JORGE ALBERTO PENALOZA GIRALDO

Earth System Modeling Earth System Modeling Group
Climate Change Science Institute
Oak Ridge National Laboratory (ORNL)
1 Bethel Valley Road, Oak Ridge, TN 137830, United States
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EDUCATION & TRAINING

Ph.D. in Civil Engineering || *Concentration:* Coastal Engineering — August (2018) – May (2024)
Civil and Environmental Engineering Dept., Center for Applied Coastal Research
University of Delaware, Newark, DE

M.S. in Water Resource — August (2012) –December (2015)
Civil and Agricultural Engineering Dept.
National University of Colombia, Bogotá, Colombia

PGDip. In Environmental Engineering — January (2010) – December (2010)
Engineering Dept.
Surcolombiana University, Neiva, Colombia

B.S. in Agricultural Engineering — August (2003) – December (2009)
Agricultural Engineering Dept.
Surcolombiana University, Neiva, Colombia

Secondary School Certificate — January (2007) – December (2008)
Colegio Claretiano, Neiva, Colombia

RESEARCH INTERSTS

Environmental fluid dynamics, sediment transport (cohesive and non-cohesive), flocculation processes, and coastal ecosystems

AWARDS & HONORS

Summer Program Fellowship, University of Delaware, Newark, DE, United States — June (2017) – July (2017)
Highest GPA Fellowship., National University of Colombia, Bogotá, Colombia — August (2013) – December (2013)
Sport Fellowship, Surcolombiana University, Neiva, Colombia — September (2004) – January (2006)

RESEARCH EXPERIENCE

Postdoctoral Researcher Associate June (2024) - Present
Earth System Modeling Group at the Climate Change Science Institute, Oak Ridge National Laboratory (ORNL).
Project: Coastal Observations, Mechanisms, and Predictions Across Systems and Scales (COMPASS-FME)
Sponsor: The U.S. Department of Energy's (DOE)

Graduate Research Assistant August (2018) – February (2024)
Center for Applied Coastal Research, University of Delaware, Newark, DE
Advisor: Prof. Tian-Jian (Tom) Hsu
Dissertation: Numerical modeling of flocculation and cohesive sediment transport in bottom boundary layer
Extract Research Focus: Validation of OpenFoam Large Eddy Simulation (LES) in a fixed ripple bottom using Direct Numerical Simulations (DNS).

Research Assistant (Visitor Scholar) June (2017) – July (2017)
Center for Applied Coastal Research, University of Delaware, Newark, DE
Advisor: Prof. Tian-Jian (Tom) Hsu
Research Focus: Fourth and fifth order for Low-Storage Runge-Kutta method

Assistant Professor January (2017) – July (2018)
Environmental and Sanitary Engineering Dept., La Salle University, Bogotá, Colombia
Project: Development of a technological tool to support the planning of water resources in Colombian agriculture

Research Assistant August (2015) – December (2015)
Magdalena River Research Center, Bogotá, Colombia
Advisor: Prof. Jorge Alberto Escobar Vargas
Project: Construction of a micromodel in the stretch San Pablo, Bolivar of the Magdalena River

Research Assistant January (2015) – August (2015)
Civil Engineering Dept, Pontifical Javeriana University, Bogotá, Colombia
Advisor: Prof. Nelson Obregon Neira
Research project: Model to define the integrated operating rules of the Quimbo-Betania hydropower system

TEACHING EXPERIENCE

Online Lecturer January (2021) – December (2021)
Environmental, Civil and Chemical Engineering Dept., Pamplona University, Pamplona, Colombia
Courses: Computational Fluid Dynamics (CFD)

Teaching Assistant January (2021) – May (2021)
Civil and Environmental Engineering Dept., University of Delaware, Newark, DE
Course: Probability and Statistics for Engineers (CIEG315)
Advisor: Prof. Sue McNeil

Teaching Assistant August (2019) – December (2019)
Civil and Environmental Engineering Dept., University of Delaware, Newark, DE
Course: Solid Mechanics (CIEG320)
Advisor: Prof. Victor N. Kaliakin

Assistant Professor January (2017) – July (2018)
Environmental and Sanitary Engineering Dept., La Salle University, Bogotá, Colombia
Courses: Fluid Mechanics, Hydraulics, Laboratory of Fluid Mechanics, Laboratory of Hydraulics, Environmental Modeling

Lecturer July (2015) – December (2016)
Environmental Engineering Dept., Sergio Arboleda University, Bogotá, Colombia
Courses: Fluid and Hydraulics, Hydroclimatology

Teaching Assistant August (2013) – December (2014)
Civil and Agricultural Engineering Dept., National University of Colombia, Bogotá, Colombia
Course: Fluid Mechanics, Research Seminar
Advisor: Prof. Leonardo David Garzón

PROFESSIONAL EXPERIENCE IN INDUSTRY

Hydraulic Modeler October (2016) – January (2017)
District Institute of Risk Management and Climate Change, Bogotá, Colombia
Project: Basic studies of the hydrological and hydraulic component that allows its incorporation in the medium- and long-term contents of the Plan of Territorial Ordering of the Capital District

Geographic Information System (GIS) Engineer April (2011) – August (2012)
Agustín Codazzi Geographic Institution

Engineer July (2010) – November (2010)
Sinco Ltda, Neiva, Colombia

Environmental coordinator March (2010) – June (2010)
Seeds of Huila, Neiva, Colombia

Environmental coordinator February (2009) – February (2010)
Inge Obras Ltda, Neiva, Colombia

Coffee farm evaluator October (2008) – December (2008)
ACDI/VOCA, Neiva, Colombia

JOURNAL PUBLICATIONS

Total Publication: 4 || First Author: 2 || In preparation: 1 || Google Scholar

1. Penaloza-Giraldo, J. A., Hsu, T.-J., Manning, A. J., Yue, L., Vowinckel, B. and Meiburg, E.: A Numerical Modeling Framework for Flocculation and Cohesive Sediment Transport in the Wave Bottom Boundary Layer, **In Preparation**, 2025.

2. Penaloza-Giraldo, J. A., Hsu, T.-J., Manning, A. J., Yue, L., Vowinckel, B. and Meiburg, E.: A modeling framework for flocculated cohesive sediment transport in the current bottom boundary layer, **Advances in Water Resources**, vol. 195, p. 104857, 2025. [paper].

3. J. A. Penaloza-Giraldo, T.-J. Hsu, A. J. Manning, L. Ye, B. Vowinckel, and E. Meiburg, "On the importance of temporal floc size statistics and yield strength for population balance equation flocculation model," **Water Res.**, vol. 233, p. 119780, 2023. [paper]

4. L. Ye, J. A. Penaloza-Giraldo, A. J. Manning, J. Holyoke, and T.-J. Hsu, "Biophysical flocculation reduces variability of cohesive sediment settling velocity," **Commun. Earth Environ**., vol. 4, no. 1, p. 138, 2023. [paper]

5. L. Ye, A. J. Manning, J. Holyoke, J. A. Penaloza-Giraldo, and T.-J. Hsu, "The Role of Biophysical Stickiness on Oil-Mineral Flocculation and Settling in Seawater," **Frontiers in Marine Science**, vol. 8. 2021. [paper]

CONFERENCE PAPERS

1. J. A. Penaloza-Giraldo, J. A. Escobar-Vargas, L. D. Donado, "A Spectral Multidomain Penalty Method Solver for the Simulation of the Velocity Attenuation in Hyporheic Flows, **Procedia Environmental Sciences**, vol. 25, p. 206-213, 2015. [paper]

CHAPTER BOOKS

1. J. Manning, L. Ye, T.-J. Hsu, J. Holyoke, and J. A. Penaloza-Giraldo, 'Oil-Mineral Flocculation and Settling Dynamics', River Deltas Research - Recent Advances. IntechOpen, Oct. 12, 2022. doi: 10.5772/intechopen.103805. [chapter]

PROFESSIONAL ACTIVITIES, SERVICE & OUTREACH

Broad Educational Outreach through YouTube (see last section)
Review research papers

MENTORING EXPERIENCE

University of Delaware

- Alyssa Wentzel (B.S. Marine Science and Public Policy)

La Salle University

- Cristina Trujillo Escobar, Tatiana Parra Chavarria (B.S. Environmental and Sanitary Engineering)

SCIENTIFIC PRESENTATIONS

Oral Presentations

1. J. A. Penaloza-Giraldo, L. Yue, T. J. Hsu, B. Vowinckel, E. Meiburg, A. J. Manning, "On numerical modeling of flocculation and cohesive sediment transport in the bottom boundary layer," **INTERCOH2023**, (2023)

Poster Presentations

1. T. J. Hsu, J. A. Penaloza-Giraldo, A. J. Manning, L. Ye, B. Vowinckel, E. H. Meiburg, "The importance of floc yield strength variability in a size class-based flocculation model," **AGU Fall Meeting**, (2022).

2. A. Wentzel, J. A. Penaloza-Giraldo, T. J. Hsu and A. James Manning, "The Sand Effects on the Floccul.ation Process: How Sand appears in Images and its Placement," **AGU Fall Meeting**, (2022).

3. A. J. Manning, L. Ye, T. J. Hsu, J. Holyoke, J. A. Penaloza-Giraldo, "The Settling Dynamics of Oil-Mineral Flocs," **AGU Fall Meeting**, (2022).

4. J. A. Penaloza-Giraldo, T. J. Hsu, A. J. Manning, E. H. Meiburg, B. Vowinckel, "Analysis of a floc size class-based model reveals the importance of floc yield strength," **AGU Fall Meeting**, (2021).

5. T. J. Hsu, J. A. Penaloza-Giraldo, L. Yue, AJ Manning, L. Ye, E. H. Meiburg, B. Vowinckel, "Toward modeling flocculation in turbulence-resolving simulations for cohesive sediment transport," **AGU Fall Meeting**, (2021).

6. J. A. Penaloza-Giraldo, T. J. Hsu, A. J. Manning, L. Ye, E. H. Meiburg, B. Vowinckel, "The Effect of Floc Strength in a Size Class-Based Flocculation Model", **AGU Fall Meeting**, (2020)

7. J. Holyoke, L. Ye, T. J. Hsu, A. J. Manning, J. A. Penaloza-Giraldo, "A Laboratory Investigation on Oil-Mineral Interactions: The Role of Mineral Type in Oil-Mineral Flocculation and Oil Entrapment", **AGU Fall Meeting**, (2020)

8. L. Ye, A. J. Manning, J. Holyoke, J. A. Penaloza-Giraldo, T. J. Hsu, "A Laboratory Investigation on Oil-Mineral Interactions: The Role of Mineral Type in Oil-Mineral Flocculation and Oil Entrapment", **AGU Fall Meeting**, (2020)

9. A. Preziosi-Ribero, J. A. Peñaloza-Giraldo, J. Escobar-Vargas, L. Donado-Garzón "A High Order Element Based Method for the Simulation of Velocity Damping in the Hyporheic Zone of a High Mountain River", **EGU General Assembly**, (2016)

10. J. A. Peñaloza-Giraldo, J. Escobar-Vargas, L. Donado-Garzón "Effect of Porosity and Velocity Fluctuation of the Interface Water/Sediment in the Turbulent Viscous Damping to Hyporheic Flow", **IAH International**, (2014)

VIDEO OUTREACH ON YOUTUBE

- YouTube Channel: Fluidomanos
- Subscribers: > 24,000
- Views: > 16,000
- Over 200 hours of education content about fluid mechanics