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## **EDUCATION**

Università d Pisa	Pisa, Italy online program	Second Level Master in Climate Change and Sustainable Development	Ongoing
Politecnico di Torino	Torino, Italy	Engineering for the Built and Natural Environment	Ph.D., 2019
Politecnico di Torino	Torino, Italy	Environmental Engineering	MS, 2011
Politecnico di Torino	Torino, Italy	Environmental Engineering	BS, 2009

## **RESEARCH INTERESTS**

Groundwater modeling, coastal hydrodynamics, real-time forecasting.

## **PROFESSIONAL EXPERIENCE**

The Water Institute	Research Scientist—Technical Lead	2018–Present
	Research Scientist	2016–2018
	Postdoctoral Fellow	2015–2016
Politecnico di Torino	Postdoctoral Fellow	2015
Prosystem Ingegneria S.r.l.	Consultant for Quality/Environmental Management Systems	2011–2012

## **AWARDS AND HONORS**

- Best Master’s Degree Thesis, National RemTech Awards, 2012
- Premio Optime, Best Graduates, Unione Industriale di Torino, 2011–2012
- Premio Ambiente Domani, Camera di Commercio Industria Artigianato e Agricoltura di Torino, 2012
- Scholarship Ing. Giulio Axerio, Academic Year 2008–2009

## **TEACHING EXPERIENCE**

Student tutor on mathematical analysis I and II, geometry, and groundwater engineering at the Politecnico di Torino, between 2007 and 2011.

Messina, MS, Ph.D.

Teaching assistant for a geometry class at the Politecnico di Torino in 2012.

### **COMMUNITY SERVICE**

Member, Volunteer                      Forum35, Baton Rouge, LA                      2016–2019

### **TRAINING COURSES**

- Project Management Training, PSMJ, 2022
- Understanding the Benefits of Operational Ocean and Forecasting Systems, 2021
- Qualification to the Engineer Profession in Italy, Sector Civile-Ambientale, Class 38/S, Ordine Degli Ingegneri di Torino, 2012
- FIRST Diploma, University of Cambridge, 2006
- DELF B1 Diploma, Commission Nationale du DELF et du DALF, 2006
- Delft3D and Delft3D Flexible Mesh, 2016
- Delft-FEWS, 2016
- MIKE Flood & Flexible Mesh, 2015

### **NOTABLE PROJECTS**

**Principal Investigator/Delft3D Basin-wide Model 50-year Production Runs to Support Mid-Barataria Environmental Impact Statement and for Evaluation of Diversion Operation**                      Current

*Coastal Protection and Restoration Authority*

Lead the effort to perform numerical simulations with the Basin-wide integrated biophysical Delft3D model developed under the Mississippi River Hydro and Delta Management (MRHDM). The intent of this project is to evaluate and examine sediment diversion operation plans (i.e., multiple operation strategies, synergies with marsh creation projects, interactions with existing projects, effect on salinity, etc.) and the 50-year evolution of the Mississippi River delta and its receiving basins. Specifically, the operation plans and environmental effects of the proposal Mid-Barataria sediment diversion in Breton Basin, in Louisiana, was investigated.

<b>Team Member/Real Time Forecasting for Coastal Louisiana</b> <i>Baton Rouge Area Foundation Coastal Protection and Restoration Authority</i> Was a key player in developing a forecasting and information system which represents a seven-day forecast on the hydrodynamics (i.e., water level, salinity, and temperature) of a pilot location in coastal Louisiana (i.e. the Mississippi River Delta at its receiving basins). The system can provide forecasted guidance on the optimal operation of the freshwater and sediment diversions to reduce the impacts to ecological health and increase the volume of sediment diverted to the receiving areas. Delft-FEWS has been used to develop the real time forecasting (RTF) framework. Delft3D has been used as engine of the RTF system.	2015–2017
<b>Team Member/Manitoba Hydro—Delft-FEWS System</b> <i>Manitoba Hydro, Deltares, USA</i> Providing technical support to Deltares USA during the implementation of a Delft-FEWS real time forecasting system for Manitoba Hydro for hydrological modelling and river forecasting for hydropower operations. The performed tasks include linking Delft-FEWS with HEC-HMS models.	2019–2020
<b>Co-Principal Investigator/Chincoteague Island Modeling Study</b> <i>Virginia Institute of Marine Science</i> Developing a calibrated and validated Delft3D hydrodynamic model (flow and waves) and sediment transport model for the Assateague and Chincoteague Islands. Performance of exploratory simulations to evaluate selected scenarios of alternate morphology.	2020–2021
<b>Program Manager/Model Repository</b> <i>Baton Rouge Area Foundation Coastal Protection and Restoration Authority</i> Goal of the project is to develop a model repository that will make numerical models searchable to promote better collaboration across the modeling community, consultant, academic, and public sector, and to let the community build on what has been done previously.	Current

## **PUBLISHED WORKS**

### **Peer-Reviewed Publications**

- Liu, B., D'Sa, E. J., Messina, F., Baustian, M. M., Maiti, K., Rivera-Monroy, V. H., Huang, W., & Georgiou, I. Y. (2023). Dissolved organic carbon dynamics and fluxes in Mississippi-Atchafalaya deltaic system impacted by an extreme flood event and hurricanes: A multi-satellite approach using Sentinel-2/3 and Landsat-8/9 data. *Frontiers in Marine Science*, *10*, 01–24.
- Georgiou I.Y., Messina F., Sakib M.M., Zou S., Foster-Martinez M., Bregman M., Hein C.J., Fenster M.S., Shawler J.L., McPherran K., Arthur C. Trembanis, Hydrodynamics and Sediment-Transport Pathways along a Mixed-Energy Spit-Inlet System: A Modeling Study at Chincoteague Inlet (Virginia, USA), *J. Mar. Sci. Eng.*, 2023, *11*, 1075. <https://doi.org/10.3390/jmse11051075>

- Takeshita, R., Balmer, B. C., Messina, F., Zolman, E. S., Thomas, L., Wells, R. S., Smith, C. R., Rowles, T. K., & Schwacke, L. H. (2021). High site-fidelity in common bottlenose dolphins despite low salinity exposure and associated indicators of compromised health. *PLOS ONE*, *16*(9), e0258031.
- Boccardo, C., Tosco, T., Fujisaki, A., Messina, F., Raoof, A., Aguilera, D., Crevacore, E., Marchisio, D., & Sethi, R. (2020). Chapter 13: A review of transport of nanoparticles in porous media: From pore- to macroscale using computational methods. In *Nanomaterials for the Detection and Removal of Wastewater Pollutants—Micro and Nano Technologies* (pp. 351–381).
- White, E. D., Messina, F., Moss, L. C., & Meselhe, E. A. (2018). Salinity and marine mammal dynamics in Barataria Basin: Historic patterns and modeled diversion scenarios. *Water*, *10*(8), 1015.
- Messina, F., Tosco, T., & Sethi, R. (2016). On the failure of upscaling the single-collector efficiency to the transport of colloids in an array of collectors. *Water Resources Research*, *52*(7), 5492–5505.
- Messina, F. (2015). *Pore-scale simulation of micro and nanoparticle transport in porous media* [Doctorate in Engineering for the Build and Natural Environment]. Politecnico di Torino.
- Messina, F., Marchisio, D., & Sethi, R. (2015). An extended and total flux normalized correlation equation for predicting single-collector efficiency. *Journal of Colloid and Interface Science*, *446*, 185–193.

## Technical Reports

- Ariza-Porras, C., Jensen, B., Messina, F., Bernard, J., & Bienn, H. C. (2022). *Metadata user manual and provisional metadata creation tool. Data and Model Catalog* (Task Order 87). Baton Rouge, LA: The Water Institute of the Gulf. Produced for and funded by the Coastal Protection and Restoration Authority.
- Bregman, M., Messina, F., Yuill, B., & Jung, H. (2019). *QA/QC Procedures for Mid-Barataria Sediment Diversion Alternatives Modeling* [Technical Memorandum under Task Orders 48 and 51]. The Water Institute, produced for the Coastal Protection and Restoration Authority.
- Bregman, M., Messina, F., Jung, H., Yuill, B. T., Baustian, M. M., & Georgiou, I. Y. (2020). *Basin Wide Model Version 4: Basin Wide Model for Mid-Breton Sediment Diversion Modeling* (Task Order 51.3. Final Report). Baton Rouge, LA: The Water Institute of the Gulf. Funded by the Coastal Protection and Restoration Authority.
- Bregman, M., Jung, H., Liu, B., Baustian, M. M., Messina, F., & Georgiou, I. Y. (2022). *Basin Wide Model Version 4 Sensitivity Analysis* [Technical Memorandum]. The Water Institute. Produced for the Louisiana Coastal Protection and Restoration Authority under Task Order 77.
- Bregman, M., Messina, F., Miner, M., Georgiou, I. Y., & Wilson, C. S. (2023). *Inter-model comparisons between physical and numerical models: Comparisons of future projections between the numerical Basin Wide Model Version 4 and the Lower Mississippi River Physical Model* (No. P-00407-01). Baton Rouge, LA: Prepared for the Louisiana Coastal Protection and Restoration Authority by The Water Institute and Louisiana State University under Task Order 69.
- Georgiou, I. Y., Messina, F., Bregman, M., Jung, H., & Liu, B. (2021). *Approach to limit crevassing in the Basin Wide model Mid-Breton Production Runs using existing and additional simulations*. Baton Rouge, LA: The Water Institute of the Gulf.
- Georgiou, I. Y., Messina, F., Jung, H., & Baustian, M. M. (2022). *Limitations and Uncertainties for the Basin Wide model Version 4 Used for the Mid-Breton Environmental Impact Statement*. Baton Rouge, LA: The Water Institute of the Gulf. Produced for and funded by the Coastal Protection and Restoration Authority under Task Order 77.
- Georgiou, I. Y., Bregman, M., Messina, F., Di Leonardo, D., Wang, Y., Zou, S., Khalil, S., Raynie, R., Swartz, J., & Miner, M. (2023). *Sediment infilling rate of Lowermost Mississippi River borrow pits and impacts on downstream dredging*. Baton Rouge, LA: The Water Institute of the Gulf, Prepared for the Coastal Protection and Restoration Authority (CPRA) under Task Order 72.2.
- Jung, H., Messina, F., Moss, L., Baustian, M. M., Sylvester, S. M. D., & Roberts, H. (2019). *Vegetation model and integration framework for the Mid-Breton Outfall Management model* (No. Task Order 51). Baton Rouge, LA: The Water Institute of the Gulf. Funded by the Coastal Protection and Restoration Authority.
- Jung, H., McManus, M., Messina, F., Georgiou, I. Y., Messina, F., & Georgiou, I. Y. (2024). *Mill Creek Watershed: Development and application of a hydrologic model to assess reservoir performance and downstream impact* (Technical Memorandum). The Water Institute, produced for the National Park Service.
- Liang, M., Meselhe, E. A., Messina, F., & Ortals, C. (2016). *Sediment diversion: optimization of the operation plans*. Baton Rouge, LA: The Water Institute of the Gulf. Funded by the Coastal Protection and Restoration Authority.

- Liang, M., Sadid, K., Xing, F., Meselhe, E. A., & Messina, F. (2016). *Improvement of model grid and bathymetry* (Technical Memorandum No. Task Orders 15, 16). Baton Rouge, LA: The Water Institute of the Gulf. Funded by the Coastal Protection and Restoration Authority.
- Meselhe, E. A., Messina, F., Sadid, K. M., & Jung, H. (2016). TO05/41/44: *Internal Model Dynamics* (Funded by the Coastal Protection and Restoration Authority under Task Orders 44). The Water Institute of the Gulf.
- Meselhe, E. A., Jung, H., Sadid, K., Messina, F., & Baustian, M. M. (2017). *Calibration and validation of Delft3D Model Version 2: Comparison of V1 and V2 model performance*. Baton Rouge, LA.
- Meselhe, E. A., Sadid, K. M., Messina, F., & Jung, H. (2017). *Basin Wide Delft3D Run for the Evaluation of Diversion Operations (Production Runs 11-15)*. Baton Rouge LA: The Water Institute of the Gulf, Produced for the Louisiana Coastal Protection and Restoration Authority under Task Order 36.
- Messina, F., & Meselhe, E. A. (2017). *The effects of various Mississippi River and Mid-Barataria Sediment Diversion hydrographs on salinity in Barataria Basin* (Technical Memorandum). Baton Rouge LA: The Water Institute of the Gulf.
- Messina, F., & Meselhe, E. A. (2017). *The effects of various Mississippi River and Mid-Barataria Sediment Diversion hydrographs on salinity in Barataria Basin* (Task Order 46) [Technical Memorandum]. The Water Institute.
- Messina, F., Bregman, M., Jung, H., Yuill, B., & Roberts, H. (2019). *Mid-Barataria Sediment Diversion Engineering Modeling Support: Production Runs with the Basin Wide model Version 3* (Technical Memorandum). Baton Rouge, LA: The Water Institute of the Gulf. Prepared for and funded by the Coastal Protection and Restoration Authority.
- Messina, F., Georgiou, I. Y., Bregman, M., Holm, G. O., & Marino, R. (2021). *Analysis of existing and predicted coastal water surface elevation trends in Breton Sound Basin: In support of the Mid-Breton Sediment Diversion Environmental Impact Statement*. The Water Institute. Prepared for and Funded by the Coastal Protection and Restoration Authority under Task Order 77.
- Messina, F., Georgiou, I. Y., Bregman, M., Jung, H., Yuill, B. T., Liu, B., Cobell, Z., & Baustian, M. M. (2021). *Mid-Breton Sediment Diversion Engineering Modeling Support: Production Runs with the Basin Wide model Version 4* [Revised March 2022]. The Water Institute. Funded by the Coastal Protection and Restoration Authority under Task Order 77.
- Messina, F., Georgiou, I. Y., Bregman, M., Holm, G. O., & Marino, R. (2021). *Analysis of existing and predicted coastal water surface elevation trends in Breton Sound Basin: In support of the Mid-Breton Sediment Diversion Environmental Impact Statement*. Baton Rouge, LA.: The Water Institute of the Gulf. Prepared for and Funded by the Coastal Protection and Restoration Authority under Task Order 77.
- Messina, F., Georgiou, I. Y., Bregman, M., Jung, H., Yuill, B. T., Liu, B., Cobell, Z., & Baustian, M. M. (2021). *Mid-Breton Sediment Diversion Engineering Modeling Support: Production Runs with the Basin Wide model Version 4 (Revised March 2022)*. Baton Rouge, LA: The Water Institute of the Gulf. Funded by the Coastal Protection and Restoration Authority under Task Order 77.
- Messina, F., Bregman, M., Zou, S., Georgiou, I. Y., Dalyander, S., & Miner, M. (2022). *Lake Borgne Gulf Sturgeon monitoring and habitat characterization*. The Water Institute of the Gulf. Produced for and funded by Coastal Protection and Restoration Authority under Task Order 81.
- Messina, F., Georgiou, I., Baustian, M., Dahl, T., Ryder, J., Miner, M., & Health, R. (2023). *Lowermost Mississippi River Management Program: Real-time forecasting model development work plan* (No. ERDC SR 23-8). U.S. Army Corps of Engineers. Prepared for the Coastal Protection and Restoration Authority.
- Messina, F., Georgiou, I. (2024). *Oblique Aerial Photo Assessment of the Louisiana Barrier Shoreline for the BICM Program Phase 3*. The Water Institute. Prepared for and funded by the Coastal Protection and Restoration Authority. Baton Rouge, LA.
- Sadid, K., Messina, F., Jung, H., Yuill, B., & Meselhe, E. (2018). TO51: *Basinwide Model Version 3 - Basinwide Model for Mid-Breton Sediment Diversion Modeling* (Funded by the Coastal Protection and Restoration Authority under Task Orders 51). Baton Rouge, LA: The Water Institute of the Gulf.

### Conference Proceedings and Presentations

- Sakib, M., Georgiou, I., Hein, C., Fenster, M., Zou, S., Esposito, C., Foster-Martinez, M., Messina, F., & Trembanis, A. (2021). *Mechanisms and rates of sand bypassing along a rapidly evolving inlet-spit system*. American Geophysical Union.

- Messina, F., Tosco, T., & Sethi, R. (2017). *On the failure of upscaling the single-collector efficiency to the transport of colloids in an array of collectors*. American Geophysical Union fall meeting, New Orleans, LA.
- Messina, F., Meselhe, E., Twight, D., & Buckman, L. (2017). *Eco-morphological real-time forecasting tool to predict hydrodynamic, sediment and nutrient dynamic in Coastal Louisiana*. American Geophysical Union fall meeting, New Orleans, LA.
- Meselhe, E., Sadid, K., Jung, H., Messina, F., Esposito, C., & Liang, M. (2017). *Ecologic and morphologic analysis of a proposed network of sediment diversions*. American Geophysical Union fall meeting, New Orleans, LA.
- Meselhe, E., Sadid, K., Jung, H., Messina, F., Esposito, C., & Liang, M. (2017). *Ecologic and morphologic analysis of a proposed network of sediment diversions*. RCEM2017 10th Symposium on River, Coastal and Estuaries Morphodynamic, Padova, Italy.
- Messina, F., Meselhe, E., Twight, D., & Buckman, L. (2017). *Eco-morphological real-time forecasting tool to predict hydrodynamic, sediment and nutrient dynamic in Coastal Louisiana*. RCEM2017 10th Symposium on River, Coastal and Estuaries Morphodynamic, Padova, Italy.
- Messina, F., Meselhe, E., Khadka, A., Twight, D., & Buckman, L. (2017). *Coastal eco-morphological real-time forecasting (CERF) system*. AGU Chapman Conference on Extreme Climate Event Impacts on Aquatic Biogeochemical Cycles and Fluxes, San Juan, Puerto Rico.
- Messina, F., Meselhe, E., Khadka, A., Twight, D., & Buckman, L. (2016). *Coastal eco-morphological real-time forecasting (CERF) system*. Northern Gulf of Mexico Operational Forecast System (NGOFS) workshop, Louisiana State University, Baton Rouge, LA.
- Messina, F., Meselhe, E., Khadka, A., Twight, D., & Buckman, L. (2016). *Coastal eco-morphological real-time forecasting (CERF) system*. Bays and Bayous symposium, Biloxi, MS.
- Meselhe, E., Pereira, J., Messina, F., Khadka, A., Miller, R., Mallory, R., Scott, D., Couvillion, B., Beck, H., Feldbaum, A., Ramachandirane, C., & Allison, M. (2016). *Comprehensive modeling approach to analyze the Calcasieu ship channel salinity control measures project*. State of the Coast, New Orleans, LA.
- Messina, F., Meselhe, E., Khadka, A., Twight, D., & Buckman, L. (2016). *Coastal eco-morphological real-time forecasting (CERF) system*. State of the Coast, New Orleans, LA.
- Sethi, R., Messina, F., & Marchisio, D. (2015). *A novel total flux normalized correlation equation for predicting single-collector efficiency*. American Geophysical Union fall meeting, San Francisco, CA.
- Messina, F., Marchisio, D., & Sethi, R. (2015). *A new correlation equation for predicting single-collector efficiency in physicochemical filtration in saturated porous media*. ECCE10-ECAB3-EPIC5, Nice, France.
- Messina, F., Marchisio, D., & Sethi, R. (2015). *A normalized and extended correlation equation for predicting single-collector efficiency in physicochemical filtration in saturated porous media*. 7th International Conference on Porous Media, Padova, Italy.
- Messina, F., Marchisio, D., & Sethi, R. (2015). *Normalization and extension of single-collector efficiency correlation equation*. European Geosciences Union General Assembly, Vienna.
- Messina, F., Sethi, R., & Marchisio, D. (2014). *Normalization and extension of the single-collector efficiency correlation equation for predicting transport of (nano)particles*. Nanosafety Forum for Young Scientists, Siracusa.
- Messina, F., & Sethi, R. (2014). *A new definition of a correlation equation for single collector efficiency*. European Geosciences Union General Assembly, Vienna.
- Icardi, M., Boccardo, G., Messina, F., Marchisio, D., Sethi, R., Tempone, R., & Prudhomme, S. (2013). *Pore-scale investigation of flow in saturated and unsaturated media: Computational tools and upscaling*. XXI congresso associazione italiana meccanica teorica e applicata, Torino, Italy.
- Messina, F., Icardi, M., Marchisio, D., & Sethi, R. (2013). *Pore scale simulation of micro and nanoscale zerovalent iron particles transport*. 5th International Conference on Porous Media, Prague.
- Icardi, M., Boccardo, G., Messina, F., Marchisio, D., & Sethi, R. (2012). *Two and three dimensional simulation of flow and particle transport in porous media*. SIMAI, Torino, Italy.
- Messina, F., & Sethi, R. (2012). *Microscale modeling of zerovalent iron micro and nanoparticles transport in porous media*. Remtech, Ferrara.
- Messina, F., Icardi, M., Marchisio, D., & Sethi, R. (2012). *Microscale simulation of nanoparticles transport in porous media for groundwater remediation*. COMSOL Conference 2012, Milano, Italy.