ORGANIZATION ROLE

Research Hydraulic Engineer

PROJECT ROLE / FOCUS AREAS

Numerical modeling

Coastal and riverine systems

Sediment management

Flood risk and impacts

EDUCATION

MS, Civil Engineering (hydraulic engineering track), Delft University of Technology, 2018

BS, Civil Engineering, Geology, Delft University of Technology, 2014

TRAINING

SFINCS Modeling Course (Deltares, 2023)
A/E/C Project Management Bootcamp (PSMJ, 2022)
Delft3D FM - Coastal Morphodynamic Modeling Course (Deltares, 2019)

MARTIJN BREGMAN, MS

Research Hydraulic Engineer

Martijn Bregman has more than seven years of continuous experience in numerical modeling of hydrodynamics, sediment transport, and morphology in coastal and riverine systems. He has contributed to numerous studies evaluating coastal protection and restoration projects, environmental impacts, and resilience initiatives. His work includes research on landscape evolution, sediment management, flood risk and impacts, and environmental dynamics. Bregman developed and automated several cross-disciplinary and probabilistic modeling frameworks, involving extensive series of simulations within high-performance computing environments. He is a subject matter expert in the Delft3D 4 (structured grid), Delft3D FM (unstructured grid), and SFINCS modeling suites. Additionally, he is proficient in several other modeling software packages, including HEC-RAS.

PROFESSIONAL EXPERIENCE

2021–Present: Research Scientist, The Water Institute

2018–2020: Research Associate, The Water Institute

2017–2018: Graduate Research Intern, Deltares (The Netherlands)

2017: Graduate Intern, Rijkswaterstaat (The Netherlands)

SELECTED PROJECTS

A Citywide Probabilistic Compound Flood Model & Real-Time Forecasting System. *City of Jacksonville, Florida (Ongoing).* The Water Institute and partners support development of Jacksonville's first resilience strategy. Led the development, testing, and analysis of a SFINCS model for Jacksonville to improve understanding of compound flooding, perform a series of sensitivity tests, and inform and support the development of a more detailed 2D HEC-RAS model.

Louisiana Sediment Management Plan (Barataria Bay). *Coastal Protection and Restoration Authority. (2021–2023).* Conducted a numerical modeling study under the Borrow Area Management and Monitoring (BAMM) program to assess the impact of in-bay sediment mining in Barataria Bay, Louisiana. Developed a Delft3D FM model to simulate hydrodynamics, sediment transport, and morphology. Analyzed model results to investigate the effect of borrow pits on tidal prism, sediment capture efficiency, and the influence of pit orientation on local and regional sediment dynamics.

Louisiana Sediment Management Plan (Lowermost Mississippi River). *Coastal Protection and Restoration Authority. (2021–2023).* Numerical modeling study assessing infilling rates and downstream impacts of borrow pits in lateral bars of the Lowermost Mississippi River. Improved and extended two Delft3D 4 hydro-morphodynamic models to better understand infilling processes. The study

also explored borrow pits' effects on regional river management, including diversion operations and navigation channel dredging.

Bayou Greenbelt Feasibility: Hydraulic and Salinity Modeling to Evaluate the Bayou Greenbelt Greenway. *National Park Service. (2023-2024).* Led the development of a three-dimensional Delft3D model to evaluate salinity impacts due to Bayou Greenbelt, a proposed connection of waterways in Lake Charles, Louisiana. Supported and co-developed a 2D HEC-RAS model to assess changes in rainfall-induced flooding.

2023 Coastal Master Plan—Integrated Compartment Model, Hydro Modeling (Louisiana). *Coastal Protection and Restoration Authority. (2019–2023).* The Integrated Compartment Model (ICM) is used to predict future landscape changes and evaluate projects that are part of the Coastal Masterplan. I supported model setup and QA/QC, analyzed and documented model results, and assessed project impacts.

Mid-Breton Sediment Diversion—Environmental Impact Statement (EIS) support and evaluation of diversion operation. *Coastal Protection and Restoration Authority. (2019–Present).* Large numerical modeling project (~1 million CPU hours) to assess the Mid-Breton Sediment Diversion's impacts in southeast Louisiana on geomorphology, salinity, flooding, and water quality in the receiving area as well as the Mississippi River. Improved the model and implemented an automated production system for simulations in a high-performance computing environment, minimizing human intervention. Led analyses on hydraulic conveyance in the Mid-Breton receiving area and assessed the impacts of the diversion on navigation and dredging in the Mississippi River.

Mid-Barataria Sediment Diversion—Environmental Impact Statement (EIS) support and evaluation of diversion operation. *Coastal Protection and Restoration Authority. (2018–2022).* Large numerical modeling project (>1 million CPU hours) to assess the Mid-Barataria Sediment Diversion's impacts in southeast Louisiana on geomorphology, salinity, flooding, and water quality in the receiving area as well as the Mississippi River. Automated parts of the modeling framework, including QA/QC and post-processing, and led assessment on water level impacts near communities in the Barataria Basin.

Partnership for Our Working Coast. *(2020–2022).* A public-private partnership between The Water Institute, energy industry partners (Chevron, Shell, and Danos), and the Greater Lafourche Port Commission (GLPC) aimed to maximize coastal restoration benefits from sediment generated by a large-scale dredging project to deepen the Port's entrance channel. Led the development, setup, coupling, and automation of the Delft3D FM hydrodynamic and morphology models, which formed the core of the framework for assessing various marsh creation projects.

Hurricane Sedimentation on Salt Marshes: Extent, Provenance, and Processes. *(2022–Present).* Collaborative study with external partners (Boston University, Virginia Institute of Marine Science) to understand delivery of mineral to salt marshes. Led development of a Delft3D FM model to simulate hydrodynamics (currents and waves), sediment transport, and morphology in the area around Sapelo Island in Georgia under regular and hurricane conditions.

A new modelling method for representing the effect of spiral flow on the bed shear stress (MSc Thesis). *Deltares, The Netherlands. (2017–2018).* Exploratory research to develop a new parameterization method for spiral flow in river bends, carried out using the Delft3D modeling suite. Investigated the shortcomings of three-dimensional and depth-averaged models in representing spiral flow and developed a new method to calculate the bed shear stress direction in rivers.

Morphological data transformation and analyses of coastal maintenance projects in the North Sea Region. *Rijkswaterstaat, The Netherlands (2017).* Intern. Investigated coastal surveying and maintenance practices of each of the member countries. Developed a method for standardization of data analysis to enhance cross-border data-based coastal research.