

Marcus N. Gomes Jr.

Curriculum Vitae

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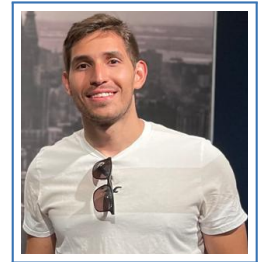
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Academic Background

- Jan–2024 to present **Postdoctoral Appointment**, *University of Arizona*, Concentration area: Hydrology and Atmospheric Sciences, NSF Project: Hydrologic closure relationships at different levels of hillslope model complexity
Advisor: Peter A. Troch, Ph.D.
- Jan–2020 to Dec–2023 **Doctor of Philosophy**, *University of Sao Paulo - Sao Carlos School of Engineering*, Title: [Advances in open source hydroinformatics for flood modeling and disaster education](#). Concentration area: Hydraulic Engineering and Sanitation, [PhD thesis recently awarded as the best of 2023 in all engineering fields of USP](#)
Advisor: Eduardo M. Mendonado, Ph.D. Co-advisor: Marcio H. Giacomoni, Ph.D., P.E.
- Jan–2020 to Dec–2024 **Doctor of Philosophy**, *University of Texas at San Antonio*, Concentration area: Civil and Environmental Engineering, Tentative Title: Real-time Control of Green-Infrastructure and Stormwater Drainage Systems Through Looped-Feedback Control Approaches. Status: Graduation on hold (1 credit missing, currently in a postdoc position and only able to defend afterwards).
Advisor: Marcio Hofheinz Giacomoni, Ph.D., P.E.
- Jan–2018 to Dec–2020 **Master's in Hydraulic Engineering and Sanitation**, *University of Sao Paulo - Sao Carlos School of Engineering*, Concentration area: Hydraulic Engineering and Sanitation
Status: Graduated. Advisor: Eduardo M. Mendonado.
- Jan–2013 to Dec–2017 **B.Sc. in Civil Engineering**, *State University of Maringa - Brazil*
Advisor: Germano Romera, Ph.D.

Professional Interests

Investigating water resources issues in multiple spatio-temporal scales via numerical modeling and data assimilation.

Supervision

Master's Degree	Dr. Eduardo Mario Mendiondo
Ph.D. Degree	Dr. Marcio Hofheinz Giacomoni , Dr. Eduardo Mario Mendiondo
Postdoctorate	Dr. Peter Troch

Skills and Activities

Programming Language	Matlab, Python, VBA, Javascript
Environment	Latex, Microsoft Office, Git, Github, HTML, Wordpress, Google Earth Engine, QGIS
Operating System	Windows

Work Experience

2025–present	Post-doctoral Research Associate II , <i>University of Arizona - Department of Hydrology and Atmospheric Sciences</i> Task: Using innovative catchment-scale hydrologic-hydrodynamic modeling and advanced land-surface modeling to particularly account for accurate snow modeling, my current goal is to apply/develop a hillslope-storage-Boussinesq (hsB) model to estimate catchment scale hydrologic signatures. Methodology application is performed in the Beaver Creek catchment, a tributary catchment of the Verde River in Northern Arizona.
2024–present	Post-doctoral Research Associate I , <i>University of Arizona - Department of Hydrology and Atmospheric Sciences</i> Task: Taking advantage of the unique and extensively monitored Landscape Evolution Observatory hillslopes high-resolution data, our project aims to assess how simplified 1D vadose Richards model coupled with a 2D Boussinesq saturated groundwater flow model can be adapted to use data assimilation techniques to identify effective material parameters and state-dependent hysteresis properties. In particular, we use a particle filter Monte Carlo ensemble approach to evaluate the temporal variation of soil material properties and discover state-dependent relationships to later use in simplified models.
2024-Spring	Teaching Assistant of Fundamentals of Surface Water Hydrology , <i>University of Arizona - Department of Hydrology and Atmospheric Sciences</i> Task: Course taught by Peter A. Troch and I was responsible for reviewing and grading all assignments, projects, and exams.

- 2020–2023 **Graduate Research Assistant**, *School of Civil and Environmental Engineering, and Construction Management, Department of Civil and Environmental Engineering*
Task: Perform stormwater water quality analysis, develop numerical models, and set up and monitor field experiments. I was responsible for setting up autosamplers, rain gauges, v-notch weirs, and collecting and analyzing samples after storm events. In the water quality analysis, I was responsible for performing total suspended solids, volatile suspended solids, heavy metals, bacteria, pH, and temperature analyzes. In this project, I was also responsible for the hydrological and hydraulic design of different permeable pavement structures funded by the City of San Antonio and constructed in January-2023 and under monitoring.
- 2022–2023 **Teaching Assistant of Hydrology I and II for Civil Engineering**, *University of Sao Paulo - Sao Carlos School of Engineering*
Task: Course taught by Eduardo M. Mendonça and I was responsible for developing supporting materials, spreadsheets and numerical models for the applied hydrology classes, as well as teaching some of the classes. Classes were offered for students in the Junior and Sophomore year.
- 2018–2020 **Graduate Research Assistant**, *University of Sao Paulo - Sao Carlos School of Engineering, Department of Hydraulic Engineering and Sanitation*
Task: Perform stormwater water quality analysis, develop numerical models and set up and monitor field experiments. I was also responsible for planning, designing and controlling the execution of a bioretention system funded by FAPESP grants 2017/21940-2 and 2018/20865-0
- 2018–2019 **Teaching Assistant of Hydrology I and II for Civil Engineering**, *University of Sao Paulo - Sao Carlos School of Engineering*
Task: Develop supporting materials, spreadsheets, and numerical models for Applied Hydrology classes. Classes were offered for students in the Junior and Sophomore year.
- 2013–2015 **Teaching Assistant**, *State University of Maringa*
Task: Help, teach, and solve tests, exams, and proposed exercises from Physics I and Physics II of Civil Engineering and Environmental Engineering Classes. Classes were offered for students in the Sophomore year.
- 2012–2017 **Teaching Assistant**, *Curso e Colégio Alfa Preparatory School*
Task: Help, teach, and solve pre-school exams of Physics and Mathematics for students in preparation for college.

Extra Activities

I run a [website](#) and a [Youtube](#) channel with content of Civil and Environmental Engineering (In Portuguese) and I plan to translate them to english in the near future. I developed more than 60 numerical tools to aid in various engineering calculations such as: design of pipes, design concrete structures, to solve hydrology and hydraulics problems, etc. The website has more than 60.000 downloads from more than 10 countries, which allowed me to network with designers and engineers around the world. My goal is to provide useful content to the engineering and water resources community with high quality and in most cases free of charge. I also write online articles about water resources and civil engineering in overall. The articles are the main source of leads to the website and are top-ranked in Brazilian search engine optimization. The website available at: www.engenheiroplanilheiro.com.br (In Portuguese).

Scholarships

Ph.D Degree at UTSA	Financed by the City of San Antonio - Texas (\$ 153,000 USD). Project - Demonstrating the Environmental Benefits of Permeable Paved Surfaces over the Edwards Aquifer
Ph.D. Degree at USP	Ph.D. Scholarship by CAPES (R\$ 74,400)
M.Sc. Degree	Master's degree scholarship financed by FAPESP (R\$ 58,116)
Bsc. Degree	Free Tuition by State University Scholarship

Fields and Keywords of Interest

Civil and Environmental Engineering	Flood Control, Water Quality Transport and Fate, Hydrodynamic Models, Hydrological Models, Water Quality Models, Low Impact Development, System Analysis, Water Resources Planning and Management, Closure-relationships, Soil Physics
Electrical Engineering	Linear Systems and Control, Control of Non-Linear Systems, Model Predictive Control, Linear Quadratic Regulators, Model Predictive Control.
Mathematics	Numerical Modeling, Explicit Methods, Implicit Methods, Finite-Difference Methods, GPU Processing, Convex Optimization, Non-linear Non-Convex Optimization, Data Assimilation, Reinforcement Learning, Particle Filter

Reviewer for Scientific Journals

2021-present	<i>Journal of Hydrology</i>
2021-present	<i>Journal of Water Resources Planning and Management</i>
2022-present	<i>Hydrological Sciences Journal</i>
2025-present	<i>Hydrology and Earth System Sciences</i>
2025-present	<i>Water Resources Research</i>
2024-present	<i>Urban Water Journal</i>
2022-present	<i>Sustainable Cities and Society</i>
2025-present	<i>Natural Hazards and Earth Systems Sciences</i>
2024-present	<i>The International Journal of River Basin Management</i>
2024-present	<i>Journal of Flood Risk Management</i>
2024-present	<i>Scientific Reports</i>
2025-present	<i>Water Research - X</i>
2020-present	<i>Journal of Hydrologic Engineering</i>
2020-present	<i>Revista Brasileira de Recursos Hídricos</i>
2020-present	<i>Revista DAE</i>
2021-present	<i>Revista REGA</i>
2024-present	<i>Geomatics - Natural Hazards and Risk</i>
2024-present	<i>AIMS Geosciences</i>
2025-present	<i>Hydrology</i>
2024-present	<i>Journal of Asian Architecture and Building Engineering</i>
2025-present	<i>Applied Sciences</i>
2025-present	<i>Hydrology</i>

Publications in peer-reviewed journals - Published or Accepted

Journals

1. **Gomes, M.N.**, Jaliha, V., Castro, M. and Mendiondo, E.M., 2025. *Exploring the impact of rainfall temporal distribution and critical durations on flood hazard modeling.* **Natural Hazards**, 121(9), pp.10989-11012 <https://doi.org/10.1007/s11069-025-07186-3>.
2. Gomes Jr, M.N., do Lago, C.A. and Mendiondo, E.M., 2024. *A Simple Method for Designing Infiltration Low Impact Development Techniques Considering Effects of Urbanization and Climate Change*, **Brazilian Journal of Water Resources (RBHR)** (2025) (accepted).
3. Vasconcelos, J.G., **Gomes Jr, M.N.**, Oliveira, P.T.S., Yang, D. and Fang, X., 2025. Reformulating the Rational Method Considering Dissimilar Land Use Types. **Journal of Irrigation and Drainage Engineering**, 151(4), p.04025017 <https://doi.org/10.1061/JIDEDH.IRENG-10431>.
4. **Gomes Jr**, Marcus Nóbrega, Ahmad F. Taha, Luis Miguel Castillo Rápalo, Eduardo Mario Mendiondo, and Marcio Hofheinz Giacomoni. "Real-time regulation of detention ponds via feedback control: Balancing flood mitigation and water quality." **Journal of Hydrology** 643 (2024): 131866. DOI: <https://doi.org/10.1016/j.jhydrol.2024.131866>
5. M. N. **Gomes Jr.**, C. A. F. do Lago, L. M. C. R apallo, P. T. S. Oliveira, M. H. Giacomoni, and E. M. Mendiondo, "HydroPol2D – Distributed Hydrodynamic and Water Quality Model: Challenges and Opportunities in Poorly-Gauged Catchments," **Journal of Hydrology**, 2023, DOI: <https://doi.org/10.1016/j.jhydrol.2023.129982>.
6. **Gomes Jr**, Marcus Nóbrega, Maria de Andrade Rocha Alencar Castro, Pedro Gustavo Câmara da Silva, Marcio Hofheinz Giacomoni, and Eduardo Mario Mendiondo. "Increasing flood awareness through dam-break serious games." **International Journal of Disaster Risk Reduction** 108 (2024): 104543. DOI: <https://doi.org/10.1016/j.ijdr.2024.104543>.
7. M. N. **Gomes Jr.**, M. H. Giacomoni, A. F. Taha, and E. M. Mendiondo, "Flood risk mitigation and valve control in stormwater systems: State-space modeling, control algorithms, and case studies," **Journal of Water Resources Planning and Management**, vol. 148, no. 12, p. 04022067, 2022. [Online]. Available: [10.1061/\(ASCE\)WR.1943-5452.0001588](https://doi.org/10.1061/(ASCE)WR.1943-5452.0001588)
8. M. N. **Gomes Jr.**, L. M. C. Rapalo, P. T. S. Oliveira, M. H. Giacomoni, C. A. F. do Lago, and E. M. Mendiondo, "Modeling unsteady and steady 1-d hydrodynamics under different hydraulic conceptualizations: Model/software development and case studies," **Environmental Modeling and Software**, 2023. DOI: <https://doi.org/10.1016/j.envsoft.2023.105733>.
9. M. N. **Gomes Jr.**, M. H. Giacomoni, M. B. de Macedo, C. A. F. do Lago, J. A. Teixeira, T. R. Pereira, and E. M. Mendiondo, "A modeling framework for bioretention analysis: Assessing the hydrologic performance under system's uncertainty," **Journal of Hydrologic Engineering**, DOI: <https://doi.org/10.1061/JHYEFF.HEENG-5705> 2023.
10. M. N. **Gomes Jr.**, P. H. B. Alves, E. M. Mendiondo, and L. F. R. Reis, "Statistical, visual and non-parametric analyses for the optimization of IDF curve fitting and construction of hydraulic works design abacuses: case study in São Carlos - SP". **Revista DAE**, DOI: <https://doi.org/10.36659/dae.2021.013> 2020 (In Portuguese).
11. Rápalo, Luis MC, Marcus N. **Gomes Jr**, and Eduardo M. Mendiondo. "Developing an open-source flood forecasting system adapted to data-scarce regions: A digital twin coupled with hydrologic-hydrodynamic simulations." **Journal of Hydrology** (2024): 131929. DOI: <https://doi.org/10.1016/j.jhydrol.2024.131929>.

Journals

12. A. S. Ballarin, J. G. S. M. Uchôa, M. S. dos Santos, A. Almagro, I. P. Miranda, P. G. C. da Silva, M. N. **Gomes Jr.**, E. Wendland, P. T. S. Oliveira, "Brazilian water security threatened by climate change and human behavior". **Water Resources Research**, DOI: <https://doi.org/10.1029/2023WR034914> 2023.
13. do Lago, C.A., Giacomoni, M.H., Bentivoglio, R., Taormina, R., **Junior**, M.N.G. and Mendiondo, E.M., 2023. *Generalizing rapid flood predictions to unseen urban catchments with conditional generative adversarial networks*. **Journal of Hydrology**, 618, p.129276, DOI: <https://doi.org/10.1016/j.jhydrol.2023.129276>.
14. K. McClymont, D. G. F. Cunha, C. Maidment, B. Ashagre, A. F. Vasconcelos, M. B. de Macedo, M. F. N. Dos Santos, M. N. G. **Júnior**, E. M. Mendiondo, A. P. Barbassa et al., "Towards urban resilience through sustainable drainage systems: A multi-objective optimisation problem", **Journal of Environmental Management**, vol. 275, p. 111173, 2020, DOI: <https://doi.org/10.1016/j.jenvman.2020.111173>
15. M. Batalini de Macedo, M. Nobrega **Gomes Júnior**, T. R. Pereira de Oliveira, M. H. Giacomoni, M. Imani, K. Zhang, C. Ambrogi Ferreira do Lago, and E. M. Mendiondo, "Low impact development practices in the context of united nations sustainable development goals: A new concept, lessons learned and challenges," **Critical Reviews in Environmental Science and Technology**, vol. 52, no. 14, pp. 2538–2581, 2022, DOI: <https://doi.org/10.1080/10643389.2021.1886889>
16. Ambrogi Ferreira Do Lago, Cesar, Jose Artur Teixeira Brasil, Marcus Nóbrega **Gomes**, Eduardo Mario Mendiondo, and Marcio H. Giacomoni. "Improving pluvial flood mapping resolution of large coarse models with deep learning." **Hydrological Sciences Journal** 69, no. 5 (2024): 607-621. DOI: <https://doi.org/10.1080/02626667.2024.2329268>
17. J. Brasil, M. Macedo, C. Lago, T. Oliveira, M. **Júnior**, T. Oliveira, and E. Mendiondo, "Nature-based solutions and real-time control: Challenges and opportunities," **Water**, vol. 13, no. 5, p. 651, 2021, DOI: <https://doi.org/10.3390/w13050651>.
18. J. A. T. Brasil, M. B. de Macedo, T. R. P. de Oliveira, F. G. Ghiglieno, V. C. B. de Souza, G. Marinho e Silva, M. N. **Gomes Júnior**, F. A. A. de Souza, and E. M. Mendiondo, "Can we scale digital twins of nature-based solutions for stormwater and transboundary water security projects?" **Journal of Hydroinformatics**, 2022, DOI: <https://doi.org/10.2166/hydro.2022.142>
19. M. Batalini de Macedo, M. N. **Gomes Júnior**, V. Jochelavicius, T. R. P. de Oliveira, and E. M. Mendiondo, "Modular design of bioretention systems for sustainable stormwater management under drivers of urbanization and climate change," **Sustainability**, vol. 14, no. 11, p. 6799, 2022, <https://doi.org/10.3390/su14116799>.
20. T. R. P. de Oliveira, M. B. de Macedo, T. H. Oliveira, C. A. F. do Lago, M. N. **Gomes Jr.**, J. A. T. Brasil, and E. M. Mendiondo, "Different configurations of a bioretention system focused on stormwater harvesting in Brazil," **Journal of Environmental Engineering**, vol. 147, no. 12, p. 04021058, 2021, [https://doi.org/10.1061/\(ASCE\)EE.1943-7870.0001938](https://doi.org/10.1061/(ASCE)EE.1943-7870.0001938)
21. Jochelavicius, V., E. M. Mendiondo, M. N. **Gomes Jr.**, and M. B. de Macedo, "Construction of Intensity-Duration-Frequency curves with future climate change scenarios for the city of São Carlos - SP aiming at the design of compensatory techniques," **Revista DAE**, vol. 147, p. 19-32, DOI: <https://doi.org/10.36659/dae.2022.065> (In Portuguese).

Publications in Conferences

Conference Proceedings

1. **Gomes Jr.** M. N., H. Bauser, P. A. Troch, *Identifying the state dependence of effective material properties in a simplified hydrologic hillslope model*, **The Conference on Computational Methods on Water Resources (CMWR)**, Tucson, 2024.
2. Brasil, J.A., Papagiannakis, A.T., Giacomoni, M.H., Johnson, D., **Gomes Jr.**, M.N. and Mendiondo, E.M., 2023. Hydrologic and Water Quality Treatment Performance of Four Permeable Pavement Surfaces. In *International Low Impact Development Conference 2023* (pp. 114-122).
3. M. N. **Gomes Jr.**, Giacomoni, M.H., Taha, A.F. and Mendiondo, E.M., 2022, August. *Model Predictive Control for Stormwater Reservoirs: Investigating Effects of Climate Change and Urbanization*. **IEEE Conference on Control Technology and Applications (CCTA)** (pp. 691-698). IEEE.
4. M. N. **Gomes Jr.**, C. A. F. do Lago, M. H. Giacomoni, E. M. Mendiondo, " *Expanding the 2-Dimensional Green-Ampt and Non-linear Reservoir Hydrological Model from SWMM to MATLAB®*". **AGU Fall Meeting, New Orleans**, 2021.
5. M. N. **Gomes Jr.**, M. H. Giacomoni, E. M. Mendiondo, A. F. Taha, " *Real-Time Control of Stormwater Reservoirs for Flood Risk Mitigation*". **The 2nd International Symposium on Water System Operations**, 2021.
6. M. N. **Gomes Jr.**, P. A. Braga, M. B. de Macedo, E. M. Mendiondo, " *Preliminary design of detention ponds using specific design discharge and orifice stage discharge relationship for different climate patterns*". **Brazilian Symposium of Water Resources**, 2021.
7. M. N. **Gomes Jr.**, P. A. Braga, E. M. Mendiondo, " *Impact of rainfall changes on the Pacaembu-SP detention reservoir: assessment of water security regarding flood risk*". **Brazilian Symposium of Water Resources**, 2019 (In Portuguese).
8. M. N. **Gomes Jr.**, E. M. Mendiondo, F. Dornelles, A. T. Papagiannakis, " *Permeable Pavement Hydrological Model to Assess the Long-Term Efficiency of Maintenance Using High-Resolution Temperature and Rainfall Data*". **World Environmental and Water Resources Congress**, 2021, 1103-1117.
9. M. N. **Gomes Jr.**, E. O. Pavan, L. M. C. Rápalo, M. H. Giacomoni, E. M. Mendiondo, " *Bidirectional Hydrodynamic and Water Quality Model (2DCAWQ): Modeling Challenges in Basins with Scarce Data: Application in the Tijuco Preto - São Carlos Basin*". **XIV National Meeting on Urban Waters and IV Symposium on Revitalization of Urban Rivers**, 2022 (In Portuguese).
10. M. N. **Gomes Jr.**, M. H. Giacomoni, E. M. Mendiondo, " *The role of raster resolution into overland flow and total suspended solids modeling in small urban catchments*". **Brazilian Symposium of Water Resources**, (2021).
11. M. N. **Gomes Jr.**, M. H. Giacomoni, A. T. Papagiannakis, " *Spatial Assessment of Overland Flow, Pollutant Concentration, and First Flush Using a 2D Non-Point Source Pollution and Hydrological Model for Urban Catchments*". **World Environmental and Water Resources Congress**, 2021, 397-413.
12. M. N. **Gomes Jr.**, M. H. Giacomoni, E. M. Mendiondo, " *Bioretention Sizing via Process-Based Simulation: Generalized TC-Hydro Model Applied in Design Conditions*". **XIV National Meeting on Urban Waters and IV Symposium on Revitalization of Urban Rivers**, 2022 (In Portuguese).
13. M. N. **Gomes Jr.**, T. R. de Oliveira, T. H. Oliveira, M. B. de Macedo, M. H. Giacomoni, E. M. Mendiondo, " *Nature-based solutions for sustainable stormwater: a model approach and sensitivity analysis for bioretention design using Green and Ampt and reservoir flood routing*". **Second International Conference of Water, Megacities, and Global Change**, UNESCO, 2021.
14. M. N. **Gomes Jr.**, L. M. C. Rápalo, E. M. Mendiondo, " *A Serious Game for societal risk perception of dam-break flood assessment using a hydrodynamic model*, **Latin American Hydraulic Congress**, (2022). *Award of Best Paper*.

15. M. N. **Gomes Jr.**, C. A. F do Lago, M. H. Giacomoni, E. M. Mendonado, Assessing the role of cross-section shape for flood routing under compound flood events using a hydrodynamic model, **Latin American Hydraulic Congress**, (2022).
16. C. A. F. do Lago, M. N. **Gomes Jr.**, E. M. Mendonado, M. H. Giacomoni, "Application of Artificial Neural Networks to Predict Water Surface Elevation". **AGU Fall Meeting, 2021, New Orleans**.
17. T. R. P. de Oliveira, M. N. **Gomes Jr.**, M. B. de Macedo, E. M. Mendonado, "Análise da sensibilidade do potencial matricial em protótipo de biorretenção". **Brazilian Symposium of Water Resources**, 2019 (In Portuguese).
18. CASTRO, M.A.R.A.; **Gomes Jr.**, M.N.; SANCHEZ, M.H.; FILHO, P.B.S., MENDIONDO, E.M. *Review of the Risk Index Applied to Dam Failure Simulation in Brazil*. **XXV Brazilian Symposium of Water Resources**. Anais. Aracaju (SE), 2023 (In Portuguese).
19. SANCHEZ, M.H; **Gomes Jr.**, M.N.; CASTRO, M.A.R.A.; MENDIONDO, E.M. *River flow forecasting methods: A review*. **XXV Brazilian Symposium of Water Resources**. Anais. Aracaju (SE), 2023.
20. M. R. de Sousa, M. N. **Gomes Jr.**, E. O. Pavan, L. M. C. Rápalo, F. A. R. Nararro, E. M. Mendonado, "Physically Distributed Modeling Based on Urban Watersheds: Hydropol2D Model Applied to São Carlos (SP)", **XXV Brazilian Symposium of Water Resources**. Proceedings. Aracaju (SE), 2023 (In Portuguese).
21. E. O. Pavan, M. N. **Gomes Jr.**, L. M. C. Rápalo, M. R. de Sousa, M. S. dos Santos F. A. R. Nararro, E. M. Mendonado, "Physically Based Modeling of Large Basins - Challenges and Opportunities for Applying The Hydropol2D Model", **XXV Brazilian Symposium of Water Resources**. Proceedings. Aracaju (SE), 2023 (In Portuguese).
22. L. F. Roysen, M. N. **Gomes Jr.**, E. O. Pavan, E. M. Mendonado, "RTC-Stormwater Model: Advances In Flood Modeling And Control Of Urban Drainage Devices", **XXV Brazilian Symposium of Water Resources**. Proceedings. Aracaju (SE), 2023 (In Portuguese).
23. A. S. Ballarin, J. G. S. M. Uchoa, M. S. dos Santos, A. Almagro, I. P. Miranda, P. G. C. da Silva, G. J. da Silva, M. N. **Gomes Jr.**, E. C. Wendland, P. T. S. de Oliveira, "The Future of Water Security In Brazil: Separating The Impacts Of Climate Change And Water Demand", **XXV Brazilian Symposium of Water Resources**. Proceedings. Aracaju (SE), 2023 (In Portuguese).
24. M. S. dos Santos, M. N. **Gomes Jr.**, D. A. Bressianim L. L. Ladeira, M. R. Benso, E. M. Mendonado "Review of the Implementation of Model Predictive Control (MPC) In Urban Reservoirs", **XXV Brazilian Symposium of Water Resources**. Proceedings. Aracaju (SE), 2023 (In Portuguese).
25. G. M. e Silva, M. R. Benso, P. G. C. da Silva, M. N. **Gomes Jr.**, E. M. Mendonado, "Serious Game on Water Risks For Planetary Health: A New Model For Knowledge Co-Production", **XXV Brazilian Symposium of Water Resources**. Proceedings. Aracaju (SE), 2023 (In Portuguese).
26. L. M. C. Rápalo, M. N. **Gomes Jr.**, D. A. Bressiani, M. R. Benso, E. M. Mendonado "Threats of Urban Flash Floods on Human Stability for The Next Century", **XXV Brazilian Symposium of Water Resources**. Proceedings. Aracaju (SE), 2023.
27. I. M. Benites, M. N. **Gomes Jr.**, A. Botari, J. C. Botari, L. Vanalli, "Analysis of the Urban Drainage System: Case Study of the Stormwater Galleries at the intersection of Rua Governador Nei Braga and Avenida Brasil in the city of Umuarama-PR". **XVII Safety, Health and Environment World Congress**, 2017 (In Portuguese).

Publications - Under Review or In Preparation

Journals

1. **Gomes Jr., M. N., M. A. R. A. Castro** *A Continental Framework for Mapping Multi-Hazard Susceptibility and Socioeconomic Exposure Across South America*. **Nature Sustainability** (under preparation).
2. **Gomes Jr., M.N., Castro, M.A.R.A., Sanchez, M.H., Rápalo, L., Giacomoni, M.H., de Paiva, R.C. and Bates, P.,** "Spatio-Temporal Performance of 2D Local Inertial Hydrodynamic Models for Urban Drainage and Dam-Break Applications". Available at SSRN 4984679, **Journal of Hydrology**, 2024, DOI: <https://doi.org/10.48550/arXiv.2410.09325> (Under Review).
3. **Gomes Jr, Marcus Nóbrega, Igor Matheus Benites, Salma M. Elsherif, Ahmad F. Taha, and Marcio H. Giacomoni.** "Modeling and Design Optimization of Looped Water Distribution Networks using MS Excel: Developing the Open-Source X-WHAT Model. arXiv preprint arXiv:2405.09044, **Water Resources Management**, 2024, DOI: <https://doi.org/10.48550/arXiv.2405.09044> (Under Review).
4. **Gomes Jr., M.N, Castro, M.A.R.A** "Rainfall Temporal Distribution Trends in the Contiguous Brazil". **Scientific Data** (Under preparation).
5. **Gomes Jr, M.N., Bauser, H.H. and Troch, P.A.,** 2025. Identifying the state dependence of effective material properties in a simplified hydrologic hillslope model, **Water Resources Research** DOI: <https://essopenarchive.org/doi/full/10.22541/essoar.175181464.43589172> (Submitted).
6. **M. A. R. A. Castro, Marcus N. Gomes Jr., Eduardo M. Mendiondo,** "Probabilistic Dam Break Flood Mapping via Monte-Carlo Simulation". **Water Resources Research** (Under Review).
7. **Rápalo, L. M C., Gomes Jr., M. N., Mendiondo, E. M,** *Multiple degrees of human instability due to urban overland flow within the 21st century: An urban watershed study case in Brazil*, **International Journal of Disaster Risk Reduction** (submitted).
8. **Castro, M. A. R. A, Gomes Jr., M. N., Mendiondo, E. M.,** *Trade-Offs Between Full Momentum, Diffusive Wave, and Local-Inertial Solvers for Dam-Break Flood Modeling*, **Natural Hazards** (submitted).
9. **Sánchez, M. H., Gomes Jr., M. N, Castro, M. A. R. A, Rápalo, L. C., Mendiondo, E. M,** *Assessment of urban flood risk in developing countries based on climate change scenarios*, **Sustainable Cities and Society**, (submitted).
10. **Gomes Jr., M.N,** *Accounting for Spatial Runoff Variability in LID Design for Urban Catchments: Model and Software Development*, **Brazilian Journal of Water Resources**, (under review).
11. **Sousa, M. R., Gomes Jr., M. N, Mendiondo, E. M.** *Hydrological-Hydrodynamic Modeling of Climate-Induced Urban Flooding of Design Storms Using HydroPol2D: A Case Study in São Carlos, Brazil*, **Brazilian Journal of Water Resources**, (under review).
12. **Gomes Jr., M.N, Brasil, A., D. Johnson, A.T., Papagianakis, Giacomoni, M. H.,** *A Coupled Darcy-Richards Framework for Hydrological Modeling of Permeable Pavements, Green Roofs, and Bioretention Systems*, **Environmental Modelling and Software**, (submitted).

Professional Memberships

- American Society of Civil Engineering (ASCE) - 2020-2021
- American Geophysical Union (AGU) - 2021-2022, 2024-present
- Brazilian Water Resources Association (ABRH) 2019-2020, 2021-2022.

Grant Writing Collaboration

- **Analysis of Unit Hydrograph Models for San Antonio Watersheds**
 - **P.I** - Dr. Marcio H. Giacomoni
 - **Tasks:** I helped to define the methods used to systematically assess the best unit hydrograph theory used for San Antonio observed data. The idea is that the standard PRF 484 unit hydrograph was oversizing the detention ponds in the city. Therefore, investigating the best-fitted unit hydrograph would reduce associated costs of low-impact development designs.
- **Curbing Climate Change-Induced Floods via Control Theory for Urban Drainage Systems**
 - **P.I's** - Dr. Marcio H. Giacomoni and Dr. Ahmad F. Taha
 - **Tasks:** Our previous [research](#) was the starting point of this proposal. We developed a real-time control model that can potentially increase the efficiency of stormwater systems for flood control. In this proposal, we plan to advance the mathematical modeling to include new stormwater systems (e.g., tunnels, dividers) and actuators (e.g., pumps and gates) to optimally control floods via real-time optimization.
- **Collaborative Research: Feedback Control of Air and Water Pressure in Pipelines and Networks: Coupling Water Operation Modeling with Smart Valves**
 - **P.I's** - Dr. Marcio H. Giacomoni, Dr. Jose G. Vasconcelos, Dr. Ahmed A. Abokifa, and Dr. Ahmad F. Taha.
 - **Tasks:** I collaborated in the mathematical description of the hydraulic conceptualization of the filling pipe problem, defining the governing equations, and reviewing the methodology.

Current Collaborators

- | | |
|--|---|
| Peter Troch,
Ph.D | Professor at University of Arizona. Google Scholar , Website . |
| Hannes
Bauser, Ph.D | Assistant Professor at University of Nevada, Las Vegas. Google Scholar , Website . |
| Paul D. Bates,
Ph.D | Professor at University of Bristol. Orcid , Google Scholar , Website . |
| Ahmad F.
Taha, Ph.D | Associate Professor at Vanderbilt University. Google Scholar , Twitter , Website . |
| Eduardo
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| Paulo T.S.
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| Marina B. de
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- A. T. Papa- Professor at University of Texas at San Antonio. [Orcid](#), [Google Scholar](#), [Website](#).
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Castillo [Scholar](#).
Rápalo, Ph.D.
- Fabricio A. University of Sao Paulo, Sao Carlos School of Engineering. [Orcid](#), [Google](#)
Richmond [Scholar](#).
Navarro ,
Ph.D.
- Tiantian University of Arizona. [Google Scholar](#).
Zhou, Ph.D

Languages

- Portuguese Native Speaker
- English English (TOEFL - Advanced). Lived two years in the US from January 2020 to January 2022 and from January 2024. Ph.D. dissertation written in English, publications and presentations in English. Currently living in the U.S. for the postdoctoral researching.
- Spanish Intermediate

Graduate Research Collaborations

César Ambrogi Ferreira do Lago, Ph.D.

Jan/2018 - Present

- During Cesar's Ph.D. at the University of Texas at San Antonio, we worked together creating hydrodynamic models. Cesar also worked with me at the beginning of the development of the HydroPol2D model.

Marina Batalini de Macedo, Ph.D.

Jan 2018 - Present

- We have been working since the beginning of my Master's degree in varied topics related to floods, water quality, and Low Impact Development.

Luis Miguel Castilo Rápalo, Ph.D.

Jan 2022 - present

- We have been working on at least 3 papers together. His thesis is the first Ph.D. to apply the [HydroPol2D](#) model, which was developed primarily by me. His 3 Ph.D. chapters are applications and new developments of the HydroPol2D model. We are also working on different problems, such as Real-Time control of stormwater facilities.

Ivan Cuervo, M.Sc.

Mar 2022 - Jan 2023

- During his Master's at UTSA, Ivan worked with me on data collection and water quality analysis. We also collaborated in the design of permeable pavements and modeling of 2-D runoff distribution.

Artur Brasil, Ph.D Candidate

Jan 2022 - Present

- We share the same project at UTSA. I stayed in UTSA for 2 years, and then Artur will finish the last 2 years of the project. We have collaborated in multiple areas, such as setting up field experiments, analyzing field data, and developing numerical models.

Mateo Hernandez, M.Sc.

Apr 2023 - Present

- Mateo has worked with me by helping me to compare [HydroHP](#) Model with HEC-RAS 1-D Model. In addition, I am his co-supervisor in his Master's that aims to develop a closed-loop feedback control algorithm to reduce flood effects via valve and gate control in detention ponds using a [distributed hydrologic-hydrodynamic model](#).

Matheus dos Santos , M.Sc.

2022 - 2024

- Matheus has defended (Out-2024) his Masters in USP and used my model ([RTC-Stormwater](#)) to evaluate the model predictive control properties such as prediction horizon for flood mitigation.

Maria Castro, Ph.D Student

2023 - present

- Maria has been used the local-inertial version of [HydroPol2D](#) to develop monte-carlo probabilist ensemble estimation of dam-break hazards considering unknown breach characteristics, initial reservoir storage, or terrain roughness coefficients. This is the topic of her Master's degree which is mainly supervised by me, although I am unable to be her official supervisor in USP.

Undergraduate Research Collaborations

Enrico Pavan Oliveira, Civil Engineering

Jun 2022 - 2023

- Enrico's undergraduate research project funding was granted by a research project written by me. He is under my supervision, and we are working on large-scale hydrodynamic modeling of a 100.000 km^2 watershed through a distributed model developed [here](#).

Lucas Fujikawa Roysen, Civil Engineering

Jun 2022 - 2023

- Lucas' undergraduate research project funding was granted by a research project written by me. He is under my supervision, and we are working towards the application of a Real-Time flood control model in a watershed in Sao Paulo - Brazil. This model simulates hydrodynamics in watersheds, reservoirs, and channels and optimally controls the valves and gates in a reservoir so that the flow performance index is maximized. He is applying the model developed [here](#). In addition, his final undergraduate project in Civil Engineering at USP was supervised by me.

Milena Rosa, Environmental Engineering

Jun 2022 - 2024

- Milena's undergraduate research project funding was granted by a research project written by me. She was under my supervision as an undergraduate student and worked towards the application of a fully distributed model (HydroPol2D) in a poorly-gauged city - São Carlos/Brazil. This model simulates the hydrodynamics of watersheds, and pollutant transport and fate in a 2-D domain. She is applying the model developed [here](#). In addition, her final undergraduate project in Environmental Engineering at USP was supervised by me.

Vivian Jochelavicius, Civil Engineering

Jan 2019 - Dec 2019

- Vivian's undergraduate research project refreshed the Sao Carlos Intensity Duration Frequency curve for scenarios of climate change. We have collaborated in developing these curves.

Professional References

- **Paul D. Bates**
 - Professor at University of Bristol
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 - School of Geographical Sciences
- **Peter A. Troch**
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