Education

Ph.D. Mechanical and Ocean Engineering – 2015 Massachusetts Institute of Technology/Woods Hole Oceanographic Institution Joint Program in Oceanography

M.S., Theoretical and Applied Mechanics – 2009 University of Illinois at Urbana Champaign

M.S., Geology – 2009 University of Illinois at Urbana-Champaign

B. A., Physics – 2006 Carleton College

Professional Affiliations

Member, American Geophysical Union (AGU)

Publications and Presentations

17

Mara M. Orescanin, Ph.D., M.S., B.A.

Coastal Engineer

Expertise

Numerical and analytical modeling of coastal hydrodynamic and wave processes using both structured and unstructured grids. Design and implementation of field experiments to support numerical models in coastal settings including tidal inlets and marsh systems. Data quality control and analysis including advanced signal processing of waves, tides, and storm surges. Processing and synthesizing model design with observations and experienced with solving model-data discrepancies. Experience with utilizing software packages and programming languages to present, analyze, and solve engineering and scientific problems.

Qualification Summary

- More than 5 years of diverse professional experience in the fields of coastal sciences and engineering, specializing in the areas of numerical modeling, field collection programs, marsh restoration, sediment transport, and littoral processes
- Strong written and verbal communication skills
- Implemented technically advanced data collection, analysis, and numerical modeling techniques to assess marine, coastal and oceanographic environments
- Numerical model experience with STWAVE, CMS-Flow/Wave, EFDC, and ADCIRC

Work Experience

2014-Present	Coastal and Ocean Engineer, Woods Hole Group
2010-2015	Massachusetts Institute of Technology/Woods Hole Oceanographic Institution (Teaching and Research Assistant)
2008	Shell Oil Company (R&D Summer Intern)
2006-2010	University of Illinois at Urbana Champaign (Teaching and Research Assistant)

Key Projects

The Nature Conservancy – Milford Neck Conservation Area Restoration – Coastal Engineer/Modeler, Field Oceanographer

Is the technical lead for hydrodynamic modeling and supporting field data collection and analysis for a tidal inlet and marsh system near Milford, DE. Key project objectives are to understand and model the existing hydrodynamic conditions in the area and to model alternative flow regimes to maximize tidal flushing in the area. Owing to previous drainage canals in the area, the land previously had been cut off from tidal access to Delaware Bay, and consequently was used as pasture land. Since a breach in the late 1980s, the site has undergone significant morphological change leading to large areas of open water and dying marsh/forests. The objective is to restore damaged areas to functional habitats.

AMEC Foster Wheeler Environment & Infrastructure, Inc. – Supawna Meadows National Wildlife Refuge Marsh Restoration – Coastal Modeler

Is a key project member providing hydrodynamic and wave modeling for the Supawna Meadows National Wildlife Refuge marsh restoration near Salem, NJ. The site has an old, partially submerged breakwater that is limiting tidal circulation within the back marsh. The goals of the project are to assess the risk of wave action on the marsh for typical and storm conditions, as well as to assess circulation within the back channels and marsh and develop a plan to increase tidal flushing within the system thereby restoring natural habitat.

MassDOT – Statewide Project for Climate Change and Extreme Weather Vulnerability Assessments and Adaptation Operations – Coastal Engineer and Modeler

Is a key project member in adapting the mesh from the MassDOT Pilot Project to account for the entire State of Massachusetts. Specifically, all coastlines are increased in resolution and inland extent to account for storm surge within the entire state compared with the Pilot Project. The project objectives are to complete a similar risk analysis of climate change scenarios to the coastal infrastructure of the State of Massachusetts as for the City of Boston in the Pilot Project.

MassDOT – FHWA Pilot Project for Climate Change and Extreme Weather Vulnerability Assessments and Adaptation Options of the Central Artery, Massachusetts Department of Transportation –Coastal Engineer and Modeler

Was a key project member on a technically advanced, leading-edge pilot project for the Federal Highway Administration evaluating the vulnerability to sea level rise and extreme weather events for the Central Artery in Boston, MA. The project combines a vulnerability assessment by conducting a new systems-level assessment and evaluated adaptation options to reduce risk to specific assets. The project also is geared towards integrating climate change vulnerability into MassDOT and FHWA overall practices. A highly resolved, numerical processes model was developed to assess the combined impact of sea level rise, storm events (tropical and extra-tropical), winds, tides, and waves. Results from the model were used to assess risk for various assets throughout the City of Boston, and subsequently investigate adaption options to reduce the identified vulnerabilities and to establish an emergency response plan for tunnel protection and/or shutdown. The investigation also included a cost benefit analysis, which helped MassDOT select the most efficient method of protecting valuable existing assets against today's weather events and future climate impacts. Climate scenarios and combined storm surge and sea level rise were developed for current day, as well as 2070 and 2100.

Publications and Presentations

Orescanin, M. M., B. Raubenheimer, and S. Elgar. "The Effect of Inlet Geometry and Bay Bathymetry on Circulation in a Shallow System: A Lumped Parameter Approach", *in preparation.*

Orescanin, M. M., B. Raubenheimer, and S. Elgar. "Changes in Bay Circulation in an Evolving Multiple Inlet System", *in press.*

Orescanin, M. M., B. Raubenheimer, and S. Elgar. 2014. "The Effects of Changing Geometry and Location of Katama Inlet on Back Bay Circulation, Martha's Vineyard, MA" [Conference: AGU 2014].

Orescanin, M. M. 2014. "Circulation Changes Due to Inlet Migration: Katama Bay, Martha's Vineyard, MA" [Invited Talk, US Army Corps of Engineers, ERDC-CHL, Vicksburg, MS, October 2014].

Orescanin, M. M. 2014. "Circulation Changes Due to Inlet Migration: Katama Bay, Martha's Vineyard, MA", [Invited Talk, Naval Research Labs, Stennis, MS, October 2014].

Orescanin, M., B. Raubenheimer, and S. Elgar. 2014. "Observations of Wave Effects on Inlet Circulation", *Continental Shelf Research,* 2014.

Orescanin, M. M., D. Prisco, J.M. Austin, S.W. and Kieffer. 2014. "Flow of Supersonic Jets Across Flat Plates: Implications for Ground-Level Flow from Volcanic Blasts", *Journal of Geophysical Research: Solid Earth*, 2014.

Orescanin, M. M. 2014. "Circulation within a Multiple Tidal Inlet System: Katama Bay, Martha's Vineyard, MA" [ADCIRC Workshop, 2014].

Orescanin, M., B. Raubenheaimer, and S. Elgar. 2012. "Circulation and Bathymetric Evolution in Katama Bay and Inlet, MA" [Conference: Ocean Sciences 2012].

Freund, J. B., and M.M. Orescanin. 2011. "Cellular Flow in a Small Blood Vessel: Dependence on Shear and Inner Viscosity", *Journal of Fluid Mechanics,* 2011.

Freund, J.B., and M. Orescanin. 2010. "Dense Cellular Blood Flow in a Model Microvessel" [Conference: Society for Engineering Science (SES), May 2010].

Orescanin, M. M., and J.M. Austin. 2010. "Exhaust of Underexpanded Jets from Finite Reservoirs", *AIAA Journal of Propulsion and Power.*

Orescanin, M. M., J.M. Austin, and S.W. Kieffer. 2010. "Unsteady High-Pressure Flow Experiments with Applications to Explosive Volcanic Eruptions", *Journal of Geophysical Research: Solid Earth.*

Orescanin, M. M. 2009. "Unsteady High-Pressure Flow Experiments with Applications to Explosive Volcanism" [Invited Talk, Mechanical Sciences and Engineering Fluid Dynamics Seminar Series, 1hr, October 2009].

Orescanin, M. M., J.M. Austin, and S.W. Kieffer. 2009. "Experimental Simulations of the May 18, 1980 Directed Blast at Mount St. Helens" [Conference: Geological Society of America (GSA), October 2009].

Publications and Presentations (continued)

Austin, J. M., M.S. Morgenstern, and S.W. Kieffer. 2008. "Experimental Simulation of Volcanic Steam Blasts and Jets at High Pressure Ratios" [Conference: American Geophysical Union (AGU), December 2008].

Morgenstern, M. S., J.M. Austin, and S.W. Kieffer. 2007. "Dynamics of the 1980 Mt. St. Helens eruption using a shock tube and nozzle" [Conference: Cities on Volcanoes, 5, Shimabara, Japan November 2007].