

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 - 2018 **Ph.D. Water Resources Systems Engineering**, National University of Colombia, Medellin (Colombia).

Working Experience

- 2020 - Present **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**.
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

- 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 coding and programming**, EAFIT University, Colombia.

Skills:

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

Publications

- 2023 **Ensemble Kalman Inversion for upstream parameter estimation and indirect stream-flow correction: A simulation study**, *Advances in water resources*, 181, 104545 **A. Pensoneault., W. Krajewski., N. Velasquez., X. Zhu., R. Mantilla.**
- 2023 **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*, preprint **R. Mantilla., M. Fonley., N. Velasquez.**
- 2023 **Snow-detonated floods: Assessment of the US 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**, *Environ. Model. 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 Reseach*, 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 Note of Caution Regarding the Interpretation of Hydrological Model Predictions under Climate and Anthropogenic Driven Changes**, *Hydrology and Earth System Sciences Discussions, M. Fonley., R. Mantilla., N. Velasquez. .*
- **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 .*

Thesis advising

- 2024 **Evaluacion del Indice de Regulacion Hidrica mediante Modelacion Hidrologica en la cuenca Magdalena-Cauca, Colombia**, *C. Basile, Universidad Nacional de Salta, Co-Director, In progress.*
- 2024 **Development of an streamflow temperature model for HLM.**, *Garcia,V, University of Iowa - IIHR, Co-Director, In progress.*
- 2023 **Analisis de las condiciones de precipitacion detonantes de eventos torrenciales en cuencas del departamento de Antioquia**, *L. Rodriguez, Universidad Nacional de Colombia, Sede Medellin, Director.*
- 2020 **Efectos de escala espacial y temporal en la modelación hidro-sedimentológica distribuida de una cuenca tropical. Caso de estudio San Lorenzo**, *Salamanca, S.P., Universidad Nacional de Colombia, Sede Medellin, Co-Director.*
- 2019 **Simulación de sedimentos mediante un modelo hidrológico distribuido utilizando información indirecta. Caso de estudio: Cuenca del Río Grande, Antioquia.**, *Osorio, S., Universidad Nacional de Colombia, Sede Medellin, Co-Director.*

Grants

- 2022 **Real-time flood forecasting for rivers crossings**, *Mid American Transportation Center, Co-PI, In execution.*
- 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.*

Other significant products

- 2021 **How the Social Sciences and Humanities contribute to understand and address 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., textbf 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.**