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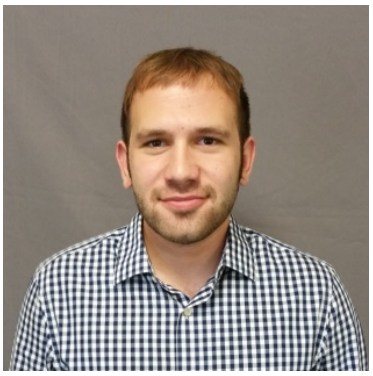

Zachary D. Stromer, M.S.

Coastal Scientist

EXPERTISE

Modeling and analysis of coastal hydrodynamics, waves, and sediment transport processes. Expertise in coastal, estuarine, fluvial geomorphology and sedimentology. Experience utilizing programming languages and software packages to present, analyze, and solve a variety of engineering and scientific problems. Climate change vulnerability assessment and adaptation planning.

QUALIFICATION SUMMARY

- Coastal numerical modeling experience with ADCIRC, SWAN, WHAFIS, SLOSH, ACES, & XBeach.
- Programming experience with MATLAB and Python3
- ArcGIS and QGIS data processing and visualization
- Strong skills in data analysis and interpretation
- Strong research, technical writing, and presentation skills
- Experience navigating HPC linux environments

WORK EXPERIENCE

2016-Present	Woods Hole Group, Inc. (Coastal Scientist)
2014-2016	University of Massachusetts - Amherst (Teaching Assistant)
2014-2016	University of Massachusetts – Amherst (Research Assistant)
2013	Woods Hole Oceanographic Institute (Field/Lab Technician)

Education

2016 – M.S.
Geology
University of Massachusetts – Amherst
2014 – B.S.
Environmental Geology/Chemistry
Northeastern University

Licenses and Registrations

- OSHA 40-Hour HAZWOPER

Publications & Presentations

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KEY PROJECTS

MassDOT Massachusetts Coasts Flood Risk Model
Worked to expand Woods Hole Groups previous award-winning effort, the Boston Harbor Flood Risk Model, to encompass the entire state. The coupled ADCIRC/SWAN model was utilized to simulate both extra-tropical and tropical cyclone events using an ensemble Monte Carlo approach. Probabilistic results are being utilized to identify road and infrastructure risk around the state. The large state-wide grid has also been utilized to analyze tidal conditions across the state, including refining tidal datums and assessing tidal flushing rates for estuaries. Outputs from the model will be made available for use in a variety of applications, such as planning, regulation and risk analysis.

Wave Modeling for Assessing Possible Resiliency Options for The Boston Harbor Islands
Developed regional-scale and local SWAN wave models of Boston Harbor to assess the impact of islands on the wave climate within Boston Harbor. A number of different storm scenarios were simulated. Results were utilized to develop conceptual designs for possible island enhancements with the goal of improving wave protection for both the Harbor and the Islands, as well as improving habitat and recreational opportunities. Conceptual designs were incorporated into a nested SWAN model, as well as a regional-scale ADCIRC hydrodynamic model to determine potential changes in wave/flow conditions.

Climate Adaptations for East Boston, MA
Developed conceptual designs for climate resiliency of several vulnerable sites throughout East Boston. Vulnerable sites were identified utilizing results from the MassDOT Boston Harbor Flood Risk Model (BH-FRM); an ADCIRC/SWAN coupled model incorporating a large suite of storm simulations and SLR scenarios to assess flooding risk throughout Boston. Proposed projects were incorporated into the BH-FRM model, and multiple storm scenarios of varying intensity were simulated to assess project effectiveness. Results from the modeling efforts will be utilized as part of a larger scale, multi-disciplinary project to assess the effectiveness and differences of green and/or grey adaptations for climate resiliency.

Submarine Cable Wave-Induced Current Velocity Analysis – Multiple Sites (Including Annaba, Algeria, East London, South Africa, and others)
Performed dynamical downscaling of coarse ECMWF wave data utilizing SWAN and XBeach wave models to model extreme wave-induced velocities at a number of submarine cable sites along the coast of Africa. The CLS tidal model was utilized for tidal inputs, and GEBCO and satellite-based bathymetry was utilized for grid generation. Long-scale hindcast simulations were run for a variety of wave conditions to calculate the range of extreme orbital velocities experienced at the proposed cable routes for follow-on on assessment of scour/abrasion. Near-surface and near-bottom currents were also assessed for offshore locations utilizing the Mercator Ocean model (describing large-scale background flows), and the FES-2014 model (which describes tidal currents).

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KEY PROJECTS (CONTINUED)

Dune Enhancement Design for Duxbury, MA
Developed conceptual designs for a dune enhancement project at Duxbury Beach. The project goal was to enhance resiliency of the barrier system, and provide storm surge and wave protection. Tested multiple designs and potential configurations under a variety of scenarios utilizing the Xbeach model. Results were utilized to select a final conceptual design. The proposed design was selected for 2019 CZM coastal resilience grant funding for construction.

Multi-Hazard Mitigation Plan Update for Marshfield, MA
Performed an update to the Multi-Hazard Mitigation Plan for the Town of Marshfield to be in compliance with MEMA/FEMA guidance and meet CRS Program requirements. Additional and updated data were acquired on all natural hazards addressed in the plan, and added hazards to match those highlighted by the State. Conducted a vulnerability assessment for Town-identified critical facilities, as well as Town-wide property and assets. Conducted an online survey to incorporate public goals and feedback on specific mitigation actions. Information was provided about the location, extent, frequency, past occurrences and likely impacts of all hazards.

Beach Management Plan for Marshfield, MA
Assisted in the production of a Beach Management Plan for the Town of Marshfield, MA. Work involved compiling existing data for management practices at Marshfield's public beaches. Existing site conditions and historical shoreline change were mapped through site visits and geospatial analysis. Public input regarding management practices was collected and analyzed through an online survey, which collected over 1,000 responses. Potential improvements and additional beach management activities were identified to improve the recreational and/or conservation functions of the public beaches. Recommendations were compiled into a final beach management plan document, and presented at multiple public and internal town meetings.

Technical Evaluation of the Effective 2016 FEMA FIRMs for the Towns of Scituate, Marshfield, and Duxbury, MA
Preformed hydrologic and hydraulic evaluations of the preliminary FEMA FIRMs released in May 2013 for the Towns of Scituate, Marshfield, and Duxbury. This work involved assessment of the methods and models used by FEMA in determining the topography, erosion, overland wave transformation, and wave runup used as inputs in FEMA's models for assessing the 100-yr flood conditions at each transect location. Transects were re-modeled using revised input parameters, and results were utilized to update floods zones and BFEs based on updated modeling results. The work was performed on an accelerated schedule and resulted in an appeal to FEMA for revisions to the FIRMs. The appeal is currently under review by FEMA.

Climate Change and Extreme Weather Vulnerability Assessments for New England Communities
Assisted in the preparation of vulnerability maps, using a both a highly-modified bathtub analysis approach, as well as the results of a highly resolved sea level rise and extreme weather model for a number of New England communities. Preformed model post-processing, QA/QC, and prepared vulnerability maps for use in supporting emergency preparedness and adaptation scoping over various planning horizons – present day, 2030, and 2070.

KEY PROJECTS (CONTINUED)

Shoreline Change Analysis for Middletown, RI
Acquired and georeferenced historical aerial photographs and charts from the 1800s to the present, and utilized these to document the location of mean high water over time along 2 miles of shoreline in Middletown, RI. Performed a shoreline change analysis using the digitized shorelines to compute a historical shoreline change rate, and help inform projections of future shoreline change rates. Compiled data, preformed an error analysis, and wrote a summary report of findings to provide guidance for future work at the site.

Record of Extra-Tropical Cyclone Driven Flooding for the Boston Area
Developed and analyzed historic data and sedimentological records of flooding for the Boston area to assess flood risk. Historic tide gauge tabulations and accounts of extreme flooding allowed for the extension of the record of the most extreme events back 300 years. Sediment cores were collected from a pond in Plymouth to validate these records independent of human modifications to Boston Harbor. Sandy overwash deposits preserved in the cores collected from the back-barrier pond provided evidence of the intensity and timing of these past strong flood events as well as recording extreme flood event occurrences over the past 1000 years. These records suggest an under-assessment of the most extreme flooding events in Boston using solely the modern instrumental data set (95 years long) and generalized extreme value statistics. Results indicate a possible correlation between extra-tropical storm frequency in the Boston area and variations in the NAO and north-south temperature gradients over the past millennium.

PUBLICATIONS & PRESENTATIONS

Stromer, Zachary D. 2017. “A Combined Historical and Sedimentological Reconstruction of Extratropical Cyclone Derived Coastal Flooding in Boston, MA.” Master’s Thesis. University of Massachusetts – Amherst. Amherst, Massachusetts.

Stromer, Zachary D. "Comparing the sediment signature of hurricane sandy with the historic and prehistoric storm deposits." Geological Society of America Abstracts with Programs. Vol. 46. No. 2.

Stromer, Zachary D. “The great colonial hurricane of 1635 – reassessing extreme flood vulnerability for the southern coast of Massachusetts.” Geological Society of America Abstracts with Programs. Vol. 47. No. 2.

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