

MADOCHÉ JEAN LOUIS, PH.D.

Postdoctoral Researcher, University of Alabama ◊ Water Resources Engineer and Coastal Scientist, contractor on-site at ERDC

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[Google Scholar](#) ◊ [ORCID](#) ◊ [GitHub](#) ◊ [LinkedIn](#)

RESEARCH INTERESTS

Compound and cascading coastal hazards; nature-based solutions and vegetation seasonality; eco-hydro-morphodynamics of rivers, deltas, and estuaries; transport timescales, connectivity, and water quality; hybrid physics-machine learning modeling; flood risk in data-scarce regions.

EDUCATION

Louisiana State University, USA

2025

Ph.D., Oceanography and Coastal Sciences

GPA: 3.88/4.00

Advisor: Dr. Matthew Hiatt

Dissertation: *Eco-hydromorphodynamics of river deltas: How vegetation shapes water transport timescales, channel networks, and system connectivity*

IHE Delft Institute for Water Education, The Netherlands

2022

M.Sc., Hydraulic Engineering and River Basin Development, *cum laude*

Grade: 8.3/10

Thesis: *Effects of climate change and deforestation on river flooding in Cap-Haïtien, Haiti, combining SWAT and 1D/2D SOBEK-Rural modeling*

Pachuca Institute of Technology, Mexico

2020

B.Sc., Civil Engineering, *magna cum laude*

Grade: 91.27/100

Thesis: *Analysis of road-traffic conflict points in Morelia, Mexico*

RESEARCH AND ACADEMIC APPOINTMENTS

University of Alabama, USA

April 2026 – Present

Postdoctoral Researcher, Civil, Construction & Environmental Engineering

Tuscaloosa, AL

- Supervisor: Dr. Hamed Moftakhari.
- Lead research on **compound and cascading coastal hazards** (storm surge, riverine, and pluvial flooding and their interactions) in Mobile Bay, Alabama, using SFINCS with subgrid downscaling.
- Developed **seasonally varying marsh roughness** fields from vegetation phenology and paired summer/winter field observations to quantify how nature-based flood mitigation varies across seasons and storm magnitudes (5- to 25-year events and Hurricane Katrina).
- Develop **hybrid physics-based and machine-learning** approaches (surrogate models and data-driven emulation of process-based simulations) for rapid compound-flood prediction under uncertainty.
- Contribute to the scientific design of a **web-based decision-support platform** for stakeholder-facing flood-risk visualization.
- **Co-write research proposals** with the PI to federal and state programs, including NOAA's Cooperative Institute for Research to Operations in Hydrology (CIROH).
- **Mentor** two Ph.D. students and one undergraduate student in hydrodynamic modeling, data analysis, and scientific writing.

Dynamic Solutions LLC . On-site at the Army Engineer Research and Development Center (ERDC), Coastal and Hydraulics Laboratory (CHL), USA April 2025 – Present
Water Resources Engineer and Coastal Scientist Vicksburg, MS

- Lead development and calibration of a **3D baroclinic hydrodynamic, salinity, and temperature model** (Delft3D FM, 10 sigma layers) of the Chesapeake Bay mouth, Hampton Roads, and Norfolk estuarine system, coupled with SWAN and DELWAQ.
- Run large simulations on 576 partitions on the DoD **Carpenter HPC** system (MPI, PBS, Apptainer).
- Build model forcing from nine watersheds, ocean boundaries (CMEMS), ERA5 meteorology, **sea-level rise scenarios** (2037, 2087), and **historical storm hindcasts** (Hurricane Isabel, 2003; 2009 nor'easter).
- Develop Python pipelines for partitioned-output processing, model–observation comparison, and scenario analysis.

State University of Haiti (UEH-CHCL), Haiti January 2024 – Present
Lecturer, Faculty of Engineering and Sciences; Founder, Laboratory of Hydraulics and Hydroinformatics (LHH) Limonade, Haiti

- Founded the **LHH** in partnership with INRS Québec; built its website, training program, and research agenda; contribute to its graduate program in hydraulics and hydroinformatics.
- Teach hydraulics and coastal engineering; supervise undergraduate theses on flood risk, irrigation, water quality, and coastal change.

Deltares, The Netherlands April 2024 – Present
Courtesy Researcher, Marine and Coastal Systems Department Delft

- Coupled Delft3D FM with the **NBSDynamics** vegetation framework (via BMI) to model vegetation–sediment–flow feedbacks for nature-based restoration.

National Laboratory of Coastal Resilience (LANRESC), Mexico August 2024 – August 2025
Researcher, Water Resources Group

- Led a coastal field assessment in Tabasco; developed socio-environmental indicators with local stakeholders.

Louisiana State University, USA August 2022 – December 2025
Doctoral Researcher, Coastal Hydrology, Hydrodynamics, and Oceanography Lab Baton Rouge, LA

- Conducted process-based Delft3D FM modeling of vegetation, water age, connectivity, and channel-network evolution in river deltas.
- Performed ADCP hydrographic surveys and vegetation and sediment sampling in the Wax Lake and Mississippi River deltas.

IHE Delft Institute for Water Education, The Netherlands May 2022 – August 2022
Scientific Researcher Delft

- Developed a coupled SWAT–SOBEK flood-modeling framework for Cap-Haïtien, Haiti; contributed to research on Small Island Developing States (SIDS).

University of Colima and Universidad Michoacana, Mexico August 2018 – August 2019
Research Assistant

- Contributed to a hydrological study of Morelia under climate scenarios; performed GIS and remote-sensing analysis.

- **Djibouti (2026):** Technical advisory on flood-hazard modeling for coastal and urban flood-risk assessment.
- **Cap-Haïtien, Haiti (2023 – 2024):** Hydrologic and hydrodynamic analysis (SWAT, SOBEK) and compound-flood modeling for flood-risk mitigation and nature-based solutions; drafted terms of reference for hydrologic, hydraulic, and bathymetric studies. This work informed flood-mitigation projects still underway in the city.

PUBLICATIONS

Peer-reviewed journal articles

1. **Jean Louis, M.**, Dijkstra, J., Quirk, T., Rovai, A., Willemsen, P., & Hiatt, M. (2026). The role of seasonal vegetation dynamics in shaping river delta channel networks and morphodynamics. *Geomorphology*, 506, 110327. doi:10.1016/j.geomorph.2026.110327
2. Alou Tankari, S., Chery, H. J., **Jean Louis, M.**, Rousseau, A. N., Gumiere, S. J., Kabore, P., & Célécourt, P. (2026). Future water demand modeling: A multi-sector review using a streamlined methodological approach. *Cambridge Prisms: Water*, 4, e1. doi:10.1017/wat.2025.10009
3. **Jean Louis, M.** & Hiatt, M. (2025). Modelling the effects of vegetation distribution and density on hydrological connectivity and water age in a river delta. *Ecohydrology*, 18(2), e2741. doi:10.1002/eco.2741 — **Wiley Top Viewed Paper (2026)**
4. **Jean Louis, M.**, Crosato, A., Mosselman, E., & Maskey, S. (2024). Effects of urbanization and deforestation on flooding: Case study of Cap-Haïtien City, Haiti. *Journal of Flood Risk Management*, 17(4), e13020. doi:10.1111/jfr3.13020

Submitted and in revision

5. Feizabadi, S., Brannum, S. M., Li, C., Hiatt, M., & **Jean Louis, M.** Hydrodynamic nonlinear interactions in river-dominated deltas. *Geophysical Research Letters*, in revision.
6. **Jean Louis, M.**, Dijkstra, J. T., Feizabadi, S., & Hiatt, M. Influences of seasonal vegetation dynamics and morphological change on water age and connectivity in river deltas. *Water Resources Research*, submitted. Preprint: *ESS Open Archive* (2026), doi:10.22541/essoar.15009921/v1

In preparation

7. **Jean Louis, M.**, Robles Camacho, J., Siders, A. C., Cherry, J. A., Jones, C. N., Radfar, S., & Mof-takhari, H. Marsh vegetation phenology modulates compound flood depth in shallowly inundated coastal areas. Target journal: *Frontiers in Marine Science*.
8. **Jean Louis, M.**, Robles Camacho, J., Radfar, S., & Moftakhari, H. When does sub-grid velocity downscaling matter? Depth-dependent value of discharge-conserving velocity downscaling in SFINCS for compound flood hazard.

Other preprints

9. Célécourt, P., Drapeau, J., Lovince, H. B., Azima, S., Thiaw, C. M., Asie, L. R., Célécourt, L., Mertilus, F., **Jean Louis, M.**, Said, A. T., & Chery, H. J. (2025). STAR: A transposition of the PICO framework to environmental sciences, engineering and beyond. *Research Square* (preprint, v1). doi:10.21203/rs.3.rs-6475550/v1

Dissertation and thesis

10. **Jean Louis, M.** (2025). *Eco-hydromorphodynamics of river deltas: How vegetation shapes water transport timescales, channel networks, and system connectivity*. Ph.D. dissertation, Louisiana State University. [LSU Digital Commons](#)
11. **Jean Louis, M.** (2022). *Effects of climate change and deforestation on river flooding in Cap-Haïtien, Haiti, combining SWAT and 1D/2D SOBEK-Rural modeling*. M.Sc. thesis, IHE Delft Institute for Water Education.

GRANTS, FELLOWSHIPS, AND AWARDS

Fellowships and competitive awards

French–American Doctoral Exchange (FADEX) Award	2025
Student Workshop on International Coastal and Marine Management (SWIMM) Award	2024
LSU Graduate School Award	2024
Dutch Government Scholarship, full M.Sc. funding at IHE Delft	2020 – 2022
Mexican Government Fellowship, full B.Sc. funding	2015 – 2019

Research support (contributing researcher)

National Science Foundation, Award 2142881 (PI: M. Hiatt): doctoral research on delta vegetation and connectivity

ERDC/DoD Cooperative Agreements W912HZ2220005 and W912HZ2520012: delta eco-hydromorphodynamics

Honors

Wiley Top Viewed Paper, <i>Ecohydrology</i> (Jean Louis & Hiatt, 2025)	2026
Wiley Top Viewed Paper, <i>Journal of Flood Risk Management</i> (Jean Louis et al., 2024)	2026
First Class Honor, Government of Mexico	2019
Best Civil Engineering Undergraduate Student, Pachuca Institute of Technology	2019
National Civil Engineering Student Champion of Mexico	2017, 2018, 2019

TEACHING EXPERIENCE

Instructor of record — State University of Haiti (UEH-CHCL), senior undergraduate civil engineering

General and Fluvial Hydraulics (Hydraulique générale et fluviale) 2024 – 2026
Designed the syllabus and assessment: open-channel and pressurized-flow design projects (70%) and an open-book exam; 2026 offering taught fully remotely over eight weeks with Python and Excel worked examples.

Coastal Engineering 2024 – 2026
Team projects designing nature-based solutions for an eroding coastline, defended before classmates acting as stakeholders.

Workshops and short courses

Coordinator and instructor, *Scientific Research and Writing Workshop*, LHH, UEH-CHCL Fall 2026
Thirteen modules (26 contact hours) from research question to paper, poster, and oral presentation; co-taught with Dr. P. Célécourt (INRS), S. Azima, and A. Pierre.

Developer, Python and geoinformatics training materials, LHH 2025 – 2026

Teaching assistant

Pachuca Institute of Technology: Calculus I–II, Differential Equations, Multivariable Calculus 2017 – 2019

Courses prepared to teach

Undergraduate: fluid mechanics; hydraulics and open-channel flow; hydrology; water resources engineering; coastal engineering; sediment transport.

New graduate courses: River Morphodynamics; Environmental Data Analysis; Integrated Modeling of the River–Coast Continuum.

MENTORING AND ADVISING

Primary advisor, completed undergraduate theses: 8 (6 at UEH-CHCL, Haiti; 2 in Mexico). Selected:

Cange Pierre Gabriel and **Dieulin Paul** (UEH-CHCL, 2024), joint thesis — *Conception d'un système d'irrigation intelligent pour la ferme agricole du Campus Henry Christophe de l'Université d'État d'Haïti à Limonade*. Both now M.Sc. students at INRS, Canada (joint Thesis)

Current undergraduate thesis projects, LHH (2026 – Present)

Rainfall thresholds triggering reported floods in Haiti from the Groundsource dataset (2000 – 2025), Cap-Haïtien and Port-au-Prince.

Satellite-derived shoreline change in Haiti with CoastSat (Trois Baies National Park, Gonaïves, Les Cayes).

Other mentoring

Two Ph.D. students and one undergraduate student, Moftakhari research group, University of Alabama 2026 – Present

M.Sc. student, hydrodynamic modeling thesis, IHE Delft (now at the Water Authority of Jamaica) 2024

Letters of recommendation written for 11 students 2023 – 2026

INVITED TALKS AND PANELS

When Does Sub-Grid Velocity Downscaling Matter? Depth-Dependent Value of Discharge-Conserving Velocity Downscaling in SFINCS for Compound Flood Hazard. Delft Software Days (DSD-INT 2026), Delft, The Netherlands (upcoming). Nov. 2026

Invited Panelist, *Biodiversité et écosystèmes face au changement climatique : science, données et solutions fondées sur la nature pour renforcer la résilience*. Local Conference of Youth (LCOY) Haiti 2026, endorsed by LCOY/YOUNGO (UNFCCC Youth Constituency), Lakou Breda, Cap-Haïtien, Haiti. Aug. 2026

Conservation of Haiti's Coastal Ecosystems. World Ocean Day, UEH-CHCL, Limonade, Haiti. June 2026

Floods in Cap-Haïtien, Haiti: Diagnosis, Perspectives, and Solutions. Faculty of Sciences, State University of Haiti, Port-au-Prince, Haiti. Apr. 2025

- Nature-Based Solutions for Coastal Zone Management in the Face of Growing Environmental Pressures. National School of Geology, Haiti. 2025
- Influence of Vegetation Distribution and Density on Water Age and Hydrological Connectivity in a River Delta. Royal HaskoningDHV, The Netherlands. June 2024
- Influence of Vegetation Density and Distribution on Connectivity in River Deltas. Wetlands Meeting, University of Twente, Enschede, The Netherlands. June 2024
- Effects of Climate Change, Urbanization, and Deforestation on River Flooding in Cap-Haïtien. Civil Engineering Week and Geomatics Conference, University of Colima, Mexico. Mar. 2023
- Hydrological and Hydraulic Modeling of Ungauged River Basins. State University of Haiti (UEH-CHCL), Limonade, Haiti. Mar. 2023

CONFERENCE PRESENTATIONS

- Jean Louis, M.**, Robles Camacho, J., Siders, A. C., Cherry, J. A., Jones, C. N., Radfar, S., & Moftakhari, H. Marsh vegetation phenology modulates compound flood depth in shallowly inundated coastal areas. AGU Annual Meeting, San Francisco, CA (upcoming). Dec. 2026
- Jean Louis, M.**, Dijkstra, J., & Hiatt, M. Influence of seasonal vegetation dynamics and morphological change on water age and connectivity in river deltas. River, Coastal and Estuarine Morphodynamics (RCEM), Barcelona, Spain. Sept. 2025
- Jean Louis, M.**, Dijkstra, J., & Hiatt, M. Modeling vegetation–morphology feedbacks to inform delta restoration strategies. One Ocean Science Congress, Nice, France. June 2025
- Jean Louis, M.**, Dijkstra, J., & Hiatt, M. Long-term deltaic morphology shaped by vegetation dynamics. State of the Coast, New Orleans, LA. May 2025
- Jean Louis, M.**, Dijkstra, J., et al. Influences of vegetation dynamics and morphological change on water age and connectivity in river delta systems. Coastal Dynamics, Aveiro, Portugal. Apr. 2025
- Jean Louis, M.**, Dijkstra, J., et al. Influences of vegetation dynamics and morphological change on water age and connectivity in river delta systems. AGU Fall Meeting, Washington, DC. Dec. 2024
- Jean Louis, M.** & Hiatt, M. Unraveling the influence of vegetation in modulating water transport timescales in a river delta system. AGU Fall Meeting, San Francisco, CA. Dec. 2023
- Jean Louis, M.** & Hiatt, M. Unraveling the influence of vegetation in modulating water transport timescales in a river delta system. Young Coastal Scientists and Engineers Conference, University of Wisconsin–Madison, WI. Aug. 2023
- Jean Louis, M.**, Crosato, A., et al. Effects of climate change, urbanization, and deforestation on river flooding in Cap-Haïtien. CSDMS Annual Meeting, Boulder, CO. Apr. 2023
- Jean Louis, M.**, Crosato, A., et al. Effects of climate change, urbanization, and deforestation on river flooding in Cap-Haïtien. The Water Week, UEH-CHCL, Limonade, Haiti. Mar. 2023
- Jean Louis, M.**, Crosato, A., et al. Effects of climate change, urbanization, and deforestation on river flooding in Cap-Haïtien. SIDS Workshop, IHE Delft, The Netherlands. Mar. 2023
- Jean Louis, M.**, Crosato, A., et al. Effects of climate change, urbanization, and deforestation on river flooding in Cap-Haïtien. NCR Days, Netherlands Centre for River Studies, TU Delft, The Netherlands. May 2022

PROFESSIONAL SERVICE

International assessment review

Expert Reviewer, Intergovernmental Panel on Climate Change (IPCC), Seventh Assessment Report, Working Group I (*The Physical Science Basis*), First Order Draft
Aug. – Oct. 2026

Journal peer review

Journal of Flood Risk Management (Wiley) 2024 – Present

Ecohydrology (Wiley) 2024 – Present

Hydrogeology Journal (Springer) 2026 – Present

Journal of Haitian Studies 2023 – Present

Book chapter review

External reviewer (double-blind) of the chapter *Aplicaciones del Modelo Ramberg–Osgood en el Análisis No Lineal de Aceros Estructurales: Innovación en la Caracterización Esfuerzo–Deformación*, for the edited volume *Innovación tecnológica, sostenibilidad y competitividad en el contexto socioeconómico de México: enfoques desde la ingeniería, la gestión y el desarrollo regional y urbano*, Universidad Autónoma del Estado de Hidalgo (UAEH), Mexico.
Feb. – May 2026

Leadership and community

Co-founder and President, Haitian Emerging Scholar Alliance (HESA), a Louisiana-incorporated non-profit with a global network of 800+ members. Organized international colloquia (International Colloquium on Konpa, 2025; Feminisms in Haiti and Beyond) and created *Vandredi Lasyans*, a Friday science-communication seminar series in Haitian Creole.
2024 – Present

Founder, Laboratory of Hydraulics and Hydroinformatics (LHH), UEH-CHCL, in partnership with INRS Québec
2024 – Present

Organizer, Friday research seminar series, Department of Oceanography and Coastal Sciences, LSU 2024 – 2025

Outreach

Founder, *Les Innovateurs*, a youth science-outreach program in rural Haiti; reached 1,532 children (75% girls).
2012 – 2024

Ocean Commotion (LSU / Louisiana Sea Grant): engaged 1,569 K–12 students and 124 teachers from 34 schools.
2024

Hydrology Day and Louisiana Sea Grant K–12 outreach, Baton Rouge, LA
2022 – 2025

Professional memberships

American Geophysical Union (AGU); Haitian Studies Association (HSA); Asociación Mexicana de Hidráulica (AMH); Haitian Water and Sanitation Initiative (HANWASH); Omicron Delta Kappa (LSU chapter)

TECHNICAL SKILLS

Hydrodynamics & water quality	Delft3D FM (2D/3D D-Flow FM, SWAN coupling, DELWAQ), NBS-Dynamics, SFINCS (HydroMT-SFINCS), AdH, HEC-RAS, SOBEK
Hydrology	SWAT, HEC-HMS, WEAP, RIBASIM; coupled watershed–river–coast workflows
Scientific computing & HPC	Python (NumPy, pandas, xarray, SciPy, Matplotlib), MATLAB, R; Linux, Git/GitHub; PBS/Slurm, MPI partitioning, Apptainer
Machine learning & data	Surrogate modeling and data-driven emulation; time-series and spatial analysis
Geospatial & remote sensing	ArcGIS, QGIS, Google Earth Engine, Sentinel/Landsat, CoastSat
Field methods	ADCP hydrographic surveys, vegetation and sediment sampling, water-quality analysis

TRAINING AND CERTIFICATIONS

Introduction to Deep Machine Learning, Louisiana State University	2023
CSDMS Modeling Training, University of Colorado Boulder	2023
SFINCS Model Training, Deltares	2023
Coastal Hydrodynamics Modelling; Coastal Morphodynamics Modelling, Deltares	2022

LANGUAGES

Haitian Creole (native); French (native/bilingual); Spanish (native/bilingual); English (full professional proficiency, C1); Dutch (basic, A1)

SELECTED MEDIA

IHE Delft alumni interview: un-ihe.org/alumni-interview-madoche-jean-louis

Génie360 profile: [From Haiti to Mexico, the Netherlands, and the United States \(2025\)](#)

REFERENCES

Dr. Matthew Hiatt, Associate Professor, Oceanography & Coastal Sciences, Louisiana State University (Ph.D. advisor) — mhiatt1@lsu.edu

Dr. Hamed Moftakhari, P.E., Associate Professor, Civil, Construction & Environmental Engineering, University of Alabama (postdoctoral supervisor) — hmoftakhari@eng.ua.edu

Dr. Clinton S. Willson, P.E., Dean, College of the Coast & Environment, Louisiana State University (Ph.D. committee member) — cwillson@lsu.edu

Dr. Erik Mosselman, Deltares and Delft University of Technology (M.Sc. committee member) — Erik.Mosselman@deltares.nl