

Nicolás Velásquez Girón

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Education

- 2004 - 2009 **Civil Engineer**, National University of Colombia, Medellin (Colombia)
- 2010 - 2011 **M.Sc. Water Resources Systems Engineering**, National University of Colombia, Medellin (Colombia)
- 2013 - 2020 **Ph.D. Water Resources Systems Engineering**, National University of Colombia, Medellin (Colombia)

Working Experience

- 2024 - Present **Assistant Professor**, Florida Institute of Technology, College of Engineering & Science
- 2023 - Present **Adjunct Professor**, The University of Iowa, College of Engineering
- 2020 - 2024 **Assistant researcher**, IIHR - The University of Iowa
- 2018 - 2020 **Postdoctoral researcher**, IIHR - The University of Iowa
- 2012 - 2018 **Hydrological risks group leader and researcher**, SIATA - EAFIT University
- 2012 - 2018 **Hydrology consultant**, Independent
- 2011 - 2012 **Risk Management Professional**, Area Metropolitana del Valle de Aburra
- 2009 - 2011 **Research Assistant**, Universidad Nacional de Colombia. Facultad de Minas, Medellin

Teaching Experience

- 2024 - Present **Fluid Mechanics**, Florida Institute of Technology, USA
- 2021 **Lecturer in Computational Hydrology**, University of Manitoba, Canada
- 2019 **Teacher assistant in Hydrogeology**, University of Iowa, USA
- 2018 **Lecturer in Hydrology**, EAFIT University, Colombia
- 2014 - 2017 **Lecturer in Hydrology**, Universidad de Medellin
- 2012 - 2015 **Lecturer in coding and programming**, Universidad Nacional de Colombia, Facultad de Minas, Medellin
- 2012 **Lecturer in Hydrology**, Politecnico Colombiano Jaime Isaza Cadavid, Medellin
- 2011 **Lecturer in Computer Science**, EAFIT University, Colombia

Current Students Mentoring

Juan Guerrero, *Ph.D. Student, Florida Institute of Technology*, Identification of the Spatial Thresholds Dividing Inland, Compound, and Storm Surge Flooding, expected to graduate in 2028

Simon Martinez, *M.S. Student (co-advised with Dr. Krajewski), University of Iowa*, How the Representation Scale of the Processes Affects our Hydrological Understanding?, expected to graduate in 2025

Jose Lozano, *M.S. Student (co-advised with Dr. Salazar), Universidad de Antioquia*, Efecto de los cambios en los usos/coberturas del suelo y el cambio climático en el régimen de inundaciones en la cuenca del río Aburrá-Medellín, expected to graduate in 2025

Valeria Garcia, *Ph.D. Student (co-advised with Dr. Weber), University of Iowa*, Development of a Nutrient Transport Model, expected to graduate in 2027

Former Students

Valeria Garcia, *M.S. (co-advised with Dr. Krajewski), University of Iowa*, Development of a Streamflow Temperature Model for HLM, graduated in 2024

Laura Martinez, *M.S. (co-advised with Dr. Carvajal) Universidad Nacional de Colombia*, Analisis de las condiciones de precipitación detonantes de eventos torrenciales en cuencas del departamento de Antioquia, graduated in 2024

Sandra Patricia Salamanca, *M.S. (co-advised with Dr. Velez) Universidad Nacional de Colombia*, Efectos de escala espacial y temporal en la modelación hidro-sedimentológica distribuida de una cuenca tropical. Caso de estudio San Lorenzo, graduated in 2020

Santiago Osorio, *M.S. (co-advised with Dr. Velez) Universidad Nacional de Colombia*, Simulación de sedimentos mediante un modelo hidrológico distribuido utilizando información indirecta. Caso de estudio: Cuenca del Río Grande, Antioquia, graduated in 2019

Grants

- 2025 **Status of Hydrology and Flow Forecasts in the Tarma, Tulumayo, and Rimac rivers**, *Chinango-Orygen, PI*
- 2024 **Real-time flood forecasting for river crossings Phase V**, *Mid-American Transportation Center, Co-PI*
- 2023 **Development of a real-time flood forecasting system for railroad crossings in the Midwest**, *Mid-American Transportation Center, and USDOT, Co-PI*
- 2023 **Examination of the Value of QPF for Streamflow Forecasting**, *CIROH, Co-PI*
- 2022 **Real-time flood forecasting for river crossings**, *Mid-American Transportation Center, Co-PI*

Skills:

Research, planning, leadership, critical thinking, collaboration, scientific writing, statistical and numerical analysis, oral communication.

Publications

Accepted **Assessing the Impact of Radar-Rainfall Uncertainty on Streamflow Prediction**, *Journal of Hydrometeorology*, **N. Velasquez.**, *W. Krajewski.*, *Bong-Chul Seo*

- 2024 **Effect of Streamflow Measurement Error on Flood Frequency Estimation**, *Stochastic Environmental Research and Risk Assessment*, **N. Velasquez**, W. Krajewski
- 2024 **Technical Note: Testing the Connection Between Hillslope Scale Runoff Fluctuations and Streamflow Hydrographs at the Outlet of Large River Basins**, *Hydrology and Earth System Sciences*, 28 (6). R. Mantilla., M. Fonley., **N. Velasquez**
- 2023 **Ensemble Kalman Inversion for upstream parameter estimation and indirect streamflow correction: A simulation study**, *Advances in Water Resources*, 181, 104545 A. Pensoneault., W. Krajewski., **N. Velasquez**., X. Zhu., R. Mantilla
- 2023 **Snow-Detonated Floods: Assessment of the U.S. Midwest March 2019 Event**, *Journal of Hydrology Regional Studies*, 47, 101387 **N. Velasquez**., F. Quintero., S.R. Koya., T. Roy., R. Mantilla
- 2023 **Applicability of a flood forecasting system for Nebraska watersheds**, *Environmental Modelling and Software*, 105693 S.R. Koya., **N. Velasquez**., M. Rojas., R. Mantilla., K. Harvey., D. Ceynar., F. Quintero., W. Krajewski., T. Roy
- 2023 **Comprehensive Analysis of Hydrological Processes in a Programmable Environment: The Watershed Modeling Framework**, *Hydrology*, 105693 **N. Velasquez**., J.I. Velez., O.D. Alvarez., S.P. Salamanca
- 2022 **Assessment of Deep Convective Systems in the Colombian Andean Region**, *Hydrology*, **N. Velasquez**
- 2022 **Implementation of TETIS Hydrologic Model into the Hillslope Link Model Framework**, *Water*, Quintero, F., **N. Velasquez**
- 2022 **The Hydrological Hillslope-Link Model for Space-Time Prediction of Streamflow: Insights and Applications at the Iowa Flood Center**, *In Extreme Weather Forecasting*; Astitha, M., Nikolopoulos, E.I., Eds.; Elsevier, 2022 ISBN 9780128201244. Mantilla, R., Krajewski, W.F., **Velasquez, N.**, Smallll, S.J., Ayalew, T.B., Quintero, F., Jadidoleslam, N., Fonley, M
- 2022 **Sequential surface and subsurface flow modeling in a tropical aquifer under different rainfall scenarios**, *Environmental Modeling and Software*, 149., 3. Jimenez, M.; **Velasquez, N.**, Jimenez, J.E., Barco, J., Blessent, D., Lopez-Sanchez, J., Castrillon, S.C., Valenzuela, C., Therrien, R., Boico, V.F
- 2022 **Identification and Regionalization of Streamflow Routing Parameters Using Machine Learning for the HLM Hydrological Model in Iowa**, *J. Adv. Model. Earth Syst*, 14., **Velasquez, N.**, Mantilla, R., Krajewski, W., Quintero, F., Zanchetta, A.D.L
- 2022 **Improvements in Performance of the Hillslope Link Model in Iowa using a Non-linear Representation of Natural and Artificially Drained Subsurface Flows**, *Hydrology*, 8, **N. Velasquez**.,Mantilla, R., Krajewski, W.F., Fonley, M., Quintero, F
- 2021 **Development and Evaluation of an ODE Representation of 3D Subsurface Tile Drainage Flow Using the HLM Flood Forecasting System**, *Water Resources Research*, M.R. Fonley., K. Qiu., **N. Velasquez**., N.K. Haut., R. Mantilla
- 2020 **Limits of Predictability of a Global Self-Similar Routing Model in a Local Self-Similar Environment**, *Atmosphere*, 11 (8), **N. Velasquez**., R. Mantilla
- 2019 **Meteorological conditions leading to the 2015 Salgar flash flood: lessons for vulnerable regions in tropical complex terrain**, *Natural Hazards and Earth System Sciences*, 24 (3), C. D. Hoyos, L.I. Ceballos, J. Pérez-Carrasquilla, J. Sepúlveda, S.M. López-Zapata, M.D. Zuluaga, **N. Velásquez**, L.H. Mejía, O. Hernández, G. Guzmán, M.Zapata

- 2019 **Reconstructing the 2015 Salgar flash flood using radar retrievals and a conceptual modeling framework in an ungauged basin**, *Hydrology and Earth System Sciences*, 24 (3), **N. Velasquez.**, Velez J.I., Hoyos C.D., Zapata E
- 2013 **Multi-criteria Spatial Evaluation for the Localization of Hydro-Pico Energy in Antioquia**, Soto E., Posada M.I., **N. Velasquez.**, Ramirez L.M., Garcia L., CIDET., EPM
- 2011 **Simulation of Sediment Production Using a Non-Linear Distributed Hydrological Model**, *Universidad Nacional de Colombia, Master Thesis*, **N. Velasquez**
- 2011 **Rainfall Distribution Based on a Delaunay Triangulation Method**, *Lecture Notes in Computer Science*, Vol 6970, **N. Velasquez.**, Valez J.I., Botero V

Submitted Publications

- **A Watershed Oriented Mesh Generator for Physically Based Hydrological Models**, *Environmental Modelling & Software*, **N. Velasquez.**, A. Arenas., M. Diaz
- **Ensemble Kalman Inversion for Upstream Parameter Estimation and Indirect Streamflow Correction: A Case Study in the Cedar River Basin**, *Advances in Water Resources*, A. Pensoneault., W. Krajewski., **N. Velasquez.**, W. Krajewski., X, Zhu.
- **What Can We Learn about Flood Frequency Estimation at Ungauged Locations from High-resolution Physically-based Hydrologic Simulations?**, *Water Resources Research*, R. Mantilla., G. Perez., **N. Velasquez.**, H. Guo., D. Wright

Reviewer

- 2024 **Journal of Hydrology X**, Two manuscripts reviewed
- 2023 **Journal of Hydrology**, Three manuscripts reviewed
- 2022-2024 **Water**, Four manuscripts reviewed
- 2023 **Water Resources Research**, One manuscript reviewed
- 2021-2024 **Remote Sensing**, Nine manuscripts reviewed
- 2020-2023 **Atmosphere**, Four manuscripts reviewed
- 2023 **JAWRA**, One manuscript reviewed

Comittee Membership

- 2024 **Victor Garcia Cano**, Master Thesis - Escuela de Ingenieros de Antioquia
- 2023 **Valeria Garcia Munera**, Master Thesis - University of Iowa

Conference Proceedings

- 2023 **Assessing the Impact of Radar-Rainfall Uncertainty in Streamflow Prediction**, *AGU 2023*, Oral presentation, **N. Velasquez.**, W. Krajewski
- 2023 **Long-Term Assessment and Uncertainty Characterization of Radar-Derived Reanalysis Precipitation Estimates over Iowa**, *AMS 2023*, Oral presentation, B.C, Seo., W. Krajewski., **N. Velasquez**
- 2022 **A web interface to perform comprehensive hydrological model performance assessment**, *AGU 2022*, Poster, **N. Velasquez.**, W. Krajewski., R. Goska

- 2021 **How the Social Sciences and Humanities contribute to understanding and addressing the Climate Change challenges? A deep look based on the analysis of the abstracts of the presentations at the interdisciplinary sessions at AGU Fall Meetings (2010-2018),** *AGU 2021, Poster, S. Ramirez., N. Velasquez., H. Mercado*
- 2021 **A cloud-based pre-processor for physically-based hydrologic models,** *AGU 2021, Poster, N. Velasquez.A. Arenas., L. Webster., S. Landsteiner*
- 2021 **A performance index based on hydrograph moments: A descriptor to identify strengths and shortcomings hydrological simulations,** *AGU 2021, Poster, N. Velasquez., R. Mantilla., G. Perez., G, Yu*
- 2020 **Insights from Physics-based Hydrologic Models and Stochastic Storm Transposition into the Underlying Assumptions of Flood Quantile Regionalization Techniques,** *EGU 2020, Oral Presentation, R. Mantilla., G. Perez., N. Velasquez., G, Yu*
- 2019 **ODE representation of tile drainage on hillslopes of varying topography,** *AGU 2019, Poster, N. Velasquez., M. Fonley., K, Qiu., N. Haut., R. Mantilla*
- 2018 **Watershed Modelling Framework: A Programmable Tool for Hydrologic Simulation and Analysis,** *AGU 2018, Poster, J.I. Velez., N. Velasquez., Hoyos, C.D., Lopera, V.A., Trujillo, J.C*
- 2018 **Assessing the Spatial Structure of Stand-alone and Embedded Convective Systems in the Colombian Andean Region,** *AGU 2018, Poster, N. Velasquez., C.D. Hoyos*
- 2018 **Assessing the Scale effects on a Hydro-Sedimentological model: The case of a tropical basin,** *AGU 2018, Poster, P.S. Salamanca., V.A. Lopera., N. Velasquez., C.D. Hoyos, J.I. Velez*
- 2018 **Assessment of climate change in terrestrial water storage over the Magdalena-Cauca basin,** *AGU 2018, Poster, L.A. Gomez., C.D. Hoyos., N. Velasquez*
- 2018 **An Operational Implementation Of The EPA-SWMM Model With Radar QPE Fields And Precipitation Nowcast For Urban Hazards Assessment,** *AGU 2018, Poster, E. Zapata., N. Velasquez., C.D. Hoyos., J. Sepulveda*
- 2018 **El papel de los sistemas convectivos en la produccion de sedimentos en una cuenca tropical de montana,** *XXVIII Congreso latinoamericano de hidraulica, Presentacion oral, Salamanda, S.P., Velasquez, N., Lopera, V.A., Velez, J.I*
- 2017 **Evaluation of rainfall structure on hydrograph simulation: Comparison of radar and interpolated methods, a study case in a tropical catchment,** *AGU 2017, Poster, Ochoa, A., Velasquez, N., Castillo, S., Hoyos, C.D*
- 2017 **Reconstructing the 2015 Flash Flood event of Salgar Colombia, The Case of a Poor Gauged Basin,** *AGU 2017, Poster, Zapata, E., Velasquez, N., Hoyos, C.D., Velez, J.I*
- 2017 **Explaining the behavior of runoff and subsuperficial flow: The role of the precedent water and precipitation features on a tropical basin,** *AGU 2017, Oral presentation, N. Velasquez., Castillo, S., Hoyos, C.D., Barco, J*
- 2015 **Role of Precedent Watershed Soil Moisture on the Characteristics of the Hydrological Response and its Implications on Model Performance,** *AGU 2015, Virtual Poster Show Case, Velasquez, N., Velez, J.I., Hoyos, C.D*
- 2014 **Simulation of Sediment Production Using a Non-Linear Distributed Hydrological Model,** *XXVI Congreso Latinoamericano de Hidraulica, N. Velasquez., Velez, J.I*
- 2014 **Proposal of a Computational Framework for the Hydrological Simulation,** *XXVI Congreso Latinoamericano de Hidraulica, N. Velasquez., Velez, J.I*

- 2013 **Evaluation of the Impact in the Integration of Radar Images and Meteorological Forecasts in Hydrological Simulations**, *Encuentro Internacional en Modelacion Hidrologica y Aplicaciones*, Hoyos C.D., **N. Velasquez.**, Ceballos I.L., Hernandez O
- 2010 **Simulation of the River-Aquifer Interaction**, *XXIV Congreso Latinoamericano de Hidraulica*, Restrepo C., **N. Velasquez**