Ovel Díaz García, MS, Ph.D.
Research Scientist
The Water Institute
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EDUCATION

National Autonomous University of Mexico (UNAM)	Mexico City, MX	Earth Sciences	Ph.D., 2020
University of Cienfuegos	Cienfuegos, Cuba	Applied Mathematics	MS, 2008
Higher Institute of Technology Applied Science	Havana City, Cuba	Nuclear Energy	BS, 2003

RESEARCH INTERESTS

Programming, complex numerical models to study environmental processes, hydrodynamic storm surge (MARS3D, FVCOM, ADCIRC), atmospheric (WRF) models, wave models (FUNWAVE, SWAN, Wavewatch III), unstructured hydrodynamic models (FVCOM, ADCIRC), operational numerical systems of storm surge.

Geographic Information Systems like MapInfo, ArcGIS, QGIS, and programming language like FORTRAN, MATLAB, and NCL, high-performance computer (HPC) environments with different queue handlers like PBS, LSF, and slurm, Shell and Python scripts.

PROFESSIONAL EXPERIENCE

The Water Institute	Research Scientist	2021–Present
Laboratorio de Ingenieria y Procesos Costeros, Instituto de Ingenieria, UNAM	Numerical Modeling Expert	2020–2021
Center of Atmospheric Studies UNAM, Ocean-Atmospheric Interaction Group	Postdoc	2020
	Modeling Expert	2017–2020
Center of Environmental Studies of Cienfuegos, Cuba Department of Environmental Management	Researcher	2003–2012

TEACHING EXPERIENCE

Professor of numerical modeling, Science Faculty, National Autonomous University of Mexico, 2017–2020.

External Advisor, Interdisciplinary Center of Marine Sciences postgraduate program, La Paz, National Polytechnic Institute, Mexico, 2021–Present.

Specialized training in atmospheric WRF model. Mexican Institute of Petroleum (IMP), 2020.

External Advisor, Marine Sciences postgraduate program, National Autonomous University of Mexico, 2019–2023.

Workshop training on unstructured mesh generations and FVCOM model introduction, Center of Atmospheric Sciences, National Autonomous University of Mexico, 2017.

AWARDS AND HONORS

- CONACYT (Mexican Board of Science and Technology) Ph.D. Scholarship, 2012–2016
- IRD Scholarship to research with French experts in Mexico, 2010–2012
- Travel Award, ICTP course at Trieste, Italy, 2007
- Academic Award, ISCTN, Cuba

TRAINING COURSES

- FUNWAVE-TVD workshop, Northeastern University, Boston, 2023
- ADCIRC Users Meeting, Baton Rouge, 2023
- R Programming, Johns Hopkins University, 2020
- The Data Scientist's Toolbox, Johns Hopkins University, 2020
- Introduccion a Data Science: Programacion Estadisica con R, National Autonomous University of Mexico, 2020
- Virtual 2020 ADCIRC Boot Camp, 2020
- 7th Spring Course in Tropical Cyclones, Merida, Yucatan, Mexico, 2015
- ADCIRC Boot Camp, NOAA's Center for Weather and Climate Prediction, 2015
- Doctoral stay aimed at studying coastal flooding and intercomparison between mathematical models of different numerical schemes, IRD, Marseille, France, 2014
- PASI Course: "The science of predicting and understanding tsunamis, storm surges, and tidal phenomena," Universidad Técnica Federico Santa Maria, 2013
- Regional Advanced School on Physical and Mathematical Tools for the Study of Marine Processes of Coastal Areas, Cienfuegos, Cuba, 2008
- ICTP Advanced School on Oceanography: World Climate & Overturning Circulation in Oceans & Mediterranean Seas, Italy, 2007

NOTABLE PROJECTS

Research Scientist/Social Responses to Climate Change Attributed Flooding in South Louisiana — Current

National Center for Atmospheric Research (NCAR) and Louisiana State University (LSU)

Storm surge and wave simulations. Historical impact of Hurricane Ida (2021) and changes in past and future climate conditions.

Research Scientist/Coastwide No Investment Risk Reduction Implementation Hindcast — Current

Coastal Protection and Restoration Authority (CPRA)

Storm surge and wave simulations. GIS data manipulation, mesh modifications, running and post-processing hundreds of simulations on HPC, compare results with the Louisiana CMP 2023 project results.

Research Scientist/2023 Louisiana Coastal Master Plan — 2021–2023

CPRA

Storm surge and unstructured grid models expert. Creation and edition of unstructured grids, data processing and numerical storm surge simulations for the 2023 Louisiana Coastal Master Plan.

Co-PI/Development of an Operational Forecasting System for Extreme Events Based on Numerical Models for Predicting the Weather, Wave and Storm Surge Conditions, Including Evaluation of Model Performance and Determination of Uncertainties for Warning Purposes — 2013

National Center for Disaster Prevention, IOA Group, CCA-UNAM

Responsible for the operational implementation of the storm surge model and the automation of the whole system. The ADCIRC model needs source code modifications to use its restart capabilities as initial conditions file for the next run. The output of the model is the NetCDF directly, and the creation of free surface elevation figures was parallelized using slurm and NCL.

PI/Transport Particle Processes in the Cienfuegos Bay — 2010–2012

Grant Awarded by the Institute of Research for the Development, conducted at CCA-UNAM

Use the 3D hydrodynamic Model for Applications at the Regional Scale (MARS3D) to study the transport particle processes in the Cienfuegos Bay, considering passive tracers' formulation. Simulations of the Caribbean Sea were performed, with nesting centered in Cienfuegos Bay. The general circulation boundary conditions were taken from HYCOM-Global outputs. We used passive tracers' equations for flushing time computing and offline Lagrangian models for particle transport.

PUBLISHED WORKS

Peer-Reviewed Publications

Rodriguez-Perez, J., Cordova-Lopez, L. F., & Diaz-Garcia, O. (2020). Hidrodinámica costera durante el huracán Wilma (2005) en Artemisa, Mayabeque y La Habana. *Ingeniería Hidráulica y Ambiental*, *41*(2), 3–17.

Diaz-Garcia, O., Zavala-Hidalgo, J., Douillet, P., Contreras Ruiz-Esparza, A., Fichez, R., Grenz, C., & Denis, L. (2020). Changes in the flooding area due to storm surge under climate change in an extensive wetland area in the southern Gulf of Mexico. *Atmósfera*, *33*(2), 105–121.

Munoz-Caravaca, A., Douillet, P., Diaz-Garcia, O., Renaud, F., Herrera-Marrero, R. H., & Alcantara-Carrio, J. (2012). Flushing time in the Cienfuegos Bay, Cuba. *Natural Resource Modeling*, *25*(3), 434–455.

Munoz-Caravaca, A., Diaz-Garcia, O., Douillet, P., Fichez, R., Herrera-Marrero, R. H., Alcantara-Carrio, J., & Garcia-Rodriguez, A. (2011). La distribución de tiempo de residencia en la Bahía de Cienfuegos. *Serie Oceanológica*, *9*, 15–29.

Munoz-Caravaca, A., Garcia-Rodriguez, A., Douillet, P., Diaz-Garcia, O., Fichez, R., Herrera-Marrero, R. H., & Alcantara-Carrio, J. (2011). Análisis de los procesos de renovación de las aguas de la Bahía de Cienfuegos. *CENIC Ciencias Biológicas*, *42*(3), 125–130.

Munoz-Caravaca, A., Herrera-Marrero, R. H., Fichez, R., Douillet, P., Diaz-Garcia, O., & Fernandez, J. M. (2010). Influencia de las características hidrodinámicas y morfométricas en la distribución de 210Pb en los sedimentos superficiales de la Bahía de Cienfuegos, Cuba. *Revista de Investigaciones Marinas*, *31*(1), 11–21.

Munoz-Caravaca, A., Douillet, P., Diaz-Garcia, O., Ouillon, S., & Fichez, R. (2008). Influence of tide, wind and fluvial input in the circulation of the waters in the Cienfuegos Bay, Cuba. *Investigaciones Marinas*, *29*(2), 101–112.

Barros, R. C., Garcia, C. R., Dominguez, D. S., Diaz-Garcia, O., & Tame, V. M. (2004). Recent advances in spectral nodal methods for numerically solving neutron-diffusion eigenvalue problems. *Transport Theory and Statistical Physics*, *33*(3 & 4).

Technical Reports

Johnson, D. R., Fischbach, J. R., Kane, P., Wang, J., Cobell, Z., & Diaz, O. (2024). 2023 Coastal Master Plan: Supplemental Material H6.8: Interaction of Protection and Restoration Projects. Version I. (pp. 1- 69). Baton Rouge, Louisiana: Coastal Protection and Restoration Authority.

Fischbach, J. R., Johnson, D. R., Kane, P., Cobell, Z., & Diaz, O. (2024). 2023 Coastal Master Plan: Attachment H5: Alternative Environmental Scenarios - Risk. Version 2. (pp 1-44). Baton Rouge, Louisiana: Coastal Protection and Restoration Authority.

Fischbach, J. R., Johnson, D. R., Wang, J., Hemmerling, S., Cobell, Z., & Diaz, O. (2023). 2023 Coastal Master Plan: Attachment C3: 50-Year FWOA Model Output, Regional Summaries. Version 3. (p. 277). Baton Rouge, Louisiana: Coastal Protection and Restoration Authority.

Georgiou, I. Y., Dalyander, S., Hemmerling, S. A., Cobell, Z., & Diaz, O. (2023). 2023 Coastal Master Plan: Supplemental Material H6.6: Restoration Impacts on Surge and Risk - Barataria Barrier Islands. Version 2. (p. 33). Baton Rouge, Louisiana: Coastal Protection and Restoration Authority.

Hemmerling, S. A., Georgiou, I. Y., Cobell, Z., Diaz, O., Fischbach, J. R., Johnson, D. R., & Wang, J. (2023). 2023 Coastal Master Plan: Supplemental Material H6.7: Restoration Impacts on Surge and Risk – Coastal Forests. Version 2. (p. 67). Baton Rouge, Louisiana: Coastal Protection and Restoration Authority.

Hemmerling, S. A., Kane, P., Littman, A., Cobell, Z., Diaz, O. Fischbach, J. R., Johnson, D. R., & Wang, J. (2023). 2023 Coastal Master Plan: Supplemental Material H6.1: Historic Storm Run – Ike. Version 2. (p. 29). Baton Rouge, Louisiana: Coastal Protection and Restoration Authority.

Hemmerling, S. A., Kane, P., Littman, A., Cobell, Z., Diaz, O. Fischbach, J. R., Johnson, D. R., & Wang, J. (2023). 2023 Coastal Master Plan: Supplemental Material H6.4: Historic Storm Run – Ida. Version 2. (p. 28). Baton Rouge, Louisiana: Coastal Protection and Restoration Authority.

Hemmerling, S. A., Kane, P., Littman, A., Cobell, Z., Diaz, O. Fischbach, J. R., Johnson, D. R., & Wang, J. (2023). 2023 Coastal Master Plan: Supplemental Material H6.5: Historic Storm Run – Isaac. Version 2. (p. 28). Baton Rouge, Louisiana: Coastal Protection and Restoration Authority.

Hemmerling, S. A., Kane, P., Littman, A., Cobell, Z., Diaz, O., Fischbach, J. R., Johnson, D. R., & Wang, J. (2023). 2023 Coastal Master Plan: Supplemental Material H6.2: Historic Storm Run – Rita. Version 2. (p. 29). Baton Rouge, Louisiana: Coastal Protection and Restoration Authority.

Hemmerling, S. A., Kane, P., Littman, A., Cobell, Z., Diaz, O., Fischbach, J. R., Johnson, D. R., & Wang, J. (2023). 2023 Coastal Master Plan: Supplemental Material H6.3: Historic Storm Run – Barry. Version 2. (p. 28). Baton Rouge, Louisiana: Coastal Protection and Restoration Authority.

Conference Proceedings and Presentations

Diaz-Garcia, O., Zavala-Hidalgo, J., Contreras Ruiz-Esparza, A., & Douillet, P. (2019). *Development of an operational numerical forecasting system for the prediction of the circulation and movement of sargassum in the Western Caribbean Sea*. Mexican Geophysical Union Annual Meeting, Puerto Vallarta, MX.

Diaz-Garcia, O., Zavala-Hidalgo, J., Contreras Ruiz-Esparza, A., & Douillet, P. (2018). *Identification of areas at risk of flooding by storm surge using high-resolution models*. WSEN 2nd Environmental Summit Meeting of Latin America Students, Mexico City, MX.

Diaz-Garcia, O., & Zavala-Hidalgo, J. (2018). *Identification of areas at risk of flooding by storm surge using high-resolution models in Veracruz, Mexico*. Mexican Geophysical Union Annual Meeting, Puerto Vallarta, MX.

Diaz-Garcia, O., Zavala-Hidalgo, J., Esli Jurado de Larios, O., Douillet, P., & Contreras Ruiz-Esparza, A. (2018). *Storm surge flooding in the Terminos Lagoon during the 33 cold front of February 2010*. 2018 Ocean Sciences Meeting, Oregon.

Diaz-Garcia, O., Esli Jurado de Larios, O., Zavala-Hidalgo, J., Contreras Ruiz-Esparza, A., & Douillet, P. (2017). *Study of storm surge flooding in Terminos Lagoon during the 33 cold front (February 2010)*. Mexican Geophysical Union Annual Meeting, Puerto Vallarta, MX.

Diaz-Garcia, O., Zavala-Hidalgo, J., Douillet, P., & Mott, G. (2016). *A high-resolution study of hurricane storm surge and inundation scenarios in Veracruz, Mexico*. Mexico Geophysical Union Annual Meeting, Puerto Vallarta, MX.

Diaz-Garcia, O. (2015). *Development of an operational storm surge numerical forecasting system for the Mexican coasts*. ADCIRC Users' Group Meeting. NOAA's Center for Weather and Climate Prediction (NCWCP), College Park, MD.

Diaz-Garcia, O., & Zavala-Hidalgo, J. (2013). *Wind wave and storm surge numerical forecasting system for the Mexican seas and coasts*. Mexican Geophysical Union Annual Meeting, Puerto Vallarta, MX.

Munoz-Caravaca, A., Douillet, P., Diaz-Garcia, O., Renaud, F., Herrera-Marrero, R. H., & Alcantara-Carrio, J. (2011). *Influence of winds and freshwater inputs on the water exchange of Cienfuegos Bay, Cuba*. World Conference on Natural Resource Modeling, Ottawa, Canada.

Diaz-Garcia, O. (2007). *CaDaSy, a system for data management of the IAEA project RLA7012*. A regional course of training in the use of nuclear techniques to address Coastal Zone Management problems in the Caribbean Region, Cienfuegos, Cuba.