ZACHARY COBELL

THE WATER INSTITUTE OF THE GULF

Company Role
Research Engineer

Project Role / Focus Areas
- Computational fluid dynamics
- Hurricane storm surge and waves
- High performance computing applications
- Numerical model development

Education
- B.S. – Civil Engineering, Environmental Engineering, University of Notre Dame, 2010

Experience Profile
Zach Cobell is a Research Engineer with the Institute's Natural Systems modeling group.

Cobell graduated with a degree in civil engineering and environmental engineering from the University of Notre Dame in 2010. Since graduating, he has helped lead numerical modeling studies throughout the United States, including the storm surge and wave analysis for both the 2012 and 2017 Louisiana Coastal Master Plans. He has also worked extensively on optimization of numerical models in high performance computing environments and serves as a key member of the ADCIRC Model Development Group.

Professional Experience

The Water Institute of the Gulf 2019-Present
- *Research Engineer*

ADCIRC Model Development Group 2012-2019
- *Model Developer and Maintainer*

Arcadis U.S., Inc 2010-2019
- *Surface Water Hydrologist*

Selected Projects (continued on page 2)

Louisiana 2012 and 2017 Master Plan: Storm Surge and Wave Analysis, Baton Rouge, Louisiana (2011-2017)
Louisiana Coastal Protection and Restoration Authority
Served as modeling lead for storm surge and wave simulations. Developed new statewide ADCIRC+SWAN model mesh maximizing efficiency and accuracy. Implemented proposed coastal protection and restoration features in the landscape. Conducted over 7,000 total hurricane simulations with varying sea level rise and landscape scenarios

Florida Protection Level of Service Hurricane Simulations, West Palm Beach, Florida (2017-2019)
Used ADCIRC, SWAN, and D-Flow Flexible Mesh to simulate storm surge near gates and pumps managed by SFWMD within narrow canals in South Florida adjacent to Biscayne Bay. Validated model using Hurricane Andrew and Wilma. Used synthetic hurricanes with varying degrees of sea level rise understand operational impacts. Trained SFWMD staff to deploy the model as required.

Galveston Bay Hydrodynamics and Salinity Modeling, Houston, Texas (2017-2018)
Developed D-Flow Flexible Mesh model geometry of Galveston Bay, Texas and surrounding areas. Simulated three years of hydrodynamics and salinity using discharge, evaporation, precipitation, astronomic tides, and atmospheric forcing. Evaluated impacts to water levels due to the construction of various gate designs at Bolivar Roads. Provided guidance to structural engineers to optimize position of structural elements to minimize environmental impacts.

Living Breakwaters Hydrodynamics and Sediment Transport Analysis, Staten Island, New York (2016-2018)
Developed a Delft3D model using multibeam LIDAR and validate hydrodynamic and wave quantities to deployed ADCP gages at project site. Supported 30, 60, and 95% phases of design for a proposed group of breakwaters near Staten Island, New York using the Delft3D modeling suit. Simulated impacts to retention time, sediment transport, wave parameters, and currents.

Gulf Coast Community Protection and Recovery District Storm Surge Suppression Study (2017)
Coastal engineering and flood hazard lead evaluating storm surge suppression alternatives in six coastal counties in northern Texas, including Harrison and Galveston, evaluating a range of alternatives using USACE accepted methodologies to expedite future USACE feasibility studies.

Support for Flood Mapping at Newark International Airport, Newark, New Jersey (2014-2015)
Led hydrodynamic modeling efforts to develop a Delft3D model of Newark Airport and surrounding areas. Validated model performance on PANYNJ property. Used modeling to support revision of FEMA Flood Insurance Rate Maps (FIRMs).

Simulations of Dynamic Levee Breaching During Hurricane Katrina, New Orleans, Louisiana (2012-2013)
Developed new modules for the ADCIRC+SWAN model to allow simulation of wave overtopping volumes and dynamic levee breaching for simulation of Hurricane Katrina. Demonstrated that the new modules accurately reproduced water level elevation and time of food arrival throughout the Central Wetlands and Lower 9th Ward. Supported DOJ expert witness through deposition and trial.

NYC Special Initiative for Rebuilding and Resiliency, New York, New York (2012-2013)
New York City
Led hydrodynamic modeling efforts to perform rapid hindcast of Hurricane Sandy. Developed high resolution model based upon the FEMA work recently completed. In a compressed schedule, use FEMA synthetic storms to evaluate proposed restoration and protection projects using multiple future sea level rise projections with varying hurricane strengths. Analyzed model results to help refine project characteristics. Received highest award from New York Chapter of the American Society of Landscape Architects which recognizes work done through a collaboration of landscape architects with allied professionals in a spirit of mutual expansion beyond traditional roles. Received Innovation Excellence Award from Hyperion Research which recognizes outstanding scientific, engineering and business computing achievements enabled by high performance computing.

West Shore of Lake Pontchartrain Hurricane Protection Project, New Orleans, Louisiana (2011-2013)
Updated ADCIRC+STWAVE model geometries for use in study area. Implemented protection features and efficiently simulate hurricanes using Department of Defense Resources. Projected vegetation and sea level rise conditions for 20 and 50 years into the future.

Flood Insurance Study: Coastal Counties, Texas (2011)
Federal Emergency Management Agency, Houston, Texas

Served as one of the modeling coordinators for the 2011 FEMA Flood Insurance Study in the coastal counties of Texas. The study used the ADCIRC and STWAVE models simulating hundreds of synthetic hurricanes to define risk coastwide. The study also provided some of the first extensive model validation of Hurricane Ike and led to advancements in the way wind drag and bottom friction are parameterized in storm surge modeling. Data from synthetic hurricanes was coordinated with the United States Army Corps of Engineers and other consulting firms for analysis of the 1% annual exceedance probability for storm surge and waves.

Selected Publications and Conference Presentations

J.H. Atkinson, H.J. Roberts, S. Zou, P. Bacopoulos, S. Mederos, J. Weishampel, and **Z. Cobell.** Deriving Frictional Parameters and Performing Historical Validation for an ADCIRC Storm Surge Model of the Florida Gulf Coast. Florida Watershed Journal, 4-2:23, 27, 2011

J. C. Dietrich, J. J. Westerink, A. B. Kennedy, J. M. Smith, R. E. Jensen, M. Zijlema, L. H. Holthuijsen, C. Dawson, R. A. Luettich, M. D. Powell, V. J. Cardone, A. T. Cox, G. W. Stone, H. Pourtaheri, M. E. Hope, S. Tanaka, L. G. Westerink, H. J. Westerink, and **Z. Cobell.** Hurricane Gustav (2008) Waves and Storm Surge: Hindcast, Synoptic Analysis, and Validation in Southern Louisiana. Monthly Weather Review, 139(8):2488, 2522, August 2011

Z. Cobell, H. Zhao, H.J. Roberts, F.R. Clark, and S. Zou. Surge and Wave Modeling for the Louisiana 2012 Coastal Master Plan. Journal of Coastal Research: Special Issue 67 - Louisiana's 2012 Coastal Master Plan Technical Analysis, pages 88, 108, 2013