current Issues" pages that supply users with interactive maps and data about recent and ongoing agency actions and public comment opportunities, including collaboration with: the Bureau of Ocean Energy Management (BOEM) for progress updates on offshore wind lease areas and projects; the US Coast Guard on Proposed Actions such as Port Access Route Studies (PARS); the Army Corps of Engineers on listing Public Notices for regulatory/permitting, engineering/planning, and navigation actions.
- New vessel traffic (AIS) data for 2020 and 2021, in partnership with the Marine Cadastre, BOEM, and US Coast Guard.
- Collaboration with the National Marine Fisheries Service (NMFS), the Mid-Atlantic Regional Ocean Council, Responsible Offshore Development Alliance, and fisheries industry and management stakeholders to create new Vessel Monitoring Systems (VMS) data products, broadly characterizing commercial fishing vessel activity from 2015-2019, while maintaining confidentiality.
- Collaboration with expert work groups and the Marine-Life Data and Analysis Team (MDAT) team to add historical fish biomass data products and update marine mammals data products
- User-driven enhanced Data Explorer functions including adding real time data visualization, ability for users to add data to the map, and a more user-friendly time slider.

The tools showcase will allow participants to meet members of the Portal Working Group, explore the Portal, ask questions and gain an increased understanding of the available data, tools, potential uses, and plans to update/maintain the Portal in the future.

Return to Table

2023 GeoTools Abstracts

What's Your Water Level

Nicole Elko, American Shore and Beach Preservation Association; Brian Glazer, University of Hawai'i; Debra Hernandez, Southeast Coastal and Ocean Observing Regional Association

The American Shore & Beach Preservation Association has recently collaborated with coastal communities and the Southeast Coastal and Ocean Observing Regional Association (SECOORA) to install Hohonu's low-cost water level sensors in nearly 60 coastal communities. This public private partnership is providing robust, real-time, water level data (relative to NAVD88 and MLLW), as well as custom predictions and mobile alerts to coastal managers: https://www.hohonu.io/. In addition to Hohonu, SECOORA's Southeast Water Level Network includes other academic partners using similar sensors. The work is part of an ongoing Community Observing program (https://secoora.org/community-observing/) to ensure coastal residents have the data and information they need to respond to and plan for changes in environmental conditions. The project fills significant supplements NOAA's National Water Level Observing Network by significantly increasing the number of water level stations. Data are publicly available on SECOORA's portal: https://portal.secoora.org/#metadata/2166/affiliate. We will demonstrate the online dashboard, provide an interactive station, and bring sensors to give attendees a hands-on experience with this emerging technology (abstract can fit in either session as organizers see fit).

Return to Table

Enabling Geospatial Analysis and 3D Visualization for Raw ADCIRC Files

Jason Fleming, Seahorse Coastal Consulting

As the developers and operators of the ADCIRC Surge Guidance System (ASGS), the real time software automation system for ADCIRC, we have developed a comprehensive suite of utilities and workflows over the past 15 years to facilitate fast and accurate pre- and post-processing of ADCIRC model data. These tools and utilities facilitate the dataflows that feed well-known web mapping applications such as CERA (https://cera.coastalrisk.live) for real time storm events including Hurricanes Gustav (2008), Isaac (2012), Matthew (2016), Florence (2018), Laura (2020), Ida (2021), and Ian (2022). As we approach the next phase in the evolution of the ASGS, we will demonstrate the encapsulation of these real time workflows into an app that will allow anyone with native ADCIRC model data to convert their files to native geospatial formats (including shapefiles and kml) and generic model formats (including XDMF) on demand for visualization and analysis in 2D and 3D.

Return to Table

FEMA Region 1 Coastal Erosion Hazard Map

Carson Hauck and Marlee Newman, CDM Smith

Coastal erosion is a hazard that threatens lives, property, and resources along much of the US coastline. Erosion is generally expected to accelerate due to future sea level rise (SLR), putting more areas at risk. To help address the risk that this poses to communities, FEMA Region I has completed a study to investigate future coastal erosion due to SLR and provides public access to the mapping results via an ArcGIS Online application (https://arcg.is/08vrj5). The map incorporates multiple SLR scenarios from the National Oceanic and Atmospheric Administration (NOAA 2012 and NOAA 2017) and multiple projection timeframes (2030, 2050, and 2100) used

in the analysis. The map application is a non-regulatory product which can be used by communities as a planning tool to identify areas where coastal erosion is a hazard, plan future mitigation actions and ultimately facilitate the reduction of future erosion risk. The application allows users to search by address, toggle on/off each of the 5 SLR scenarios, change basemap views, and export map views to PDF.

Coastal erosion hazard areas are estimated from both the long-term historical erosion rate and the impacts of future sea level rise. Currently, the map application displays results for 670 miles (1080 km) of coastline across 11 counties in the New England states of Massachusetts, Maine, New Hampshire, and Rhode Island. Future planned updates to the map application will include results for an additional 9 counties in Connecticut, Massachusetts, Rhode Island, and Maine. Furthermore, upcoming analysis will use the latest NOAA 2022 SLR scenarios.

Return to Table

A Spatial Assessment of the NOAA National Water Level Observation Network

Tigist Jima, Lynker at NOAA Center for Operational Oceanographic Products and Services; Laura Rear McLaughlin, Greg Dusek, Aisha Haynes, and Caiti Guerin, NOAA Center for Operational Oceanographic Products and Services

Long-term coastal water level observations support many applications, such as ensuring safe navigation, understanding storm surge impacts, predicting high tide flooding, verifying tsunami inundation, and determining vertical reference systems. This critical information is gathered by NOAA's Center for Operational Oceanographic Products and Services' (CO-OPS) National Water Level Observation Network (NWLON), a network of over 210 real-time stations across the coastal U.S., Great Lakes and Pacific Islands. These stations require significant resource commitment which necessitates comprehensive planning and prioritization.

A Geographic Information System (GIS) based prioritization assessment was performed to determine how the NWLON network supports tidal datum computation, safe and efficient navigation, and sea-level monitoring. In this ArcGIS Pro/ ArcGIS online coupled assessment, tidal datum (standard elevation defined by a certain phase of the tide and used as references to measure local water levels) coverage areas, the spatial extent of where that station can provide adequate datum estimates, and the remaining datum gaps along the coast, were used as a basis to incorporate multiple GIS layers and attribute data. In this manner, we are able to assess the relative importance of existing NWLON stations as well as where new NWLON stations are most needed.

CO-OPS plans to consult with others about the results from this study to seek water level partnerships to address these gaps in order to maximize performance of the NWLON.

Return to Table

2023 GeoTools Abstracts

High Tide Flooding Outlooks Get a Geospatial Facelift

Analise Keeney, NOAA Center for Operational Oceanographic Products and Services

High tide flooding is increasingly more common due to climate change and sea level rise. Damaging floods that only historically occurred during moderate or major storms now happen more regularly, especially during full-moon cycles or minor storm events. To mitigate the impacts of persistent flooding, NOAA's Center for Operational Oceanographic Products and Services (CO-OPS) produces the annual State of High Tide Flooding Outlook. Formerly a static PDF, the product is now an interactive geospatial dashboard of projected high tide flooding days, regional flood statistics, and animated data visualizations. Enhancements rely on GIS infrastructure. Plots on a page come to life as interactive maps to view expected high tide flooding days out to the year 2050. With a click, flooding thresholds can be applied to visualize expected levels of inundation first hand. Data points become attributes for precise prediction of flooding based on regional sea level rise scenarios and years of observations. The combination of Python and GIS allows these products to be easily updated and remain evergreen, and clearly visualizes the inter-relationships between the High Tide Flooding Outlook and updated sea level rise scenarios in new ways. The enhanced system creates infrastructure to host and visualize a variety of data types to make the science behind each annual prediction tangible to users. All metadata is coded to pull directly from CO-OPS' derived data application platform interface (API); a function that allows future generations of this product to host both annual projections and seasonal forecasts. With 5-year funding from the Bipartisan Infrastructure Bill, CO-OPS will implement sea surface height anomaly prediction systems to better understand the potential for impacts on a seasonal basis. The integration of models and observation systems will inform robust tools for understanding climate impacts and supporting a climate-ready Nation.

Return to Table

New Methods to Understand Flood Risk and Build Equitable Community Resilience

Shelly Klose, True Flood Risk, Inc.

Flood maps and models have been widely used to examine the horizontal plane of how water flows in different directions and heights. However, current methods do not incorporate the structural height of properties to determine at what depth of water a specific property will flood. One critical data point that helps to understand and mitigate flood risk down to the building level is structural elevation which is often referred to as First Floor Height (FFH) or Lowest Floor Elevation (LFE). This data point represents the distance between the ground and the lowest finished level of building that is either entirely at or above the ground. Combined with ground elevation, expected base flood elevation and foundation type, FFH provides the missing data insight to help determine a property's true flood risk.

This presentation showcases True Flood Risk's patented technology (U.S. Patent 11,120,557) that uses digital images to instantly estimate the first floor height of properties with an accuracy more than 90% within a +/- 1 foot error of margin. Specifically, True Flood Risk estimates first floor height by various techniques including but not limited to counting steps leading into the first floor of a property through a machine learning tool that processes images from the street view of a building generating individual property results within milliseconds and entire communities within hours. True Flood Risk's real-time global property risk management software solutions help property owners, renters, insurers, floodplain managers and resilience experts to:

- Gain immediate overview of flood risk on any municipality in the United States,

- Determine economic loss of any expected sea level rise, Cat storm events or floodplain management improvements through an interactive dashboard and summary report,
- Narrow down streets in regions of interest that are least resilient (true equity-in action), and
- Estimate both costs to elevate properties and insurance premiums to transfer the risk (single property or community based).

Return to Table

USGS Coastal Change Hazards Guided Discovery Hub

Erika Lentz, Amanda Cravens, and Emily Himmelstoss, U.S. Geological Survey; Richard Snell, Cherokee Nation System Solutions contracted to the U.S. Geological Survey

The U.S. Geological Survey has spent the last three years establishing a Coastal Change Hazards (CCH) programmatic focus that prioritizes products and tools that meet stakeholder needs. These products are often underutilized by partners or fail to reach intended users for a variety of reasons, including that the products may not be immediately applicable to specific coastal management issues, confuse users in the information-space they occupy, or encounter challenges in the communication of their intended use. Additionally, coastal stakeholders are already overwhelmed with too many tools, meaning the bar is high for adoption of new product or an information source. As CCH works to provide meaningful and actionable information, a key consideration is how best to serve our science products such that the information they provide is easy to find, navigate, understand, and apply.

Through a transdisciplinary effort, social and physical scientists have applied a Human-Centered Design (HCD) approach to the development of new CCH products by moving iteratively and consciously through the process of defining our audience, determining their needs, brainstorming solutions, developing prototypes, and testing them with the stakeholders. A product we are actively prototyping, the CCH Guided Discovery Hub, serves as an entry point to assist users in finding CCH products and tools that meet their specific needs. Developed based on input from listening sessions with many of our intended audiences, the Hub provides an aggregation space where users can find, filter, compare, and explore CCH resources. The “guided search” function of the Hub allows users to search by desired information characteristics, serving products that may meet their requirements geographically, temporally, and in terms of the hazards (e.g. future flooding, storm impacts, shoreline change) they are concerned about. The prototype presented is being actively tested among user groups, with an initial release of April 2023.

Return to Table

Strategic Conservation Assessment: A Geospatial Tool Suite for Land and Habitat Management in the Gulf of Mexico Coastal Region

Yong (Ethan) Liang, Kristine Evans, and Sathish Samiappan, Mississippi State University; Amanda Sesser, Shannon Westlake, and Todd Hopkins, U.S. Fish and Wildlife Service; Anthony Collini, Mississippi State University

In the U.S. Gulf of Mexico Coastal Region (GCR), there are numerous complex social-environmental challenges that require consideration in developing tools for ecological planning, habitat conservation, and private/public land management. Decision-makers need rigorous and readily available information about regional ecosystems and socioeconomically

vulnerable areas on the landscape. Science-based, data-driven decision support tools that are readily accessible can incorporate openly available geospatial data and stakeholder priorities to provide decision support for land and resource administrators. Using a scientific co-production framework that included >650 conservation stakeholders, we developed a web-based geospatial tool suite as part of the Strategic Conservation Assessment (SCA) project. The geospatial SCA tools were developed to provide evaluation of potential project areas based on user-defined priorities encompassed by RESTORE Council goals. The tools have been helping land and resource managers evaluate the co-benefits of potential habitat conservation projects in the GCR. Participants from organizations along Gulf Coast were provided multiple opportunities for input into the content and design of the tools through a series of stakeholder charrettes in 2018, 2020, and 2022. User feedback gathered over the life of the project has led to improved integration, functionality, and performance of the tools, along with applicability and relevance. We will demonstrate how our tool suite allows for planning research, project prioritization, benefit assessment, and seamless visualization, with an illustration of the support it provides for strategic conservation across the Gulf Coast Region. Those interested will have an opportunity to walk through the tools with team members from Mississippi State and explore how the tools may be applied to inform their conservation decisions.

Return to Table

AccessAIS – Delivering the Nation's Data in the Cloud

Ken Logsdon, Dewberry; Dave Stein, NOAA Office for Coastal Management; Jesse Brass, CSS at NOAA Office for Coastal Management

Under the Marine Cadastre Project, the National Oceanic and Atmospheric Administration (NOAA) and the Bureau of Ocean Energy Management (BOEM) built a new modern system that provides public access to the U.S. Coast Guard's Automatic Identification System (AIS) vessel data in a cloud-based and map-centric platform. Deploying via MarineCadastre.gov, users now use a modern geospatial viewer (AccessAIS) to quickly locate and select areas of interest, indicate their time range of interest, and then download custom data orders.

The platform's visioning and architecture was completed in May 2020 to feature custom data orders that reflect specific areas of interest and time periods. The backend Azure cloud environment is a first for NOAA and serves as a roadmap for migrating other application resources off-premise for improved data management in the cloud. Full implementation was completed, and the system went live in 2022. The project used an Agile development approach to complete ahead of schedule.

Return to Table

Web Application for the New York State Flood Information Decision Support System (NYS FIDSS)

Juan Martinez, CIESIN at Columbia Climate School, Kytt MacManus, and Gregory Yetman, CIESIN at Columbia Climate School

This web application provides an online centralized hub for data that is part of the New York State Flood Information Decision Support System (NYS FIDSS), which models coastal and riverine flooding under different sea level rise and storm scenarios for all New York State counties excluding New York City. This app also displays data from the New York State Building

Footprints with Flood Analysis project, which provides a flood assessment model with integrated coastal and riverine flood projections and damage assessments. Additionally, this app displays the location and type of critical infrastructure in New York State; the location, footprints, and classification of all buildings; Flood analyses from the NYSERDA Hudson River Flood Impact Decision Support System and the FEMA Digital Flood Insurance Rate Map; and the U.S. Social Vulnerability Index developed by the NASA Socioeconomic Data and Applications Center (SEDAC). This app provides information on how to interpret each of the data layers and allows users to explore the layers in more detail. It contains four case studies that demonstrate how to use and combine the layers at the local level. The case studies include emergency, infrastructure, and resource-allocation scenarios such as determining the type of critical infrastructure at risk of flooding near a riverbank, determining the number and type of buildings at risk of flooding in a town during an extreme flooding event, and determining the number of households in areas that are both socially-vulnerable and high-risk flood zones. Finally, the application allows users to dynamically explore all of the data layers or to create a combination that is specific to the location and purpose of each user.

Return to Table

Nearshore Management Prioritization Tool and Web Map Application

Brian McTeague, Squaxin Island Tribe's Natural Resources Department

The Squaxin Island Tribe works collaboratively with multiple groups in the South Salish Sea and surrounding upland watersheds within the Tribe's Treaty Ceded Lands in Washington State, including Salmon Enhancement Groups, Land Trusts, Conservation Districts, and others, towards to goal of preserving and restoring natural areas and ecological services that have been deemed important to fish & wildlife and the habitats & ecological functions upon which they depend. This work tends to take the form of discrete conservation & restoration projects implemented at the scale of several acres to tens of acres and often involve multiple organizations collaborating to manage & protect natural resources.
Pursuing those solutions presents another problem: Where to invest limited funds and expertise to effectively place projects on the landscape in locations where their effectiveness and benefits are maximized and additionally have the potential enhance the benefit of other projects completed, underway, or proposed.

The Tribe developed an assessment tool that allows project planners & managers to quickly assess the ecological health & function of various potential project locations and provide information about the natural resources and development impacts at each site and make the analysis results and recommendations available via an Esri web map application.

The assessment incorporated data from multiple agencies & projects. The conceptual design of the analysis closely followed that of the Puget Sound Partnership's *PSNERP* with the major difference being the inclusion of biological data and the use of a smaller unit of analysis which will allow for more comprehensive and precise evaluation and placement of discrete projects on the landscape. Originally completed in 2014, the analysis and application will be updated as source datasets are updated.
Detailed information about the analysis can be viewed via the Help widget on the web app mapper.

Return to Table

2023 GeoTools Abstracts

U.S. Coastal Inundation Impacts Viewer

Keith VanGraafeiland and Craig McCabe, Esri; George McLeod, Old Dominion University

Some coastal communities are already dealing with inundation due to minor high tide flooding and king tide events. The frequency and severity of these events will continue to increase, and those areas not already impacted by inundation will begin to experience this phenomenon. Climate change is causing the sea level to rise.

The Coastal Inundation Impacts Viewer facilities visualization of various U.S. Sea Level Rise Scenarios over time and the associated impacts of populations, infrastructure, critical facilities, etc. This web-based application allows communities to begin to realistically interpret how sea level rise will impact them and their surrounding areas. Allowing 3D visualization of sea level rise impacts can help community planners and municipalities effectively plan ways to mitigate or retreat from areas that are problematic.

Return to Table

2023 GeoTools Abstracts

Engaging Users in Data and Tool Development

User Needs Assessment for Future Coastal Inundation Information and Tools
Cayla Dean, NOAA Center for Operational Oceanographic Products and Services; Brenna Sweetman, NOAA Office for Coastal Management

Coastal communities are becoming increasingly vulnerable to inundation threats as sea levels continue to rise, impacting the health and resilience of communities, ecosystems, and economies. User-friendly information is needed to support decision-making for increased coastal resilience to the combined hazards of storm surge, precipitation, riverine impacts, groundwater impacts, high tide flooding, and sea level rise. This is a growing concern for coastal regions across the U.S. There are many tools available for coastal communities, but some can be quite convoluted, often resulting in users feeling confused and overwhelmed. In other regions, such as Alaska and the Great Lakes, there is not sufficient water level information to aid in decision-making. To address this challenge, NOAA's Center for Operational Oceanographic Products and Services and the Office for Coastal Management conducted five sector-specific stakeholder engagement workshops to understand user needs related to products and services at climate timescales. Using methods aligned with NOAA's Service Delivery Framework, the workshops targeted the following communities: planning; transportation and navigation; real estate and insurance; health and human services; and natural resource and floodplain management. During these workshops, common themes emerged, including: enhancing equity, communication, education, and outreach; improving technical data availability and accessibility; and addressing regional gaps and different scales of geographical information. This presentation will provide an overview of the insights gained from these engagement activities to better understand stakeholder needs to inform effective climate resilience strategies and improvements to resilience products within NOAA.

Return to Table

Filling the Gaps in Alaska: Water Level Collaboration and Advancing VDatum
Leslie Jones, State of Alaska; Jacquelyn Overbeck, NOAA Office for Coastal Management

Alaska Water Level Watch (AWLW) is a collaborative group working to improve the quality, coverage, and accessibility to water level observations in Alaska's coastal zone. The coast of Alaska is populated with over 100 rural communities, navigated by national and international mariners, utilized for subsistence, sport, and commercial fishing, and much more. The coast, however, lacks critical water level data to support community, mapping, or economic activities in the nearshore. In 2014, NOAA conducted a gap analysis of the National Water Level Observation Network (NWLON), which identified 32 water level monitoring gaps in Alaska and more recently 26 gaps in short-term water level observations to support the development of statewide VDatum. The importance of these data were realized when four NWLON and eight real-time water level stations maintained by AWLW partners were utilized for high water level mark data collection during Ex-Typhoon Merbok, the largest storm to impact western Alaska over the last 50 years. Recent NOAA funding to the State of Alaska will help to fill water level monitoring gaps and will be leveraged to install the remaining 26 short-term tidal datum establishment sites required to develop statewide VDatum and will fill a major foundational data gap that will lead to enhanced inundation, topobathymetric mapping, and support future storm prediction and response.

Return to Table

2023 GeoTools Abstracts

Using Citizen Science to Track Coastal Trash
Wes Shaw and Chris Rae, Blue Urchin, LLC

Nobody likes trash along their coasts, but what can you do about it? We'll explore two states' experiences using apps and app-derived data to track and remove marine debris.

We'll focus on the beach adoption and cleanup program in South Carolina, which until 2016 used paper forms. We'll also look at the creosote-treated wood removal program in Washington, and the abandoned boat tracking in both states.

They've had success: their apps have tracked over 250,000 bits of trash that have been removed from 29 adopted beaches in South Carolina, and over 3,000 pieces of creosote-treated wood in Washington (of which 500+ have now been removed). Over 500 abandoned boats have been identified between the two states.

States are using the locations of debris to guide the decisions to address the problem at its roots, such as placing trashcans where the apps show people are dropping it.

How did they do it? In ten short minutes, the app developers and the state(s) will reveal their secrets.

Return to Table

Integrating and Expanding Community with ArcGIS Hub
Drew Stephens, CPC, Inc.

The Gulf of Mexico Alliance is using ArcGIS Hub to share data and maps from a variety of public and private authoritative sources across the five Gulf states. Hub has provided the tools needed to create a single point of entry for users to discover, explore, and access Gulf-wide data from a variety of sources. GOMA's Platform now includes theme maps, a data explorer, and featured tools. This presentation will include methods used to overcome a variety of challenges, as well as a way forward for expansion and community interaction using the Hub.

Return to Table

2023 GeoTools Abstracts

Prioritization Tools for Assessing and Enhancing Coastal Resilience

Harnessing Energy on Alaska Coastal Mapping Initiatives to Support Resilience Coastal Communities

Nadine Doiron, Alaska Geospatial Office

Alaska's 66,000 miles of coastline constitutes immense strategic, economic, and ecological resources for the United States. Accurate and modern mapping of these areas is crucial to the support of Alaska's economy, healthy ecosystems, and the resilience of coastal communities. In November 2019 a Presidential Memorandum outlined an urgent need to map Alaska's coastal and near shore areas. Native communities along the coast are being severely impacted by erosion, coastal flooding, and permafrost thaw and do not have access to modern and accurate baseline data needed to support floodplain mapping, hazard assessments, or community relocation projects. In late September 2022 the west coast of Alaska, including 35 coastal and riverine communities, were severely impacted by Typhoon Merbok, emphasizing the immediate need for baseline data and increased digital equity. This project aims to improve accessibility of existing digital data, increase equity in the planning process for future data acquisitions, and improve coordination with underserved communities to ensure map product and tools are developed in a way that meet their needs. To better support the needs of underserved communities, a suite of web applications has been developed to improve hazard response, community planning, and prioritization of data acquisitions. Tools like these are realized and implemented through successful collaboration amongst partners, furthering Alaska's coastal mapping goals.

Return to Table

The Alaska Coastal Mapping Strategy and a Supporting Case Study of NOAA's Coastal Mapping Program in Southeast Alaska

Colin Cooper, NV5 Geospatial

The Alaska Coastal Mapping Strategy was spearheaded by the 2019 Presidential Memorandum on Ocean Mapping of the United States Exclusive Economic Zone and the Shoreline and Nearshore of Alaska, and brought together NOAA, the State of Alaska, and the Alaska Coastal Mapping Executive Committee. The long-term vision is to create seamless coastal mapping data across the state of Alaska by 2030, with short term goals of prioritized topobathymetric lidar mapping campaigns that will build a strong connection between land and sea.

NOAA's Coastal Mapping Program targets this prioritized data collection around the Revillagigedo Island area in southeast Alaska. Topobathymetric lidar collection utilized the Leica Chiroptera 4X and Hawkeye 4X sensors. A look at the operational considerations, logistical challenges, ground truthing, and results will be presented as well as how the data will enable increased efficiency and safety of NOAA's Hydrographic Operations planned for the same area in 2022.

Return to Table

2023 GeoTools Abstracts

A Tool for Assisting Prioritization of Nature-based Coastal Resilience Projects in the Great Lakes
Sue Hoegberg and Ashley Gordon, Dewberry; Lara O'Brien, Lynker at NOAA Office for Coastal Management; Jeff Gangai, Dewberry

The Great Lakes' shorelines have seen increased damages in recent years due to historically high lake levels as well as the coincidence with severe storm events. Many of the community shore facilities and resources have been damaged and closed. Communities and property owners have initiated projects to restore and protect the shorelines from future high lake levels. Many of these projects are considering hard structural solutions.

This presentation will provide an overview of the Lake Michigan Coastal Resilience Initiative, sponsored by NOAA and the Great Lakes and St. Lawrence Cities Initiative, and funded by EPA through the Great Lakes Restoration Initiative. This initiative aims to educate, promote, and provide funding for the use of nature-based shoreline protection measures with the goal to enhance natural habitats and species. We will discuss the collaborative process of working with the communities along the Lake Michigan shoreline to identify eligible municipal-scale coastal resilience projects.

We will demonstrate the prioritization tool developed for the project, which incorporates aspects of project readiness, scale, benefits to habitat and species, coastal hazards addressed, climate and social justice, community resilience, and fiscal capacity. The focus will be on how community resilience, social justice, and community-capacity geospatial data were used to help inform the project rankings. Several state and federal social justice geospatial datasets were considered, with the ultimate goal to choose the best available data with the least amount of overlap. A discussion around the scoring criteria, innovative design of the prioritization tool, and how it might be adapted to other similar projects will be included.

Return to Table

Digital+Analog: Advancing the South Atlantic Salt Marsh Initiative by Blending Digital Geotools with Participatory GIS Approaches to Create Comprehensive and Inclusive Geodata on Combined Human and Natural Coastal Systems
Mike Wissner, Jessie Mandirola, and Lora Clarke, The Pew Charitable Trusts

The South Atlantic Salt Marsh Initiative aims to conserve and protect the approximately 1 million acres of salt marsh that currently exists from North Carolina to Northeast Florida. Threatened by sea level rise, unsustainable development, and other threats, managers must plan now to ensure this vital habitat persists into the future. Comprehensive coastal planning and prioritization requires managers to access high-resolution data. The internet abounds with publicly available geospatial datasets that offer high-quality information into geographic patterns of key variables for coastal management. But despite its widely recognized value, qualitative data often takes a back seat to the quantitative, science-driven information layers. On the ground, humans and ecosystems interact in complex ways influenced by culture, values, and other intangibles. Lost in the rush to compile the perfect set of geospatial data layers that quantitatively pinpoint an exact "right" location for a conservation intervention are these qualitative data. As such, the map product can eclipse the mapping process, leaving out many people and perspectives. Elevating the geospatial data creation process results in more valuable map products that have inherent buy-in from a diverse set of stakeholders. This blending of digital GeoTools with analog participatory GIS (PGIS) mapping approaches captures highly nuanced and insightful geographic patterns of combined human and natural systems in coastal areas. The Pew Charitable Trusts utilized this PGIS approach in its work to support the

2023 GeoTools Abstracts

South Atlantic Salt Marsh Initiative in North Carolina. This presentation will demonstrate how webmaps and PGIS can bring together scientists, managers, community members, and other local actors around large-scale maps to identify conservation priority areas, potential salt marsh migration pathways and interventions, and existing data errors, to facilitate the inclusion of actionable human perspectives on resilience, ecosystem health, and visioning of thriving communities, now and in the future.

Return to Table

2023 GeoTools Abstracts

Data Products for Marine Spatial Planning

Is there any Space Left in the Ocean? A National Exclusion Layer to Inform Siting of New Ocean Industries

James Morris, NOAA National Centers for Coastal Ocean Science; Karina Khazmutdinova, Axiom Data Science; Robert Bochenek, Brian Stone, Trevor Golden, Kyle Wilcox, Adrienne Canino, Aidan Lewis, and Ken Riley, NOAA National Centers for Coastal Ocean Science

The development of new ocean industries for the production of food and energy is critical to national security and reducing the impacts of climate change in the U.S. and globally. Determining how much and where space is available for these new industries are pertinent evolving questions. To begin answering these questions, we conducted a national-level analysis for seven U.S. regions: Pacific Islands, U.S. Caribbean, Gulf of Mexico, Southeast, West Coast, Northeast, and Alaska. This analysis was conducted for aquaculture and identified constraints that would likely impact development for waters up to 1,000 m depth. We mined data from over 30 data portals that resulted in compiling over 620 data layers. Of the data collected, 61 data layers were selected for the spatial analysis with 93 data layers selected to inform characterization of the areas identified. Similar to previous work performed by NOAA, a hexagonal grid was used to perform the spatial analysis. A hexagonal hierarchical geospatial indexing system (H3) was used to partition areas of interest into hexagonal cells, and each input data layer was hexed using a resolution of 10 acres. In this presentation, we will present the results (acreage) of the areas identified for each region as constrained and potentially suitable for aquaculture development. We will also present some characteristics of these spaces including the depth profiles.

Return to Table

Wave Climatology Summary Products from 30-year Wave Hindcast Model Data

Jeremy Fontenault, Tayebeh TajalliBakhsh, John Speers, and Matthew Bernardo, RPS; Daniel Martin CSS at NOAA Office for Coastal Management; Dave Stein, NOAA Office for Coastal Management

Having a general understanding of typical wave characteristics (height, period, direction, etc.) is important for any coastal or offshore planning or operations activity. For example, the peak period provides an understanding of the variation of waves (wind-driven vs swell) for planning and significant wave height can be used to help design coastal structures or testing the effectiveness of existing structures. Pacific Northwest National Laboratory (PNNL), through the US Department of Energy - National Renewable Energy Laboratory (NREL), developed a high-resolution ocean surface wave hindcast for a 32-year period from 1979 to 2010, for most U.S. waters.

This presentation will explain a recent project to summarize these data and make GIS data products that are easily visualized and integrated into NOAA's OceanReports tool and MarineCadastre.gov to support ocean planning activities. The hindcast data included nine different wave characteristics, at over 4 million data points, at 3-hour time steps, for the full 32-year period. The steps to process and summarize this massive amount of data at various time and spatial scales for a select set of wave parameters will be described, and examples of the final data products and their uses will be demonstrated.

Return to Table

2023 GeoTools Abstracts

Regional Ocean Spatial Modeling for Siting of Wind Energy: How NOAA is Supporting BOEM and Conserving NOAA Trust Resources
James Morris, NOAA National Centers for Coastal Ocean Science; Jessica Carlton, Rabiya Dar, Brian P. Free, Jonathan A. Jossart, Alyssa L. Randall, Jennifer L. Wright, CSS at NOAA National Centers for Coastal Ocean Science

Spatial modeling at the ocean region scale is critical to inform siting of new industries such as wind energy. Coastal ocean ecosystems are dynamic, complex, and critical to our Nation's natural security, food security, and economy. Disruption due to poor siting of new industries can result in significant impacts; therefore, it is crucial that the highest level of intelligence be used to inform siting of new industries. Over the past year, the National Oceanic and Atmospheric Administration (NOAA) has developed new spatial planning capabilities to support the siting of wind energy. NOAA is providing this support to the Bureau of Ocean Energy Management (BOEM) for incorporation in the BOEM wind planning and development process, which is a high priority for the Biden administration and many states around the U.S. In addition to the provision of spatial data development services, NOAA is providing spatial modeling capabilities for siting call areas, wind energy areas, and cable routing, which is providing new insights and capabilities to BOEM. These efforts have been highly successful in the Gulf of Mexico with forthcoming results in other regions including the Central Atlantic, Gulf of Maine, and Oregon. This presentation will provide information on NOAA spatial modeling activities currently underway in the U.S., examples of methodologies being used, and will highlight some challenges and ideas for new directions going forward.

Return to Table

Development of Commercial Fishing Activity Data Products for the Northeast and Mid-Atlantic
Jeremy Fontenault, RPS; Nick Napoli, Northeast Regional Ocean Council

A key component in ocean use planning is understanding impacts to commercial fishing operations. Knowing where fishing is occurring and at what level, for different fisheries, is a critical first step. Currently, the offshore wind industry is heavily relying on this data for siting and permitting development activity.

The Vessel Monitoring System (VMS), managed by NOAA National Marine Fishery Service (NMFS) Office of Law Enforcement (OLE), is a satellite-based surveillance system used to monitor the location and movement of commercial fishing vessels in the U.S. This data includes vessel positions over time for all commercial fishing vessels that may fish in certain federally regulated fisheries. Due to the confidential nature of individual vessel fishing locations, the data needs to be filtered and summarized such that only fishing activity where three unique vessels have fished are included.

This presentation will describe new tools and processes used to prepare VMS-based fishing density map products for the northeast and mid-Atlantic regions for fishing activity covering 2015 to 2019. This will include details of the confidentiality filtering process used to evaluate over 60 million vessel positions and the generation of density maps that are made accessible through regional data portals like the Northeast Ocean Data Portal. The methods, visualizations, uses of these data products were informed by extensive industry and agency outreach to understand limitations of this data and to ensure the most accurate representation of commercial fishing activity.

Return to Table

2023 GeoTools Abstracts

Emerging Technologies for Elevation Data and Modeling

The USGS 3D Elevation Program Next Generation
Cindy Thatcher, U.S. Geological Survey National Geospatial Program

The first generation of 3DEP will provide an essential national baseline of consistent, high-quality data that will continue to grow in value as it is used for comparison with new data collected over time. With 3DEP-quality data available or in progress for about 84 percent of the Nation as of the end of Fiscal Year 2021, we are looking towards our future vision for topographic mapping and science at the USGS. USGS is developing the 3D National Topography Model (3DNTM), the terrestrial component of the 3D Nation vision that we share with NOAA for delivering a continuous information surface from the depths of our oceans to the peaks of our mountains. The 3DNTM includes the next generations of the 3D Elevation Program and National Hydrography Datasets. The USGS is drawing on the 3D Nation Study and our experience with managing the 3DEP baseline to design the next generation program to provide increased QLs and refresh rates with more flexibility to meet changing user needs.

Return to Table

Analysis Ready Elevation Data – USGS 3DEP and The National Map
Rob Dollison and Jason Stoker, U.S. Geological Survey

This presentation will provide an introduction on out how to take advantage analysis ready elevation data through new web tools and direct cloud-based access for working with 3DEP lidar and elevation data that are now available through applications on the USGS National Map Data Delivery (https://usgs.gov/NationalMap/data) and associated sites.

Can you say PDAL? Use an AWS Public Data Set? Take advantage of a Web Coverage Service to support analysis? Visualize your lidar before deciding download or use it?

Return to Table

Coastal National Elevation Database – Enhanced Transitional Blending Between Disparate Bathymetric and Nearshore Elevation Models
William Matthew Cushing and Dean Tyler, U.S. Geological Survey

The USGS Coastal National Elevation Database (CoNED) Project is introducing an enhanced interpolation methodology to improve the seamless integration between adjacent topography and bathymetry data sources that builds upon an existing geospatial framework established in 2016. This method uses two interpolated datasets, Micro-Blend and Macro-Blend that supports the removal of “Ghost Shorelines” and improves the transition between two adjacent disparate bathymetry datasets. A new fundamental component has been introduced to CoNED’s methodological workflow that classifies each pixel space based on the spatial relationship between all overlapping input data sources. Based on the pixel’s classification, the new Micro-Blend and Macro-Blend algorithms apply the appropriate interpolation for that pixel space. An example is when a pixel is classified as “Ghost Shoreline,” that pixel space and all adjacent pixels with the same class are interpolated using the Micro-Blend where an Inverse Distance Weight (IDW) interpolation is applied. The Macro-Blend algorithm is applied when a pixel is classified as a “Transition Zone”, the area located between two disparate bathymetric datasets. This transition zone has two or more overlapping datasets; one is a high-density dataset derived from newer mapping technologies such as multibeam or lidar, while the coarser source represents data from older acquisition technologies. The transition zone (50 to 100 meters) is

interpolated over the coarser dataset where that underlying data is used to weight the IDW interpolation generating a smooth transition. Pixel values on either edge of the weighted interpolation represent actual source pixel values and the further away the pixels are from the high-density datasets the elevation values trend toward the underlaying dataset's profile. Introducing these two interpolated data layers into the CoNED topobathymetric DEM will improve processing efficiency with the automatic removal of the "Ghost Shoreline" artifact along with the improved integration of disparate bathymetric datasets using the Micro-Blend algorithm.

Return to Table

The USGS Coastal National Elevation Database (CoNED): Integrated Topobathymetric Models and Applications for the U.S. Coastal Zone

Jeffrey Danielson, Monica Palaseanu-Lovejoy, Dean Gesch, W. Matthew Cushing, Dean Tyler, and Jeffrey Irwin, , U.S. Geological Survey

The USGS Coastal National Elevation Database (CoNED) Applications Project develops enhanced topographic (land elevation) and bathymetric (water depth) datasets that serve as valuable resources for coastal hazards research. These datasets are used widely for mapping inundation zones from riverine flood events, hurricanes, and sea-level rise and for other Earth science applications, such as sediment transport, erosion, and storm impact models. As part of the vision for a 3D Nation, the CoNED Project is working collaboratively with the USGS National Geospatial Program, the National Oceanic and Atmospheric Administration, and the U.S. Army Corps of Engineers through the Interagency Working Group on Ocean and Coastal Mapping to build integrated elevation models in the coastal zone by assimilating the land surface topography with littoral zone and continental shelf bathymetry. CoNED topobathy development is focused in select regions around the U.S. coast, such as the Northern Gulf of Mexico, the eastern seaboard from New England to Florida, California, the Pacific Northwest, the North Slope of Alaska, and select central Pacific islands and atolls. Completed and published topobathymetric digital elevation model (TBDEM) 1-meter integration work will be highlighted in the Northern Gulf of Mexico and the Coastal Carolinas along with showcasing plans for future work. One critical challenge in creating regional topobathy models is locating bathymetry data to fill gaps that occur along the land/water interface. As a potential solution, satellite-derived bathymetry (SDB) methods are being investigated to support coastal wave and inundation modeling. Example SDB results from the Florida Keys and Puerto Rico using Landsat 8, Sentinel-2, and WorldView imagery will be highlighted where band/ratio and photogrammetric methods were compared.

Return to Table

2023 GeoTools Abstracts

Blue Economy Panel

The New Blue Economy: Application of Ocean and Coastal Data and Technology Across Sectors to Support Decision-Making

Moderator: Paul M. Scholz, Deputy Assistant Administrator for NOAA's Ocean Service and Coastal Zone Management

Panelists: Debra Hernandez, Director, Southeast Coastal Ocean Observing Regional Association
Gerhard Kuska, Director, Mid-Atlantic Regional Association Coastal Ocean Observing System
Carl Gouldman, Director, NOAA Integrated Ocean Observing System

The rapid and accelerating pace of climate change is driving increased demand for information about the ocean and along our nation's coasts. In particular, geospatial data and services are key climate planning and resilience tools used throughout the climate community for understanding and predicting problem areas and preparing and implementing responses.

As the world's largest provider of climate and weather data, including forecasts, predictions, and outlooks for sea surface temperature, precipitation, water level, pH, salinity, surface currents, and harmful algal blooms, NOAA is building on traditional ocean and coastal uses to promote the New Blue Economy: The gathering and use of new and enhanced ocean and coastal information to identify societal challenges that, when addressed, drive the acceleration of ocean and coastal data and products.

This Town Hall will provide a forum for academia, government, and industry to inform NOAA and the greater Blue Economy community on approaches for making New Blue Economy data more findable, accessible, interoperable, and reusable by asking the presenters to provide their views on the following questions:

- How can new and improved drifters, buoys, and autonomous instruments be used to expand the ocean observing network?
- How can ocean observing networks integrate across organizations and products to leverage resources and simplify user experiences?
- How can partnerships be leveraged to ensure that the data needed to make risk-informed decisions at the coast are useful, useable, and used?

Return to Table

2023 GeoTools Abstracts

Assessing Coastal Inundation Impacts

Assessing Sea Level Rise vulnerabilities
Keith VanGraafeiland and Craig McCabe, Esri; George McLeod, Old Dominion University

Nearly 30% of the total US population lives in coastal counties. These communities will experience an accelerated rate of sea level rise over the next few decades, impacting infrastructure (stormwater systems and roads), critical facilities (emergency management facilities, hospitals, and power plants), real estate, and schools. This presentation will cover the methodology used to generate the different sea level rise scenarios, including the decadal timesteps over the next century, and assess the various impacts. Using workflows in ArcGIS Pro, we will analyze the impacts and create meaningful maps and reports that help communicate the most vulnerable locations and populations.

Return to Table

A Bluff Erosion Potential (BEP) Index for the Pennsylvania Lake Erie Coast
Sean Rafferty, Pennsylvania Sea Grant College Program; Anthony Foyle and Mike Naber, Penn State Behrend

Pennsylvania possesses approximately 123.3 kilometers (76.6 miles) of Lake Erie shoreline, dominated by unconsolidated bluffs ranging in height from 1.5 to 54.9 meters (five to 180 feet) above lake level. Nearly all the shoreline is designated as a Bluff Recession Hazard Area. Given the potential economic and environmental impacts associated with accelerated bluff retreat, we identified the need for a bluff retreat index. The Bluff Erosion Potential (BEP) Index, available at https://pawalter.psu.edu, graphically illustrates the potential for future land losses due to erosion in the vicinity of bluffs along the Pennsylvania coast of Lake Erie. The BEP Index provides a geometric estimate of the probable future locations of the bluff crest as the bluff face, toe, and crest retreat landward over extended time periods that approximate the lifetimes of residential and commercial structures. The index utilizes long-term average retreat rates for the bluff, incorporating 1938 crest position data and 2015 lidar data. The estimated future position of the bluff crest is a useful proxy for estimating the relative erosion risk of tableland areas located adjacent to the bluff crest during future decades. The BEP Index identifies four erosion-potential zones that are oriented approximately parallel to and track the present bluff crest. In order of decreasing erosion potential and increasing distance inland, these zones are the Very High Erosion Potential (VHEP) zone; the High Erosion Potential (HEP) zone; the Moderate Erosion Potential (MEP) zone; and the Low Erosion Potential (LEP) zone. The variable-width zones cover the region between the bluff toe and a line located as much as 272 meters (890 feet) landward of the toe, beyond which the erosion potential is expected to be insignificant at building-lifetime timescales. This presentation will provide an overview of the BEP Index web-based mapping application.

Return to Table

2023 GeoTools Abstracts

Sea Level Rise in the South Salish Sea Story Map
Brian McTeague and Candace Penn, Squaxin Island Tribe

In 2015 the Squaxin Island Tribe was awarded a Tribal Climate Resilience Grant by the Bureau of Indian Affairs (BIA). The award funded a project titled; Assessment of Climate Related Impacts and Adaptation Planning for Cultural and Subsistence Resources- Shellfish and Forage Fish. The purpose of the project was to assess the vulnerability of shellfish and forage fish habitat to climate-change related impacts that will result from predicted sea level rise. The project was led by the Tribe's Climate Change Ecologist: Candace Penn and Quantitative Services Manager; Brian McTeague.

The project's objectives were; determine the precise tidal range on the shoreline of Squaxin Islan, assess the spatial distribution of multiple shellfish and forage fish species and their preferred habitats on the shoreline of Squaxin Island, use forecasts and modelling to determine the expected change in tidal heights/ranges and beach inundation due to Sea Level Rise, and examine and interpret the associated change/shift in tidal heights/ranges and beach inundation as it relates to shellfish and forage fish.

In 2018, the Tribe published an Esri story map web application to serve the results of the Sea Level Rise analysis and highlight the ways the Tribe is engaging with multiple partners to better understand the potential impacts of climate change, mitigate those impacts, build climate change resilience, highlight the role that Traditional Ecological Knowledge can play in those endeavors, and undertake projects and partnerships that aspire to benefit the places and animals that are the cornerstone to the Tribe's health and happiness.

Return to Table

Real-Time Model Guidance and Decision Support for Coastal inundation
Jason Fleming, Seahorse Coastal Consulting

In a landfalling tropical cyclone, storm surge poses the greatest danger to human life, and the ADCIRC finite element coastal ocean model has been used extensively over the last twenty years for design and risk analysis studies for this threat. In 2006, the open source ADCIRC Surge Guidance System (ASGS) software was created to automate the execution of ADCIRC in real time for tropical cyclone events. In 2008, the Coastal Emergency Risks Assessment (CERA) web mapping application was used for the first time to deliver an easy-to-use interactive data exploration and dissemination for ASGS results for official decision makers in US public sector agencies including NOAA, FEMA, the Coast Guard, and the Army Corps of Engineers, among others. The ASGS and CERA technologies are described, and examples of the use of these technologies to protect life and property over the last ten years are provided, up to and including the most recent and historically remarkable 2020 hurricane season as well as Hurricane Ida (2021) and Hurricane Ian (2022).

Return to Table

2023 GeoTools Abstracts

Data and Visualizations for Coastal Management

JALBTCX Quick Response Toolbox
Ashley Elkins, US Army Corps of Engineers

LiDAR derived volume changes provide both visual and statistical information for how shorelines change over time. Multi-year, regional topographic/bathymetric lidar datasets collected through the USACE National Coastal Mapping Program (NCMP) are available for all coastal regions of the contiguous United States, including the Great Lakes. The repeat lidar digital elevation models (DEMs) produced by the NCMP are the foundation for important coastal change metrics including erosion/deposition volumes and volume change, shoreline change, and coastal geomorphology features (i.e., bluffs, dunes and sandbars). The Joint Airborne Lidar Bathymetry Technical Center of Expertise (JALBTCX) Quick Response Toolbox contains modules for the creation of these metrics using a standardized workflow in a GIS. The Quick Response Toolbox module computes beach volume change and shoreline change using 'before' and 'after' DEMs and a user-defined transect/volume bin framework. Volumes are computed for each volume bin via pixel summation performed on an elevation difference grid. Shoreline change is computed for each shore-perpendicular transect. Specific metrics produced using the JALBTCX Quick Response Toolbox include shoreline change, total volume change, and above and below Mean High Water volume changes. The standard outputs are stored in a file geodatabase and include the DEMs, difference grids, and user-defined transect/volume bins and analysis masks. Each bin has attributes for each metric. Volume change quantities are provided in cubic yards or cubic meters, while volume density changes are in cubic yards per year per linear foot or cubic meters per year per meter. The toolbox was developed as a quick response tool to standardize the production of shoreline changes and sediment volumes lost or gained after storm events. Most recently, the JALBTCX has applied the toolbox to assess beach volume changes following Hurricane Ian. The past volume assessments are made available through the JALBTCX Volume Change web mapping application located at https://usace.maps.arcgis.com/apps/webappviewer/index.html?id=1c27ace28b7845deb7f126935f490878.

Return to Table

Coastal Habitat Evolution and Sedimentation Measured with Historic Lidar and Aerial Imagery in Port Royal Sound, Beaufort County SC
Keil Schmid, Geoscience Consultants, LLC

This Phase I project provides insight into the drivers of marsh habitat evolution in the Broad River/Port Royal Sound habitats in southeastern South Carolina. The information was gathered to help shape restoration plans by defining the processes that control marsh longevity and evolution. Studying these low-energy habitats, their history, and their sensitivity to elevation and sea level trends has helped provide relationships between inundation period and sedimentation and how they vary with sediment source availability and habitat type. The major findings include the role of seaward vs landward sources of sediment in this estuary, the usefulness of lidar in measuring sedimentation in marsh and tidal flat habitats, the relationship between inundation and deposition, and the role that human structures play in shaping depositional patterns in marshes. The marsh island site itself is unique and is bisected by an historic railroad causeway that has created conditions that help tell the story starting in about 1875 about the roles of sediment accumulation, erosion, and sea level rise on the coastal habitats throughout the area. One of the more surprising results, higher sediment deposition measured on tidal flats than on the adjacent marsh habitats, highlights the important role of inundation periods on

sedimentation. The study is driven by lidar data spanning almost two decades and aerial imagery reaching back about 75 years. The availability and temporal ranges of these data sources are common in the coastal US and many of the techniques and analyses described are applicable to marshes and low energy coastal habitats throughout the US.

Return to Table

LiDAR Shoreline Extraction for Coastal Management Applications
Claire Babineaux, Joby Czarnecki, John Cartwright, Northern Gulf Institute -Mississippi State University

Regular monitoring of shoreline erosion is critical for effective permitting and management of coastal and marine ecosystems. Existing tools and models were applied to geospatial datasets to produce a complementary set of application workflows and best practices for shoreline extraction and mapping with LiDAR derived digital elevation models. A shoreline extraction workflow was used to map out a proxy shoreline for two applications. The first application used QL2 LiDAR data from 2015 to map the shoreline of St. Louis Bay along the Mississippi Coast for input into a permutation of the Virginia Institute of Marine Science Shoreline Management Model for a living shoreline site suitability analysis. The second application focused on using LiDAR data collected over a twelve-year period to map the shoreline of Ship Island, one of Mississippi's barrier islands. These data were then used to analyze shoreline erosion trends with the Digital Shoreline Analysis System (DSAS). The workflow for both applications was focused on the identification of the zero-elevation value to objectively identify the land-water interface and map the shoreline. In both applications, the LiDAR derived shorelines had improved detail when compared to other available shoreline datasets. For the DSAS application, the process provided improved precision in shoreline extraction for temporal comparisons. Using LiDAR data for the shoreline extraction process helps minimize subjectivity, however expert input improves the output due to various environmental and landscape factors associated with both inshore and offshore environments.

Return to Table

Accelerated Conservation and Restoration through Multi-Objective Targeting
John Wolf, Scott Phillips, Ken Hyer, U.S. Geological Survey

The Chesapeake Bay Program (CBP) is a unique regional partnership that leads and directs Chesapeake Bay restoration and protection efforts. The 2014 Chesapeake Bay Watershed Agreement established 10 goals and 31 outcomes that guide the actions of the partnership. The topics addressed by these goals and outcomes often relate to place-based management of fisheries, habitats, water quality, and watersheds.

The CBP partnership spends about $1.2B annually on activities toward achieving the goals of the Watershed Agreement, with a traditional focus on water-quality improvement. Recent funding increases, including the Bipartisan Infrastructure Law, provide additional opportunities to accelerate progress toward multiple Watershed Agreement outcomes while simultaneously achieving state and local benefits. A science-based approach to target resources, including these funding increases, is needed to use decision-support tools wisely and identify places to more effectively advance multiple outcomes and benefits.

In collaboration with CBP partners, including the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA), the U.S. Geological Survey (USGS) has developed a web-based portal that contains a wide range of existing decision support tools that can be used to target resources. The portal is an ArcGIS Hub implementation

with integrated and cross-linked web mapping applications. The information is organized around several topics based on the goals of the Chesapeake Watershed Agreement: (1) accelerate water-quality improvements, (2) improve fish, wildlife populations and habitats, (3) expand land conservation efforts, and (4) increase benefits to people, with all topics considering opportunities to enhance climate resiliency.

This presentation will provide an overview of the portal, sample use cases for selecting and applying several decision-support tools, and a description of how the Portal can be used for multi-objective ecosystem management.

Return to Table

A Geospatial Tool to Identify and Classify the Impacts of Sea Level Rise on Transportation Networks
Kate Grala and John Cartwright, Mississippi State University

The impacts of the sea level rise (SLR), storm surge, extreme weather events, and other shifting climatic conditions pose an increasing risk to the U.S. transportation system and are of great concern to emergency managers and many state and local governments. However, in dynamically changing conditions, such as those associated with hurricanes, emergency managers often lack information and tools that would allow for expedient identification of vulnerable transportation network sections and plan evacuation routes accordingly. The Geospatial Education and Outreach (GEO) Project at Mississippi State University is using geospatial technologies to analyze interactions between SLR scenarios and transportation features to determine the potential impacts of changes in sea level on transportation networks. The goal of this project was to identify sections of coastal transportation networks that are most vulnerable to the impacts of the projected scenarios of sea level rise. Transportation layers for coastal Mississippi and SLR feature layers from the National Oceanic and Atmospheric Administration were analyzed. A custom tool was developed to automate the spatial analysis and provide summaries based on the categories of linear input features. The analysis delineated vulnerable transportation segments, their span, and their category in relation to the estimated SLR layers. The results are disseminated as interactive web-based maps and data dashboards. Coastal managers can use this automated tool to augment their decision-making, help them plan evacuation routes, and determine impassable transportation segments. In addition to linear features, such as transportation networks, the geospatial tool designed by the GEO Project team is applicable to other feature geometries and allows to determine the impacts of SLR on land use, zoning districts, land parcels, building footprints, utility structures, or other points of interest.

Return to Table

GeoVisualization for Coastal Inundation
John Cartwright, John van der Zwaag, and Kate Grala, Mississippi State University

The Geosystems Research Institute at Mississippi State University is working to enhance geo-visualizations for coastal flooding. The frequency of flooding events in coastal areas has been increasing for several decades. Current sea level rise projections for this century will make the extreme events of today the norm by 2100. As the frequency of these events increases so does the need for improved education and decision-making. Through the Geospatial Education and Outreach (GEO) Project, efforts have focused on the development of a suite of applications to simulate and visualize sea level rise.

2023 GeoTools Abstracts

GeoCoast3D is an interactive web-based application that allows users to visualize inundation along the MS coast. Using routing analysis, users can visualize the impact of inundation on transportation and service areas for critical infrastructure. This provides them with an enhanced view of the dangers in relation to rising sea levels and hurricanes in coastal communities.

The GeoLidar Viewer was created based on colorized LiDAR datasets combined with other layers, including 3D buildings, sea level rise extents, LiDAR-based elevation, and satellite imagery. These layers are displayed in a single interactive 3D scene that is publicly available online. Individual layers can be turned on and off to change the focus of the display to various landscape features.

These efforts are being coupled with augmented and virtual reality for in situ 3D modeling of coastal flooding. GeoCoast AR allows the user to increase and decrease simulated inundation levels on the actual landscape as they navigate the area through the camera on their mobile device. GeoInundation uses detailed, realistic models generated from LiDAR data, satellite imagery, and site photos. GeoPanorama combines 360° panoramic photos with LiDAR data to create immersive, realistic virtual reality experiences. Both allow the user to simulate water surface height or select a predefined historical high water marker.

Return to Table

Visualizing the Impacts of Sea Level Rise in 3D
Craig McCabe, Keith VanGraafeiland, Esri; George McLeod, Old Dominion University

Creating 3D visualizations of flooding scenarios is an effective way to engage with your community and demonstrate potential impacts of Sea Level Rise, from the regional to the human scale. In this session, we will explore several Sea Level Rise scenarios in Miami, Florida, to assess impacts to buildings and transportation infrastructure, and to discover which populations may be most at-risk to future flooding. Using the U.S. Sea Level Rise Inundation Scenarios, and applying the ArcGIS 3D Basemaps and Flood Impact Analysis Solutions, you will learn how to create and visualize these 3D flood impact layers for your community.

Return to Table

2023 GeoTools Abstracts

Emerging Technologies for Real-Time Data Applications

Importance of Near Real-time Data Processing for Topo-bathymetric Lidar Operations
Karen Hart and Nathan Hopper, Woolpert

Data collection rates are increasing while the need for near real-time information for decision-makers has struggled to keep pace. Woolpert has developed edge computing and processing capabilities through research efforts that address some of these issues. For instance, in an effort to improve operational efficiency in the field and provide customers with timely project status reporting from the field, Woolpert is developing a data processing toolset that will assist topo-bathymetric lidar operations by providing much-needed data coverage information in near real-time. Daily production of high-resolution area coverages will immediately allow the field team to determine if there are gaps or data issues that may require re-flights. While primarily developed for use with the BULLDOG system, Woolpert plans to test and utilize this toolset across multiple sensor platforms, like the Leica Chiroptera and Hawkeye systems or the Optech CZMIL system. Collection requirements, such as hurricane recovery, maritime navigational awareness, and infrastructure, for upcoming projects with NOAA's National Geodetic Survey (NGS), necessitate weekly or possibly daily delivery of data coverage information. It will therefore be essential for Woolpert to process the data coverages close to near real-time, especially in remote locations like the Pacific Islands, where network bandwidth is limited for data transfer.

Return to Table

Real-Time Flood Forecasting
Brian Mayfield and Mark Topping, WGI Geospatial

Extreme weather and rising sea levels pose a significant threat to our nation's communities and to the readiness and resilience of both coastal and inland communities. Regardless of location, the ability to prepare, mitigate, and recover is at the very core of our nation's goals of becoming resilient in the face of these threats. NOAA has placed an emphasis on tool development, data collection, and risk mitigation in coastal zones to reduce the impact of future sea level rise and flooding.

WGI Ventures and Streamline Technologies have developed a Real Time Flood Forecasting (RTFF) tool that is a great supplement to the NOAA Sea Level Rise Viewer. Using the RTFF, we can accurately predict the likely extent and duration of flooding, at the street level, 2 to 3 days into the future.

This presentation will demonstrate, through a series of examples, an approach that leverages NOAA's real-time and forecasted precipitation-related data along with rapidly developed and/or existing available detailed hydraulics and hydrology (H&H) models such as USGS 3DHP, and digital twin data to provide advanced notice of site-specific flooding risks (buildings, roads, airstrips, lift stations, etc.). The resultant approach provides a risk-informed decision tool that will help emergency management personnel prepare for potential threats, mitigate the risks and damages, and put the recovery efforts in place in advance of the threat; thus, improving their resilience.

With Real Time Flood Forecasting, government agencies at all levels will be able to transform from a reactive, wait-and-see position to a more proactive approach. This will save lives and money.

Return to Table

2023 GeoTools Abstracts

Applying Technology to Inform Drivers of Flooded Roads in Real-Time
Mark Slauter, FloodMapp; Kyle Spencer, City of Norfolk, Virginia

Flooding is occurring with increasing frequency; more days of nuisance flooding and more short-duration heavy rainfall events create additional stressors on the functionality of our road infrastructure. While these increased impacts occur in urban, suburban, and rural areas, coastal cities face the additional stressors of tidal fluctuations, limited storm sewer capacities, sea-level rise, or land subsidence. Together, these stressors are forcing resiliency officers, local floodplain managers, and emergency managers to implement creative adaptation techniques.

The City of Norfolk, Virginia, collaborated with RISE Resilience Innovations, Waze and FloodMapp in a project that dynamically modeled the various flood factors to implement an operational real-time flood intelligence capability. The outcome was to provide flooded road intelligence to drivers. FloodMapp was able to provide this capability by modifying its existing real-time flood modeling into RoadSafe. The live flooded road data is supplied to the City, then sent to the Waze app for public consumption. This allows the City to inform the public and re-route drivers by virtually closing roads. So far, the system has successfully and safely routed thousands of residents around flooded roads.

Return to Table

“Will Flooding Impact me Today?” TIDEeye Can Help!
Robert Hauck, City of Charleston

“Will flooding impact me today?” TIDEeye can help!

Charleston’s residents and visitors need at-a-glance, real-time information to make informed flooding adaptation decisions. TIDEeye was developed by the city to meet this need by collecting data from half a dozen sources in real-time and presenting it through a simple interface that is optimized to be viewed on a phone. Data sources include the National Weather Service, NOAA, City-operated weather stations, Waze user flood reports, and City reported road closures, with more sources being added over time.

TIDEeye helps answer basic short-term planning questions such as “Is flooding possible during my commute today?” or “Could flooding impact an important event in two days?”. Charleston’s short-term tide forecasts can and do change daily depending on weather conditions. TIDEeye makes it easy to see our up-to-date tide forecasts and the associated risk.

TIDEeye also answers some important real-time questions: Has the city closed any roads due to flooding this morning?, Are any Waze users reporting flooding?, or What’s the exact tide right now?. Being able to answer these questions helps users make informed adaptations decisions. An example being adjusting their commute by leaving early or delaying their departure to avoid flooding-related traffic congestion.

TIDEeye is also an operational tool used by the Charleston Police Department to aid in their king tide planning and response. The tool allows officers to monitor the tide and rain rate in real-time, lessoning the resources needed to physically monitor low lying roads for inundation and barricade placement.

Return to Table

2023 GeoTools Abstracts

Tools Showcase Two (Wednesday)

OceansMap: A Data Ecosystem Supporting Collaboration and Decision-Making

Jenna Ducharme and Kelly Knee, RPS Group

RPS' OceansMap unlocks the power of data by translating it into insight and enabling users to make informed decisions. It is a cloud-based data ecosystem; behind the UI a collection of harvesters, processors, and services brings together environmental data and forecasts from disparate sources, applies community standards, and ensures availability for visualization and analysis. Designed specifically to meet the challenges of offshore environments and complex MetOcean conditions by bringing together environmental data including historical observation and survey data, real-time observations, and model forecasts, Oceansmap enables collaboration, provides a common operational picture, and facilitates decision support.

To meet user needs, specialized instances of OceansMap can be created allowing users to focus the data content of the instance, integrate proprietary data, control user access, and access specialized tools.

The tools showcase will allow participants to meet members of the OceansMap team, and explore:

- Global and regional oceanographic, meteorological, and environmental data including model forecasts, satellite data, buoys & observation stations, profiles, gliders, and static contextual GIS layers,
- The virtual station tool, allowing users to set and save point locations and create tabular and graphical summaries,
- The Multivariant Traffic Light tool, which facilitates offshore operations planning by providing spatio-temporal analysis of user defined operating criteria,
- The Validation tool, which provides on-the-fly skill assessments of any included forecast model, allowing users to determine which forecast is best based on current conditions
- The Compare tool, a 'swipe-map' concept, which enables seamless spatial comparisons of any combination of map layers, time-steps, or vertical levels,
- The Share tool, which allows users to easily share maps, giving full control over which settings are persisted

From maritime planning, offshore wind operations, oil spill response, coastal resilience, water quality monitoring to operational search-and-rescue, regardless of your application, OceansMap turns complex data into easy decisions.

Return to Table

Disaster Management and Visualization of Spatial Data: USGS Event Support Maps and Multi-agency High Water Mark Planning Dashboard

Xan Fredericks, Lance Clampitt, Chris Cretini, Eliza Gross, and Cyndi Rachol, U.S. Geological Survey

The U.S. Geological Survey (USGS) Geospatial Information Response Team (GIRT) is responsible for coordinating, communicating, and providing access to spatial information during a hazard event, such as a hurricane, flood, or earthquake.

2023 GeoTools Abstracts

The Event Support Map (ESM) is used by the USGS GIRT to facilitate operations and to support situational awareness and resource management for the Bureau and the Department of the Interior. ESMs support a timely response to and mitigation of natural hazards and provide critical information about the Earth and its processes. Placing information, such as links to high-resolution elevation data portals, imagery, and potential flooding hazards in a “one-stop” access point is key in supporting community resiliency and sustainability and safety during a response.

Additionally, the USGS has collaborated with the National Oceanic and Atmospheric Association (NOAA) and the US Army Corps of Engineers (USACE) to create a Multi Agency High Water Mark Planning Dashboard to aid in cooperative collection of high water marks post-event, when applicable. This presentation will include an ESM and Multi Agency High Water Mark Planning Dashboard demonstration showing how response data, as well as base USGS National Geospatial Program Data and information, are leveraged to plan, coordinate, and collect post-event data that document the impact of natural disasters, while supporting mitigation. https://apps.nationalmap.gov/event-support-map-hub/

Return to Table

Using ArcGIS GeoPlanner to Visualize the Cumulative Impact of Green Stormwater Infrastructure

David Hart and Scott McComb, University of Wisconsin Sea Grant Institute; Gabriel Wilkins, University of Wisconsin-Madison

It is challenging to communicate the benefits and costs of green stormwater infrastructure, especially in comparison to conventional "gray" infrastructure. The coastal management community needs an easy-to-use tool to measure and visualize the incremental contributions that different green stormwater infrastructure practices can make to meet community stormwater capture and infiltration goals, combined with a way to locate these practices through collaborative scenario design processes. Geodesign is a collaborative design process that uses geospatial technology to consider the current features of a landscape and to create, analyze, and compare planning scenarios. ArcGIS GeoPlanner is a geodesign platform that allows users to visualize and draw different scenarios, analyze their benefits and drawbacks at a variety of scales, and use map layers to choose suitable locations for green infrastructure practices. Wisconsin Sea Grant has developed a GeoPlanner template documented by a training lesson to support green stormwater infrastructure. This session will demonstrate how to create and assess green infrastructure scenarios and assess their impact through visualization dashboards. While green infrastructure cannot solve all urban stormwater issues, the cumulative benefit of many practices in sufficient density can help take the burden off gray infrastructure.

Return to Table

Indigenous Communities in the Coastal Realm

Brandon Krumwiede, NOAA Office for Coastal Management

NO ABSTRACT PROVIDED

2023 GeoTools Abstracts

Forerunner: Resilience through Smarter Floodplain Management

Susanna Pho and Owen MacNeill, Forerunner

Floodplain managers play a crucial role in engendering resilience and adaptation in coastal communities, but their work can be difficult. Cities and counties of all sizes can struggle with enforcing complicated local and federal floodplain regulations, particularly in areas experiencing high rates of development. Additionally, it can be difficult for resource-constrained communities to leverage the data that they have on hand to get a clearer understanding of flood risk for planning into the future. These challenges can be compounded when a community experiences a large-scale storm affecting thousands of residents. Forerunner (withforerunner.com) is a floodplain management platform that addresses some of these challenges. The software pulls together disparate datasets from federal and local data sources and provides it to users on a per-property basis. In addition to aggregating existing data, Forerunner also unlocks a crucial dataset by utilizing machine-learning to extract information from paper floodplain permits. This data is then used to help enable smarter permit review through error detection. It's also provided to users to drive geospatial analysis, support grant applications, and inform decision-making in floodplains.

Forerunner's partners use Forerunner to track development, stay on top of changes in their built environment, and provide personalized information to residents. Post-disaster, Forerunner's preliminary damage assessment tools help users collect important data about the local impacts of disaster events. By making granular data more accessible using web-based tooling, Forerunner streamlines floodplain management, compliance, and outreach for partners ranging in geography and scale from Ocean City, NJ to Harris County, TX.

Return to Table

QNSPECT: A QGIS Plugin to Estimate Nonpoint Source Pollution and Erosion over a Watershed and Compare Land-Use and Climate Change Impacts on Pollution and Erosion

Abdul Raheem Siddiqui, Ian Todd, and James Parker, Dewberry

Nonpoint source pollution and erosion in watersheds have been a source of concern for the water quality of streams, agricultural soil management, land development, and coastal pollution. Calculating nonpoint source pollution and erosion requires extensive data preparation, large modeling effort, and high computing power. In 2004, the NOAA Office for Coastal Management (OCM) developed a simple and easy-to-use methodology Nonpoint Source Pollution and Erosion Comparison Tool (NSPECT) to estimate approximate baseline pollution and erosion over a watershed with minimum data requirements. The emphasis on simplicity and the lack of temporal dimension means NSPECT is best used for high-level studies and is not intended to provide an accurate level of pollutants at a particular spot or time.

Dewberry recently partnered with the NOAA-OCM to develop 'QNSPECT' (QGIS-NSPECT), a python QGIS plugin, to modernize, improve, and bring NSPECT methodology to the wider open-source GIS community. The plugin is developed using the QGIS processing framework. It is free, open-source, and available to users of all countries and operating systems.

2023 GeoTools Abstracts

The QNSPECT computational engine relies on several established methodologies and algorithms for dataset processing. For example, GDAL for raster analysis, GRASS for material transport, NRCS Curve Number method for runoff generation, and RUSLE for erosion estimates. The algorithms are flexible, allowing users to either use the default land-cover to pollutant lookup coefficients or provide their own, thus making the tool useful for application on various watersheds and allowing calibration. The final outputs are pollutant and erosion rasters. The decision-makers can use QNSPECT's quick run time, the use of QGIS as an interface, and the supporting tools available in the package to quickly modify inputs and run multiple land-use and precipitation scenarios and then compare the impact of each on pollution and erosion.

Return to Table

BOEM's Enhanced ESPIS

Alexa Ramirez, NV5 Geospatial; Jonathan Blythe, BOEM ESP

BOEM's Environmental Studies Program (ESP) produces data and information on physical, biological, oceanographic and social sciences to support Environmental Analyses and Environmental Impact Statements that are required under the National Environmental Policy Act (NEPA). The primary customers for this information are the environmental assessment analysts within BOEM who carry out NEPA analysis and consultations. The Environmental Studies Program Information System (ESPIS) plays a unique role as the dissemination tool for the BOEM ESP, which accounts for all study reports and products produced from every one of its 2000+ studies conducted over the past 50 years. Recently, BOEM contracted with NV5 to enhance ESPIS to better communicate to the general public BOEM's purpose in conducting each of its studies. A new front end application leveraging ESRI's ArcGIS Online Hub and Web Experience Builder applications and hosted in BOEM's geoSEAS environment will reduce maintenance costs associated with custom code applications and streamline BOEM's ability to update the application with new information. This site along with ESP's past investments in geospatial footprints depicting the applicable areas for studies information will provide a new way for the general public to explore and identify ESP studies information. The culmination of this enhancement effort is a curated collection of over 50 "theme pages" that are targeted to specific BOEM information uses and are better suited to reach and communicate BOEM's environmental mission to a broader, non-technical audience.

Return to Table

Tools and Visualizations for Assessing and Communicating Sea Level Rise and Coastal Flood Risk

Dan Rizza and Kelly Van Baalen, Climate Central

Floods already cause an average of over $5 billion of damages in the U.S. annually (FEMA 2022). With sea levels projected to rise about a foot and multiply the frequency of moderate flooding ten-fold by 2050 (NOAA 2022), it is more imperative than ever that coastal resource management professionals have the tools they need to assess the risks posed by sea level rise and coastal flooding and communicate those risks to the public.

Climate Central has created online tools, maps, and visualizations, grounded in peer-reviewed research, to help coastal professionals assess and communicate sea level rise and coastal flood risk. Our Coastal Risk Screening Tool (coastal.climatecentral.org) maps the areas at risk

from coastal flooding and sea level rise under different climate and flooding scenarios. Our Risk Finder tool (riskfinder.org) provides detailed information on the people, infrastructure, and contamination risks exposed to different flood levels. Our Sinking Tax Base tool (climatecentral.org/tools/sinking-tax-base), provides county-level assessments of the risk sea level rise poses to private properties and the local taxes they generate. Finally, our photorealistic images and fly-over videos (picturing.climatecentral.org) depict what hundreds of iconic locations around the world could look like after sea levels rise. These tools and visualizations have been shared by the news media thousands of times, used by millions of people, and featured at the UN climate conference.

In this tools showcase, we will walk the audience through our toolkit, provide examples of how our tools and visualizations have been used by coastal stakeholders and professionals, and seek input from the audience regarding their needs to inform our next generation of tools.

Return to Table

Adapting Stormwater Management for Coastal Floods

Brenna Sweetman, NOAA Office for Coastal Management

NO ABSTRACT PROVIDED

GeoCoast Tools

John van der Zwaag and John Cartwright, Mississippi State University

GeoCoast Tools is a suite of web applications that gives users multiple methods to interactively visualize the effects of inundation along the Gulf Coast. GeoCoast3D is a 3D web application that allows users to navigate a 3D map of the coastal regions complete with topography, roads, and buildings generated from QL2 LiDAR data collected along the Gulf Coast in 2015. Users can choose from several different types of inundation including a basic sea level rise model based on the ground elevation data, NOAA's sea level rise data, a Katrina storm surge hindcast model, and NOAA's Effects of Sea Level Rise (ESLR) data. The application renders an inundation surface colored by depth so users can easily see the potential extent of inundation that could affect coastal cities. Likewise, the roads and 3D buildings are colored by the amount of inundation so users can also quickly visualize the impact on residences and businesses. In addition, routing and service area tools are included that show the impact to transportation and critical infrastructure. The additional applications, GeoInundation and GeoPanorama, compliment GeoCoast3D by highlighting specific locations along the Gulf Coast with more detailed visualizations. GeoInundation uses detailed, realistic models generated from LiDAR data, satellite imagery, and photographs. GeoPanorama combines 360° panoramic photos with LiDAR data to create immersive, realistic virtual reality experiences. Both GeoInundation and GeoPanorama allow the user to interactively raise and lower the water surface or select from specific high water marks such as Hurricane Katrina or Hurricane Camille.

Return to Table

2023 GeoTools Abstracts

Demonstration of the NWS Eastern Region Coastal Flood Webpage with Potential Coastal Flood Extent Overlays

Nelson Vaz, Jeff Orrock, Laurie Hogan, Donald Dumont, James Notchey, Chris Birchfield, Kirk Lombardy, NOAA National Weather Service

During the extratropical storm season, NWS stakeholders and partners need coastal flood hazard and impact information, particularly flood visualizations, for effective decision making and planning. The NWS Eastern Region Coastal Flood Webpage was debuted in the Spring of 2021, as a one stop coastal flood and marine hazards page with a consistent look and feel between offices. This webpage is intended to enhance the communication of flood impacts by integrating numerous NOAA coastal hazard and impact resources, with official NWS tidal and marine observations, forecasts and alerts, including WFO daily total water level forecasts for over 80 coastal gauge locations.

The second (latest) version of the ER Coastal Flood Webpage, released in Spring of 2022, has now added experimental “Potential Coastal Flood Extent” layers. These layers were created through a collaborative effort between NOAA's Office of Coastal Management (OCM) and NWS Eastern Region (ER), "converging" the NOAA Digital Coast information with coastal gauge Flood Category Thresholds (established by NWS offices and partners). Coupling real-time water level observations, NWS total water level forecasts, and a plethora of coastal hazard and impact resources, with the "Potential Coastal Flood Extent" layers in this web display, now provides a powerful tool for NWS partners and stakeholders to spatially visualize and better plan for coastal flooding impacts ahead of and during extratropical coastal flood events. Stakeholder and public feedback has been overwhelmingly positive during the evaluation period. These maps represent a successful partnership between NOAA agencies to address a long-standing service gap from the National Weather Service. This presentation will demonstrate how the ER Coastal Flood Webpage with “Potential Coastal Flood Extent” layers is utilized by the NWS, its partners and the public to better plan and prepare for threats to life and property from coastal hazards

Return to Table

The Mid-Atlantic Ocean Data Portal

Avalon Bristow and Nick Napoli, MARCO; Karl Vilacoba and Tony MacDonald, Monmouth University Urban Coast Institute; John Bognar, Richard Lathrop, and Jim Trimble, Rutgers University Center for Remote Sensing and Spatial Analysis (CRSSA); Ryan Hodges, Ecotrust; Corrie Curtice, Duke University Marine Geospatial Ecology Lab; Jeff Herter, New York State Department of State

NO ABSTRACT PROVIDED

U.S. Interagency Elevation Inventory

Kirk Waters, NOAA Office for Coastal Management; Rebecca Mataosky, CSS at NOAA Office for Coastal Management

The U.S. Interagency Elevation Inventory (USIEI) is a tool that provides information and access to publicly available high-accuracy topographic and bathymetric source elevation data for the United States and its territories. It’s your first stop when looking for existing elevation data for a wide range of projects, including coastal inundation mapping. The inventory is actively

maintained by multiple agencies and covers federal, state, and local datasets. The tool interface has been updated to provide the user with not only a new look and feel, but with access to additional search capabilities, more filtering options, and additional dataset information. One of the additional pieces of information that has been added is a link to datasets in cloud-friendly formats, such as Entwine Point Tiles (EPT. These links allow the user to view and interact with the lidar point cloud without having to download all the data.

Return to Table

2023 GeoTools Abstracts

Preparing for Inundation in Coastal Virginia

Harnessing Data to Create a Call for Action for Virginia's Coastal Master Plan
Brian Batten, Johanna Greenspan-Johnston, Seth Lawler, Mat Mampara, Alec Brazeau, Eric King, Ravi Pavuluri, Alaurah Moss, Joel Plummer, and Jeff Gangai, Dewberry

The Commonwealth of Virginia has the highest rate of sea level rise on the east coast, the third highest in the nation, just behind Texas and Louisiana. Increased sea levels have already resulted in tangible increases in flood frequency and impacts. Virginia has over six thousand miles of diverse coastline, with over 6 million residents and over 78% of the state's GDP in coastal areas. While several Virginia communities have made significant progress in advancing adaptation plans, the state lacked a coordinated effort to increase coastal resiliency.

In 2021, Virginia completed Phase One of their Coastal Resilience Master Plan. The long-term effort seeks to bring a whole of government approach, equity, a broader viewpoint, and a funding strategy to address Virginia's coastal resilience needs. Phase 1 was the first step down this pathway and focused on 1) developing consistent state-wide existing and future condition coastal flood hazard data, 2) understanding the potential impacts of these changing flood conditions on communities, critical and natural infrastructure, and the social fabric, 3) inventorying state-wide capacity building and resilience project needs, 4) establishing a project prioritization framework, and 4) assessing funding opportunities.
Our presentation will provide an overview of how we established a robust data-driven approach leveraging cloud-based computing to enable completion of the state's objectives in a rapid eight-month timeframe. This includes high-resolution spatial mapping of an array of flood events from tidal to storm surge conditions and presenting them as a graduated flood hazard product to communicate changing flood extent and frequency. Other topics will include vulnerability assessment, exposure and economic flood loss metrics, down-scaling demographic data to identify highly socially vulnerable communities with flood risk, a geospatial project database, and a relational network to "matchmake" funding opportunities with different project types.

Return to Table

Highs and Lows of Low-Relief Coastal Inundation: Hydro-correction, Topobathy Models, and Hypsometry in Hampton Roads, Virginia
Thomas Allen, George McLeod, and Yin-Hsuen Chen, Old Dominion University

LiDAR derived digital elevation models have extended the geospatial science of digital terrain analysis and enabled revolutionary advances in coastal inundation ranging from storm surges to environmental modeling to sea level rise risk assessments. Nonetheless, there remain lingering limitations to the application of DEMs such as accuracy in marshes, complex coastal urban topography, geographic variability of data quality, and primarily low-resolution shallow bathymetry data available for inundation modeling. This presentation describes an integrative approach to improve DEMs in low-relief coastal Hampton Roads, Virginia, spanning urban to rural areas. The approach targets communities at acute risk to storm surge as well as those susceptible to chronic tidal flooding with sea level rise. Techniques assimilated include siting, installation, and integration of IoT flood and water level sensor networks, deploying small Uncrewed Aerial Systems (sUAS) to capture fine-scale features requiring hydro-correction, enhancing shallow-water bathymetric data with small Autonomous Surface Vessel (sASV) surveys, tools to analyze seamless topobathy sUAS/sASV and LiDAR data, and developing GIS tools to improve DEMs for nested hydrodynamic modeling. Specific applications described in the talk will highlight algorithms to detect and map coastal ditches and implement

stream-burning, assess isolated low-relief depressions versus DEM “pits” using “Blue Spot” mapping and storm water GIS infrastructure, and deriving hydro-hypsometric curves from coastal DEMs to assess future tidal flooding exposure with sea level rise. Practical results and implications are described as well, including assessments of inundation modeling accuracy with and without hydro-corrections and uncertainty when evaluating multiple flood hazard parameters such as errors of flood omission, commission, timing of onset, flood release and flood duration. The presentation concludes with plans to share tools and data in a dedicated hub site and to demonstrate them in future emergency management exercise and planning scenarios.

Return to Table

Resilient Design Guidelines for Hampton Roads
Benjamin McFarlane, Hampton Roads Planning District Commission

Southeastern Virginia is one of the most vulnerable regions in the United States to coastal flooding and sea level rise. For more than a decade, the Hampton Roads Planning District Commission (HRPDC) has focused on developing policy recommendations, vulnerability analyses, GIS data, and mapping products to aid its member jurisdictions and other local, regional, and state entities in Virginia in addressing these challenges. Since 2020, one of the focuses of the HRPDC’s Coastal Resiliency Program has been the development of resilient design guidelines for floodplain and stormwater management. These guidelines build on state and federal data products, including those from FEMA, NOAA, USACE, and others, recent climate research, and local initiatives. The goals of this effort are to have easily accessible data products and policy recommendations for the HRPDC’s member local governments to incorporate into their individual plans, policies, and regulations. The guidelines are divided into three sections: regional projections of future climatic conditions, applications of those conditions to specific policy questions, and technical resources (including methodologies, tables, and GIS layers). Specific policy applications include regional sea level rise planning scenarios (based on the 2022 NOAA Sea Level Rise Technical Report), projected future floodplains, tailwater elevations, precipitation levels, and compound design storms that incorporate both tides and rainfall. This effort has been coordinated with the HRPDC’s local governments through its Coastal Resiliency Committee and with other governmental, non-governmental, and academic partners at the local, regional, state, and federal levels. Incorporation of these recommendations into local policies such as design standards and zoning ordinances will allow localities to reduce their current and future flood risk.

Return to Table

Estimating the Economic Impact of Sea Level Rise in Coastal Virginia, a GIS-based Approach
George McLeod and Yin-Hsuen Chen, Old Dominion University

Estimating the economic impact of recurrent flooding is an essential element of flood risk management. Policy interventions to mitigate the impact of recurrent flooding must be balanced against the financial and economic costs of flooding. Using NOAA projections of sea level rise for 2040, 2060, and 2080 and estimates of storm damage for unique events, we utilize GIS desktop software and HAZUS-MH to investigate the financial costs of recurrent flooding across planning districts in the Commonwealth of Virginia. We briefly discuss the methodology to estimate the annual expected damage (AED) given discrete events and likelihoods and how these AEDs flow into the estimation of the net present value of recurrent flooding in Coastal Virginia.

Return to Table

2023 GeoTools Abstracts

Short and Sweet: Modeling and Mapping in the Coastal Zone

Continuously-Updated Digital Elevation Models (CUDEMs) to support Coastal Inundation Modeling

Christopher Amante, Matthew Love, Kelly Carignan,Michael MacFerrin, Elliot Lim, and Kelly Stroker, NOAA National Centers for Environmental Information

The National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI) develops digital elevation models (DEMs) that range from the local to global scale. Collectively, these elevation models are essential to determining the timing and extent of coastal inundation and improving community preparedness, event forecasting, and warning systems. We initiated a comprehensive framework at NCEI, the Continuously-Updated DEM (CUDEM) Program, with seamless bare-earth, topographic-bathymetric and bathymetric DEMs for the entire United States (U.S.) Atlantic and Gulf of Mexico Coasts, Hawaii, American Territories, and portions of the U.S. Pacific Coast. We generate the CUDEMs through a standardized process using free and open-source software (FOSS) and provide open-access to our code repository. The CUDEM framework consists of systematic tiled geographic extents, spatial resolutions, and horizontal and vertical datums to facilitate rapid updates of targeted areas with new data collections, especially post-storm and tsunami events. The CUDEM Program is also enabling the rapid incorporation of high-resolution data collections ingested into local-scale DEMs into NOAA NCEI's suite of regional and global DEMs. We will discuss recent progress and future directions of the CUDEM Program.

Return to Table

Building the United States National Bathymetry

Katrina Wyllie and Glen Rice, NOAA Office of Coast Survey; Phuntsok Geleg Lynker at NOAA Office of Coast Survey; Casiano KoprowskiSFI; Barry Gallagher and Miya Pavlock, NOAA Office of Coast Survey; Bill Shi, Lynker NOAA Office of Coast Survey; Kurt Brown, NOAA Office of Coast Survey

The Office of Coast Survey has established the National Bathymetric Source to support its navigational and hydrographic survey mandates with the best available bathymetry. As a maintained and metadata rich compilation of bathymetric data, these data can also support multiple sectors and stakeholders in the new blue economy and help support resilient coastal communities. Built for throughput, the phases of the National Bathymetric Source workflow (discover, normalize, combine, and pipeline generation) are discussed in terms of their value to the process and the effort required to move data through to delivery. In addition, we describe the types of data sources, vertical datums, data formats, data licenses, and access for each of the five delivery pipelines currently generated.

Return to Table

Coastal Mapping with PlanetScope Data

Corbin Kling, Katie Salvaggio, and Erik Friesen, Planet Federal

A warming climate is accelerating changes in coastlines due to rising sea levels and extreme weather events, which are increasing in both frequency and intensity. Monitoring and quantifying the changes along sandy coastlines is key to understanding their complex behavior and the risk to local communities. With a global archive dating back to 2009, near daily revisits, and 3.7-meter spatial resolution, Planet's PlanetScope data enables us to quantify changes on finer spatial and temporal scales than has historically been possible with traditional satellite data from

platforms such as Landsat or Sentinel. Using open-source coastline detection tools, we demonstrate how PlanetScope data can be used to capture shoreline variability across short term, seasonal, and annual time scales. Leveraging the high temporal resolution of PlanetScope imagery and environmental sensor network records (NOAA CO-OPS tidal gauges), we utilize only imagery from high- or low-tide events. This enables a comprehensive look at changes in sea level and coastlines without having to correct for imagery collected during times of intermediate tidal activity. We also note that PlanetScope and RapidEye imagery is available to all researchers through the NASA CSDA program. Users approved for the program can access the entire archive of Planetscope and RapidEye imagery, and can download up to 5,000,000 square kilometers of data per contract period.

Return to Table

Database of Topo-Bathy Cross-Shore Profiles and Characteristics for the U.S. Atlantic and Gulf of Mexico Sandy Coastlines
Rangley Mickey and Davina Passeri, U.S. Geological Survey

A database of seamless topographic and bathymetric profiles and their associated morphologic characteristics was recently generated to serve as inputs for current and future morphological modeling studies along the Atlantic and Gulf of Mexico sandy shorelines. The database consists of 3989 sandy beach cross-shore profiles spanning from landward of the foredune to the 20-meter depth contour at locations along the Atlantic and Gulf of Mexico coastlines at alongshore resolutions of 0.5 kilometers to 2.5 kilometers, with cross-shore resolution ranging from 2.5 meters for the subaerial portion of the profile down through the nearshore and up to 10 meters in the offshore. The topographic portion of the profiles were derived from the latest available lidar ranging from 2011-2020 and cover the area landward from the shoreline. The bathymetric portion was extracted from the National Oceanic and Atmospheric Administration's Continuously Updated Digital Elevation Model (CUDEM) and span seaward from the shoreline to a depth of 20 meters. The seamless connection of these two datasets at each alongshore location provides a representative profile for that specific area which can be used as inputs for various 1-dimesional morphologic and hydrodynamic modeling studies. Furthermore, each of the 3989 profiles have topographic morphological metrics extracted or calculated that include: foredune crest elevation, foredune toe elevation, foredune width, foredune volume, foredune relative height, beach width, beach volume, beach slope, and nearshore slope. While these are the most prominently used morphometrics associated with coastal morphology studies, by providing the full topo-bathy profile users can derive more specific metrics that would better serve their study. The database presented here provides coastal scientists with a rich data source of coastal morphological factors that can inform geological, hydrodynamic, ecological, and engineering studies across varying spatial scales at the local, regional, and national level.

Return to Table

A GIS Database for Wastewater Facilities and Outfalls to Support Ocean Planning
Tara Franey and Jeremy Fontenault, RPS; Daniel Martin CSS at NOAA Office of Coastal Management; Lisa Wickliffe, CSS at NOAA National Centers for Coastal Ocean Science

In 2021 and 2022, RPS worked with NOAA's Office of Coastal Management and Dewberry to develop a GIS database of coastal wastewater facilities, outfalls, and outfall pipes. This database, which was created for incorporation in the NOAA OceanReports Tool and MarineCadastre.gov, covers all US coastal waters and navigable waterways that connect to coastal waters. These features were compiled for all publicly owned treatment works (POTW), other privately owned wastewater treatment facilities of substantial size, large power generation plants, and other large facilities that discharge to surface water. The wastewater outfalls dataset

can be used to identify the location of wastewater discharges directly into or upstream of coastal waters, which may be especially useful in the context of coastal uses that are particularly water quality sensitive, such as aquaculture.

This presentation will highlight the design and scope of the dataset, the original data sources, and supplementary data used to confirm and emend the original data. Starting from EPA National Pollutant Discharge Elimination System (NPDES) permit and facility information databases, a variety of other datasets were extensively referenced to confirm or improve accuracy, relevancy, and currency of the information. The presentation will also detail the workflow required to ensure the data quality and consistency for a dataset that covers multiple states and territories and describe some of the unique issues encountered and solutions developed throughout the process.

Return to Table

Potomac River 2 Topo/Bathymetric Non-Tidal Lidar Collection
Roger Barlow, Jeff Danielson, and John Young, U.S. Geological Survey-National Mapping Program

A brief review of the of Potomac River topo/bathy airborne lidar acquisition from October 2021, a continuation upstream of the October 2019 Potomac River non-tidal airborne lidar. Additional bathy data was acquired from boat sonar upstream of two dams to supplement the airborne topo/bathy lidar. Wading GPS bathymetric points and roving topographic points were collected by fields teams to aid in data calibration. This project review will show instrumentation differences between the Potomac 1 and Potomac 2 projects, data use cases, and a data issue resolved. USGS validated this data September 23, 2022. The Potomac 2 data is not yet publicly available at the time of this abstract submission, but is expected to be available by the time of this presentation. The final portion of this presentation will look ahead to the next river section planned for collection.

Return to Table

Space-Based Coastal Profiling
Kyle Goodrich, TCarta Marine LLC

Elevation profiling is a tried-and-true method within coastal modeling, hydrographic and hydrologic fields to provide rapid 3-dimensional assessment of a location. Traditional collection methods include site surveys and diver surveys. In coastal areas, mobilization and access challenges increase risk, reduce sampling numbers and contribute to high cost.

The ICESat-2 sensor provides the potential to produce accurate, remotely-collected coastal profiles both in the nearshore and onshore environments using a space-based green LiDAR system. These capabilities have been game-changing in the Satellite Derived Bathymetry and coastal surveying communities, providing modern and accurate elevation profiles for remote atolls and Arctic regions, in locations with dynamic geomorphologies and variable seabed compositions.

This short and sweet presentation will focus on demonstrating ICESat-2 coastal elevation profiling capabilities in diverse global locations including enhanced and interactive visualization techniques and dissemination platforms.

Return to Table

2023 GeoTools Abstracts

Assessment Tools for Predicting Infrastructure Impacts from Flooding

FIMAN-T Surge: Predictive Statewide Coastal Inundation Mapping for Road Networks
Matthew Dudley, ESP Associates, Inc.; Kurt Golembesky, North Carolina Department of Transportation

During Hurricane Florence, the State of North Carolina experienced significant flooding that included unprecedented impacts to the transportation system in the eastern part of the state. Many roads, including Interstate Highways were inundated and closed for days, impacting not only routine travel throughout the state, but the ability for emergency responders to reach areas in need. During and immediately following the event, many questions concerning impacts to the transportation system arose from Sr leadership that could not be readily answered. To assist the NCDOT, ESP is developing FIMAN-T Surge, a web application that can be used to provide predictive flood inundation and depths along roads. The application uses ADCIRC model results from UNC's RENCI center to develop detailed inundation mapping and road inundation products for the entire coast. This data is compiled using an automated workflow which kicks off following ADCIRC model result availability after the National Hurricane Center issues each published advisory during an active tropical system. This presentation will overview the features of the web application and how it can be used for planning by emergency management officials prior to the onset of storm surge.

Return to Table

A Tool For Probabilistic Assessment of Damage to Residential Structures From Coastal Erosion
Jeff Gangai and Joel Plummer, Dewberry; Lauren Schmied and Betsy Hicks, Federal Emergency Management Agency

The Federal Emergency Management Agency (FEMA) is exploring data and tools that can help provide an improved understanding of coastal flood hazards and associated risks. This evolution necessitates the investigation into a more comprehensive understanding of flood hazard and risk. Typically, flood hazard analyses rely on deterministic methods to assess risk or a binary categorization of hazard and risk. The Future of Flood Risk Data (FFRD) framework is moving towards a more robust graduated hazard and risk assessment, which can incorporate Average Annualized Loss (AAL) as a metric for structure specific information and hazard specific damage. These AAL calculations are used to represent a structure's risk to a wide cross-section of flood frequencies and associated hazard conditions. Coastal episodic erosion is driven by coastal storm surge and waves, which FEMA has traditionally assessed using a single deterministic value, based on the 1-percent-annual-chance event. This effort expands that approach by evaluating storm-induced erosion across multiple frequencies to provide data for estimating erosion damages to structures and calculating the structure's AAL due to the storm-induced erosion hazard. A tool was developed using open-source software to quantify storm-induced erosion risk at coastal residential structures using a Monte Carlo simulation of random storm events. This framework enables a shift from binary to graduated risk, as well as an AAL calculation that better represents the full range of site-specific erosion hazards. The tool reads in geospatial files and tables, performs geospatial operations, calculates the erosion on profiles using FEMA's storm-induced erosion methods, and outputs geospatial files for ease of viewing and interpreting the results. Our presentation will provide an overview of the multi-frequency erosion methodology, the implementation of the methodology in the coastal erosion AAL tool, sensitivities to the approach and assumptions, as well as lessons-learned from the effort.

Return to Table

2023 GeoTools Abstracts

Resiliency, Climate Change and Sea Level Rise: Success Stories from the U.S. Navy's Naval Facilities Engineering Systems Command
Paul Braun, Axim Geospatial

The U.S. Navy's Naval Facilities Engineering Systems Command (NAVFAC) is a leader across the Defense Department in employing geospatial data, technology, and applications to assess risks due to improve installation resilience, assess climate change and sea level risk, mitigate those challenges and be a good environmental steward via activities such as effective energy management. Axim has been supporting NAVFAC since 2007 to design, build, deploy and support applications that assist NAVFAC leadership to accomplish these tasks.

This presentation will showcase several GIS applications that are in active use to meet the challenges of climate change, sea level rise and resiliency. At a minimum, two such examples will be presented. The Navy Shore Geospatial Energy Module (NSGEM) an interactive web map and reporting tool that provides the Navy with a standardized, transparent view of authoritative energy security data and metrics. NSGEM integrates a variety of data from authoritative sources, including real property, consumption data, NOAA weather data, and others. Initially created as a tool for visualizing data at an enterprise level, NSGEM evolved into a tool that enabled all levels of the Navy enterprise (region, installation, facility, tenants, etc.) to visualize their energy consumption data and metrics. In addition to expanding on data visualization capabilities, NSGEM has added capabilities that enable various methods of reporting, analysis, and collaboration. The second application is the Flood Inundation and Surge Hazard (FISH) tool. FISH empowers Navy end users to perform analysis of flood impacts on Navy assets in order to understand, mitigate, and respond to those challenges. Ultimately, FISH gives the Navy and its stakeholders a deeper understanding of flooding, its threats, and potential mitigation, to more effectively and efficiently protect Navy assets.

FISH was quickly updated recently to ingest additional content to support risk assessment of Hurricane Ian.

Return to Table

Geiger-Mode Lidar Capabilities and How it Can Help Predict Infrastructure Impacts from Flooding
Matthew Falter, VeriDaaS Corporation

NO ABSTRACT AVAILABLE

2023 GeoTools Abstracts

Data and Tools for Assessing Coastal Resiliency

Coastal Change Likelihood - A Synthesis of Factors that Drive Future Coastal Change
Travis Sterne, Elizabeth Pendleton, Erika Lentz, and Rachel Henderson, U.S. Geological Survey

Coastal environments are increasingly impacted by erosion, extreme weather events, sea-level rise, nuisance flooding, and other potential hazards related to climate change. These hazards have unique impacts on coastal landforms due to the varying spatial, geologic, and ecological factors that exist at a given location. To better address these hazards, the U.S. Geological Survey has updated its coastal vulnerability index (CVI) to sea-level rise assessment that was conducted 20 years ago with a new product, Coastal Change Likelihood (CCL). CCL preserves the decision support focus and analysis of geologic properties and hazards that influence coastal change, while applying advances in spatial analysis, source data, resolution, and timescales of anticipated coastal change. CCL utilizes over twenty datasets derived from a variety of federal, state, and local sources that describe the coastal landscape type and define six common coastal hazards. A supervised machine learning framework is used to synthesize these geospatial datasets and related hazards to determine a likelihood of coastal change in the coming decade. Results are location-specific at 10-meter resolution for a pilot study in the Northeastern U.S. (Maine to Virginia) and include five raster datasets: (1) landscape resistance to change, (2 & 3) event-driven and perpetual coastal hazards, and (4 & 5) two machine learning outputs based on the cumulative effects of these hazards on the coastal landscape. In order to assess the accuracy of the results, a series of tests were conducted on the source data, output data, the outcomes as compared to historical landcover change, and two site-specific studies of local-scale accuracy. Final published datasets are intended to be used as a first order planning tool to determine which areas of the coast are likely to change in response to future coastal hazards, as well as to examine factors that make coastal change more or less likely.

Return to Table

A Geospatial Coastal Resilience Assessment for the United States
Greg Dobson, Ian Johnson, Jessica Orlando, University of North Carolina Asheville's NEMAC; Kristen Byler, National Fish and Wildlife Foundation; Bridget Lussier, Lynker at NOAA Office for Coastal Management

As sea levels rise and coastal storm events occur with increased intensity and frequency, many coastal communities—both human and natural—have become more exposed to the resulting impacts. A recent project led by the National Fish and Wildlife Foundation, NOAA, and UNC Asheville's National Environmental Modeling and Analysis Center has produced GIS-based Regional Coastal Resilience Assessments for all U.S. coastlines. These assessments identify areas of open space where implementing nature-based solutions, such as wetland restoration, has the greatest potential to benefit fish and wildlife while also building resilience for communities exposed to flooding threats.

Through the integration of geospatial analyses using raster modeling and spatial analytical techniques, two key composite index layers were created to (1) inform areas of high flooding threat, and (2) to highlight areas of dense critical community assets and population. These two composite index layers were combined to generate a final community exposure index that showed where community assets are exposed to coastal flood threats. Two additional composite index layers were also generated to show the presence of terrestrial and aquatic fish and wildlife species, combining to create a final fish and wildlife index.

Finally, resilience hubs were developed to provide a lens with which the community exposure and fish and wildlife indices values could be analyzed and ranked to better understand where proposed mitigation and restoration projects could be most favorably located. These resilience hubs identify natural open spaces or habitats suitable for conservation or restoration efforts capable of generating dual benefits for protecting fish and wildlife habitat while also building resilience of coastal communities.

The assessments are delivered through a custom interactive mapping tool called the Coastal Resilience Evaluation and Siting Tool (CREST), in which users can view and interact with the assessment results, analyze possible project sites, and download input and final data.

Return to Table

The Community Resilience Guide: A Resource for Reducing Repetitive Flood Losses and Enhancing Coastal Resilience
Eleanor Rappolee, Association of State Floodplain Managers

With higher sea levels, heavier rain, and more people living along coastlines, there is a higher risk of repetitive flood losses. The number of repetitive flood loss properties has increased by 3,000 per year in recent years and has cost the National Flood Insurance Program more than $12.5 billion - making up about half of the program's $23 billion debt. Flood claims frequently go towards repairing the property without reducing the flood risk, perpetuating the issue and putting a financial burden on taxpayers. Addressing repetitive loss properties is a multi-dimensional process that requires involvement from all levels of government; consideration of economic, environmental, and social factors; and effective floodplain management. Local floodplain managers are often not well-equipped to handle such a complex process and face numerous barriers, many of which relate to understanding the community's flood risk, communicating effectively with stakeholders, and acquiring funding for implementing mitigation strategies. To address these barriers and increase community resilience towards coastal flood hazards, ASFPM and CSO are designing a Community Resilience Guide for Repetitive Flood Losses to provide technical guidance and training for local floodplain managers. This presentation will showcase the Community Resilience Guide website and training on mapping and communicating coastal flood risk, as well as discuss next steps for expanding the guide to reach more communities at risk of flooding across the coastal U.S.

Return to Table

Evaluating Socioeconomic Indicators for Coastal Resilience
Brenna Sweetman, Kate Quigley, and Chris Ellis, NOAA Office for Coastal Management

A critical element of coastal resilience and hazard planning is understanding the underlying vulnerabilities of a community. There are a variety of indicators, indices and tools in use across local, state, and federal governments; academic partners; and nonprofits. These indicators are used to identify vulnerable communities for planning, technical assistance, grants, and other services. However, there is limited understanding of how appropriate these indicators are for different coastal geographic regions. These indicators and indices can be used to signal areas that need attention where resources might best be focused to support resilience and better address coastal inundation challenges. The goal of this project with NOAA and TetraTech is to review and evaluate socioeconomic indicators in use to help local communities build long term ecological, economic and social resilience to climate impacts.

Return to Table

2023 GeoTools Abstracts

Marine Spatial Planning Decision Support Tools

Development and Application of Advanced Decision Support Tools for Coastal Sand Resources: A Case Study from Bogue Banks, North Carolina

Lisa Wickliffe, Hannajane Prichett, Ashley Reade, Alexa Ramirez, Kurt Baker, Rudi Rudolph, Dave Bernstein, Chris Freeman, and Cherie Jarvis, NV5 Geospatial

Sand is considered a critical coastal resource for the Southeast United States, both from socioeconomic and ecological standpoints. Sand is used as a means to replenish (i.e., nourish) beaches visited by millions of tourists each year, as well as acting as valuable offshore habitat in the form of sand shoals. As a finite and diminishing resource in many coastal areas, County, State, and Federal entities are searching for innovative ways to determine locations and quantities of future sources of beach compatible sand for nourishment and how geophysical and geotechnical data can be leveraged to guide decision-making. As a case study for how these methods can be developed and applied; we present a scenario from Carteret County, a coastal county in eastern North Carolina, seeking intelligence on where the next fifty-year sand resource areas are located. First, reconnaissance-level data (e.g., sediment type, sediment thickness) for the Bogue Banks area were collected, processed, and formatted to use within a GIS-based sand search model to determine where beach quality sand was present. Next, outputs from the sand search model were applied in a secondary model to determine logistical factors (e.g., distance from shore) and constraint factors (i.e., areas to avoid for sand mining) ultimately distinguishing potential sand reserve areas (good quality sand that could be economically extracted) from sand resource areas (marginal quality sand that may be difficult to extract). Lastly, data are also being used to develop a public-facing tool where users can explore all datasets, establishing a transparent framework to share results for resource manager decision-making. The local application of these innovative methods and tools can be modified and applied to a multitude of US coastal areas seeking sand resource/reserve identification and prioritization in a sustainable and balanced manner.

Return to Table

Southeast Marine Mapping Tool: Increasing Access to Regional Ecological Data to Help Inform Offshore Ocean Use Decisions

Marta Ribera, Mary Conley, Erik Martin, and Mark Anderson, The Nature Conservancy

The nearshore ocean across the United States is facing a growth in marine uses, including wind energy sites or sand dredging. Informed siting of these uses can help mitigate the impact of these marine ecosystems and with existing uses. The southeast United States (NC, SC, GA, and FL) is not exempt from the increase in ocean uses and access to regional ecological data to provide context when making decisions on offshore development is limited. The Southeast Marine Mapping Tool (https://maps.tnc.org/marinemap/se) was developed to help fill that gap, allowing users to access an array of information available for a given ocean space.

Developed in collaboration with technical and management partners from across the region, the Southeast Marine Mapping Tool leverages, compiles and interprets existing regional-scale marine life, habitat and management data. The tool facilitates access to data layers which previously may have only been available independently. Information on features, species and people are presented to provide spatial and historical context. With funding through the Southeast Coastal Ocean Observing Regional Association (SECOORA), The Nature Conservancy continues to work with potential users to refine the tool. This presentation is an opportunity to learn about the tool and how to get engaged.

Return to Table

2023 GeoTools Abstracts

Alabama Offshore Sediment Resources Inventory
David Tidwell and Stephen Jones, Geological Survey of Alabama

The Geological Survey of Alabama (GSA) initially developed the Offshore Alabama Sand Information System (OASIS) to provide stakeholders the geospatial coverage of legacy geophysical and geotechnical sediment and depositional characterization. Through an on-going cooperative with the Bureau of Ocean Energy Management (BOEM), the GSA is in the process of updating OASIS with additional legacy investigations and a very comprehensive geodatabase. In 2009 the OASIS platform utilized Viewer for Flex technology. Since then, ESRI has improved its Application Programming Interface (API) from Viewer for Flex to HTML/JavaScript. This update improves functionality and allows stakeholders to view interactive maps from mobile devices. In the current BOEM-GSA cooperative, BOEM provided GSA with a robust file geodatabase to display data collected and developed for each study. The file geodatabase is organized by features classes and supporting tables that are linked together by GUIDs. The very nature of the OASIS supports gap analysis as related to offshore geophysical and sediment sampling locations and supported with ancillary data considered as obstacles impeding significant sediment source designations. Quantum Spatial developed the ESRI® ArcToolbox™ SediSearch tool, funded by BOEM; and The Water Institute of the Gulf (WIG) developed the ESRI® ArcToolbox™ Northern Gulf Sediment Availability and Allocation Program (NGSAAP), funded by the Gulf of Mexico Alliance (GOMA). These models support the vertical component of gap analysis by using selected core data criteria to model areas of potentially suitable sediment sources for fitting sediment criteria for restoration projects. This updated OASIS online interactive viewer will aid stakeholders in determining where suitable sediment for nourishment projects is located, generate volume of sediment, support the designation of significant sediment resources areas, and support future sediment investigations and geological research.

Return to Table

Who Should I Talk To? The West Coast Blue Pages Tool and Better Ocean Planning
John Hansen, West Coast Ocean Alliance

The ‘West Coast Blue Pages’ is a new innovative approach to enhancing coordination and communication between government co-managers on the U.S. West Coast focused on existing and emerging ocean uses. The West Coast Blue Pages are organized via geospatial and thematic search functions to link to a database of government contacts corresponding with ocean management topics, providing both government managers and interested stakeholders a new ability to immediately identify contacts related to specific ocean uses and geographies. Geographic classifications of the tool allow state, tribal and federal staff members to first self-identify their interest in ocean management topics in a particular area of the West Coast. By choosing a geographic area or topic to search by, tool users can then identify all related entities and staff members that would like to be notified or have expertise for that ocean topic and/or geographic area. Example management topics include, aquaculture, offshore renewable energy, submarine cables, fisheries and sediment management, among others. Improved engagement on ocean management decisions via the Blue Pages tool will improve understanding of past, current, and future interactions among ocean uses and ecosystems, over time promoting more compatible and sustainable ocean uses on the West Coast. This presentation at Coastal GeoTools 2023 will provide insight into the original impetus for development of the tool, how the tool was technically built with ongoing guidance from the members of the West Coast Ocean Alliance, and early lessons from the tool's launch impacting regional ocean planning on the U.S. West Coast. Over time the West Coast Ocean Alliance hopes that the West Coast Blue Pages tool can be exported to other areas and serve as a model for enhanced regional coordination on ocean management.

Return to Table

2023 GeoTools Abstracts

Geospatial Tool Use Cases

The Sea Level Rise Planning Guide: Fostering Local Capacity for Sea Level Rise Adaptation Planning on the Oregon Coast
Carl Hendrickson, Meg Reed, Christine Shirley, and Tanya Haddad, Oregon Department of Land Conservation and Development

Oregon is experiencing the pervasive effects of sea level rise, which often hit underserved populations, rural communities, and fragile ecosystems the hardest. Along the coast, local governments are on the frontlines responding to sea level rise impacts and will need flexible frameworks to identify options for mitigating harm to people, property, and coastal ecosystems. The Oregon Coastal Management Program (OCMP) has developed The Sea Level Rise Planning Guide (The Guide) to help Oregon's coastal communities address the anticipated impacts from sea level rise. The Guide consists of three parts: a mapping tool, a vulnerability assessment, and adaptation strategy guidance. It can be used by various entities at different levels of government to evaluate a specific geographic region. The mapping tool is designed to help assess locations, populations, and assets at risk from sea level rise related hazards including erosion, flooding, and storm waves. The vulnerability assessment tool helps planners organize and prioritize vulnerable assets using an Excel spreadsheet and provides a structured approach and facilitated process of assessing their vulnerability. The tool assigns scores to each evaluated asset based on location, physical characteristics, services provided, and other factors important to communities, which can be tailored. The adaptation strategy guidance provides a menu of potential adaptation strategies and principles of equitable planning and will be updated with lessons learned over time. A NOAA Coastal Management Fellow is now working with communities on the northern Oregon coast to utilize this newly released toolkit and develop sea level rise adaptation action plans to address their individual risk. Planning for sea level rise is essential to prepare for impacts, identify adaptation strategies, and foster healthy, vibrant, and resilient coastal communities.

Return to Table

QNSPECT: the Next Generation Nonpoint Source Pollution and Erosion Comparison Tool
Shan Burkhalter, Lynker at NOAA Office for Coastal Management; Jamie Carter, NOAA Office for Coastal Management

NSPECT is a long-serving water quality screening tool that predicts, visualizes, and compares the impacts of nonpoint source pollution and erosion for both existing land cover changes and proposed alternative land uses. The Office for Coastal Management continues to serve the coastal resource management community with training, user support, and updates to the NSPECT product. Part of this effort is to provide efficient tools in a cost-free and open-source GIS environment. We find QGIS to be an effective open-source platform, and are pleased to announce the release of QNSPECT: the next generation nonpoint source pollution and erosion comparison plugin. This session describes recent updates and discusses the enhanced functions of the new QNSPECT plugin within QGIS.

Return to Table

2023 GeoTools Abstracts

Efficiency in Realtime GIS Project Management Tools
Dave Neff, Woolpert

Woolpert Inc. has been developing innovative survey technology for decades. The advancement of geospatial mapping technology has increased the ability to collect much higher resolution data at a much faster pace than in years previous. To compliment this fast-paced tempo of acquisition, Woolpert has developed real-time GIS tools for project management, data delivery, and client interaction. These new age tools allow the personnel associated with the project a real-time visibility of field as well as processing efforts. This visibility promotes real-time situational awareness to the entire team. Additionally, these GIS tools offer an ability for Clients to interact with cloud based digital GIS products in an environment that requires no licensing or specialized training, only an internet connection.

Return to Table

Linking NOAA Line Offices through Web Based Geo Application Code
Jay Coady, NOAA Office of Response and Restoration; Kari Sheets and Nipa Parikh, NOAA National Weather Service; Robb Wright, NOAA Office of Response and Restoration

Reduce, reuse, and recycle does not only apply to trash; today's application development teams can reuse and leverage existing code bases to meet their project's needs. This is particularly helpful when teams need to have a specialized skill set and be well versed in navigating through Federal IT security boundaries. Over two years ago, the National Ocean Service and National Weather Service formulated an agreement to share resources across offices, which provided the foundation for future collaboration on web mapping applications. The challenges and benefits are examined in this presentation along with the lessons we learned along the way.

Return to Table

2023 GeoTools Abstracts

Habitat Conservation Using Imagery Analysis

Remote Sensing Applications to Support Large-Scale Riverine and Floodplain Assessment and Monitoring

Mischa Hey, NV5 Geospatial

Remote sensing and spatial analytics have substantial utility to support riverine and floodplain assessment and monitoring at extents not feasible with traditional field surveys. This presentation will provide an overview of relevant technologies such as topobathymetric lidar, sonar, and multiple imagery types, as well processes for integrating and analyzing these data. Broad-scale, objective, and reproducible analytics allow for geographic and temporal comparison across entire river systems to aid in inundation modeling, restoration prioritization, efficacy monitoring, and more. Quantification and mapping of geomorphic features, thermal refugia, floodplain connectivity, riparian vegetation, solar exposure, and water quality are some of the applications we will review. While this presentation is focused mainly on river systems, many of the concepts and data products can be applied similarly to other benthic systems such as ocean or lakes. The goal of this presentation is to provide managers and decision makers information on how remote sensing technologies, data fusion, and analytics can support their operations.

Return to Table

High-Altitude Topographic and Bathymetric Lidar Sensor Field Test Plan and Results

Nathan Hopper, Woolpert

Woolpert wanted to collect bathymetric data at 10,000 feet to meet customer requirements for increased efficiency and flight safety for topo-bathy collections. To accomplish this, the Woolpert team spent the last three years at its maritime research lab developing the Bathymetric Unmanned Littoral LiDar for Operational GEOINT (BULLDOG), a multispectral, multichannel, topo-bathy lidar system that can fly higher and collect more data in less time than previous bathymetric systems. The patented lidar system maximizes the use of three different wavelengths of light—532nm, 647nm, and 1064nm—by distributing them into five distinct channels designed for shallow water, deep water, Raman, infrared and Geiger-mode detectors. This presentation will discuss the details of this emerging technology and the review the results.

Return to Table

2023 GeoTools Abstracts

Using Hyperspectral Remote Sensing for Manoomin (Wild Rice) Habitat Mapping and Restoration in the Great Lakes

Lara O'Brien, Lynker at NOAA Office for Coastal Management; Brandon Krumwiede, NOAA Office for Coastal Management

Manoomin (wild rice) is a keystone species for both the wetland ecosystems and tribal communities in the Great Lakes basin. Unfortunately, manoomin is also highly vulnerable to the impacts of climate change, land development, invasive species, and other threats, which have led to a dramatic decline in manoomin populations. To help support manoomin management and restoration efforts in the region, the National Oceanic and Atmospheric Administration (NOAA) Office for Coastal Management, together with the Bureau of Indian Affairs, collaborated with tribal partners on two projects in the Lake Superior and Lake Michigan-Huron basins. Central to this collaboration was the exchange of cultural and traditional knowledge together with technical assistance, including the use of airborne hyperspectral remote sensing and field data collection and analysis to map and monitor existing manoomin stands.

This presentation will discuss project methods and results as well as various applications of the remote sensing data, including assessing manoomin and other aquatic vegetation and identifying potential suitable habitat for future enhancement and/or restoration projects. Lessons learned for meaningful engagement through workshops and on-the ground coordination with tribal partners will also be discussed, along with other potential applications of the remote sensing methods. NOAA will also provide an update on our upcoming manoomin work, which will continue to focus on addressing remaining geospatial needs and helping develop system resilience indicators to better understand the dynamics and stressors affecting manoomin distribution in the Great Lakes.

Return to Table