

**Angel Darío Monsalve Sepúlveda, Ph.D.**

**Civil Engineer**

PostDoctoral Fellow

Center for Ecohydraulics Research

Civil and Engineering Department

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Place of Birth: Arauco, Region of Biobío, Chile

Country of citizen: Chile

Family and given name: Angel Darío Monsalve Sepúlveda

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**Research interest**

My scientific field is fluvial geomorphology, in particular the evolution of landscapes, sediment dynamics, and hydraulic processes. My interests in general are in the interaction water – sediment and flow dynamic, especially their mathematical modelling. My research centers on furthering the understanding of the physical processes that control sediment transport and flow field at the local and reach scales using advanced numerical modelling techniques (3D CFD flow models, Large eddy simulations, RANS) and theoretical work.

My research is focused on fluvial geomorphology of mountain streams, with a particular focus on step-pool systems and the effect of the spatial distribution of flow and sediment grain sizes. Also I'm very interested in stream temperature and water quality modelling.

Some of my current research themes are listed below.

- Step-pool channel morphology and dynamics
  - Formation and development of sediment patches
  - Effect of sediment patches in sediment transport
  - The role woody debris in river bed surface texture
  - Channel roughness and flow velocity
  - The mechanics of bedload transport
  - Initiation of bedload motion
  - Bedload transport as a stochastic process
  - Monitoring bedload transport in natural streams
  - Stream temperature modelling
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## Education

### Undergraduate:

2002-2008\*: Civil Engineering at the Department of Civil Engineering, University of Concepción, Chile. (Universidad de Concepción).

\*A bachelor's degree program in civil engineering in Chile takes six years minimum

### Graduate:

2008-2010: Master of Science with a major in Civil Engineering at the Department of Civil Engineering, University of Concepción, Chile. (Universidad de Concepción)

Master's thesis: Field and numerical investigation on the spatial and temporal distributions of river's temperature.

2011-2016 Ph.D. in Civil Engineering, University of Idaho, Department of Civil Engineering, Center for Ecohydraulics Research. Boise, Idaho.

Doctorate thesis: Sediment Transport Predictions and Bed Surface Adjustments in Spatially Variable Flow

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## Research and professional experience

2020 – Present: PostDoctoral fellow at the Center for Ecohydraulics Research, Civil and Environmental Engineering, University of Idaho.

2016-Present: Professor and researcher at Department of Civil Engineering, Universidad de la Frontera, Chile.

2011-2016: University of Idaho. Research Assistant. Center for Ecohydraulics Research. Boise, Idaho.

2010-2011: University of Concepción. Hydraulic Engineering Laboratory. Conicyt Project "Scour at a cohesive sediment embedded bridge pier: laboratory and numerical experiments". P.I. Dr. Oscar Link Lazo.

2008-2010: EULA Center – Center for Environmental studies– University of Concepción. Working as Civil Engineer in hydrological and hydraulic research projects.

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## Scholarship Accomplishments

### Refereed Journals

- Dudunake, T., Tonina, D., Reeder, W. J., & Monsalve, A. (2020). Local and reach-scale hyporheic flow response from boulder-induced geomorphic changes. *Water Resources Research*, 56, e2020WR027719. <https://doi.org/10.1029/2020WR027719>
- Monsalve, A., Segura, C., Hucke, N., and Katz, S.: A bed load transport equation based on the spatial distribution of shear stress – Oak Creek revisited, *Earth Surf. Dynam.*, 8, 825–839, <https://doi.org/10.5194/esurf-8-825-2020>, 2020.

- Monsalve, A., E.M. Yager (2017) Bed surface adjustments to spatially variable flow in low relative submergence regimes. *Water Resources Research*, 53, 9350–9367. <https://doi.org/10.1002/2017WR020845>.
- Monsalve, A., E.M. Yager, and M. Schmeeckle (2017) Effects of bed forms and large protruding grains on near-bed flow hydraulics in low relative submergence conditions. *Journal of Geophysical Research: Earth Surface*, 122, 1845–1866. <https://doi.org/10.1002/2016JF004152>.
- Monsalve, E.M. Yager, J. Turowski, and D. Rickenmann (2016) A probabilistic formulation of bed load transport to include spatial variability of flow and surface grain size distributions, *Water Resour. Res.*, 52, 3579–3598, doi:10.1002/2015WR017694.
- Yager, E.M., M. Kenworthy, and A. Monsalve (2015), Taking the river inside: Fundamental advances from laboratory experiments in measuring and understanding bedload transport processes, *Geomorphology*. 244. 21-32. <https://doi.org/10.1016/j.geomorph.2015.04.002>
- Link, O., A. Huerta, A. Stehr, A. Monsalve, C. Meier, M. Aguayo (2012), The solar-to-stream power ratio: A dimensionless number explaining diel fluctuations of temperature in mesoscale rivers. *River Research and Applications*. DOI: 10.1002/rra.2579.
- Monsalve, A., Link, O. & Stehr, A. (2012), “The thermal regime of rivers: development, verification and application of a numerical model”. *Water Technology and Sciences (in Spanish)*. 3(4):41-56

### **Books and book chapter published**

- Link, O. y *Monsalve, A.* (2010) “Métodos y modelación numérica en hidráulica de cauce abierto” Concepción, Editorial Universidad de Concepción. 117 p. ISBN 978-956-8029-89-0 (Numerical methods and modeling in open channels hydraulics)
- Link, O., *Monsalve, A.*, Stehr, A., García, A. y Urrutia, R. (2009) Thermal regime of the Itata River, Chapter 3, pp. 44-57 (In: Parra, Castilla, Romero, Quiñones y Camaño Eds. *La Cuenca Hidrográfica del Río Itata, Aportes Científicos Para Su Gestión Sustentable*. Concepción (The Itata River watershed, scientific contributions for a sustainable management), Editorial Universidad de Concepción, 389 pp). ISBN: 978-956-227-326-8

### **Conferences and presentations**

- A. Monsalve, C. Segura (2020) A new approach to estimate bed load including the spatial distribution of shear stress: Oak Creek Revisit. Proceedings of the 2020 AGU fall meeting. San Francisco, USA.
- E. Yager, A. Monsalve, R. Kaitna, S. Leblois, and M. Gundlach (2019) Taking the plunge: the limited control of flow magnitude on step-pool morphology. Proceedings of the 2020 AGU fall meeting. San Francisco, USA.
- A. Monsalve, Yager, E (2018) Bed Surface Responses to Different Hydrographs and Sediment Supply Conditions in Low Relative Submergence Regimes. Proceedings of the 2018 AGU fall meeting. Washington DC, USA.
- A. Monsalve, Yager E. (2017) Bed Surface Responses to Spatially Variable Flow in Low Relative Submergence Conditions. AGU fall meeting. New Orleans, Louisiana, USA.

- A. Monsalve, Yager, E. (2015). Formation and establishment of forced sediment patches in high gradient channels. Proceedings of the 2015 CSDMS (Community Surface Dynamic Modeling System) annual meeting. Boulder, Colorado, USA. Poster presentation.
- A. Monsalve, Yager, E. (2014). Including sediment patches in sediment transport predictions in steep mountain channels. Proceedings of the 2014 CSDMS (Community Surface Dynamic Modeling System) annual meeting. Boulder, Colorado, USA. Poster presentation.
- Yager, E., A. Monsalve, H. Smith and A. Badoux (2013) Are grain packing and flow turbulence the keys to predicting bedload transport in steep streams? AGU fall meeting. San Francisco, California, USA.
- A. Monsalve, Yager, E. (2013). Effects of sediment patches on sediment transport predictions in steep mountain channels. 2013 AGU fall meeting. San Francisco, California, USA. Poster presentation.
- A. Monsalve, Yager, E. (2012). Development of forced patches in steep channels. 2012 AGU fall meeting. San Francisco, California, USA. Poster presentation.
- Stehr, A., Bohle, G., Caamaño, D., Link, O., Monsalve, A., Caamaño, F., Torres, P. y Aguayo, M. (2009). "Evaluation of different spatial discretization schemes in the hydrologic response of an Andean watershed". V International Conference on SWAT, Boulder Colorado, USA, 4-7 August.
- Stehr, A., Link, O., Monsalve, A., (2009) Development and verification of a stream temperature model for the Itata river, Chile. Analysis of potential impacts of climate change. An international conference on "Science and Information Technologies for Sustainable Management of Aquatic Ecosystems".

#### **Chilean Conferences and Journals**

- Monsalve, A. (2015). Evaluating the influence of hyporheic flows on solute transport using a numerical model. Revista Ingeniería de Obras Civiles - RIOC - Volumen 5/2015.
- Monsalve, A., (2014). Effects of reach channelization and straightening on the habitat quality for Chinook salmon at spawning and juvenile stages. Revista Ingeniería de Obras Civiles - RIOC - Volumen 4/2014.
- Monsalve, A., Link, O. y Stehr, A. (2011). Numerical modeling of the thermal regime of the lower Itata. XX Congreso Nacional de Ingeniería Hidráulica. Proceedings XIX Chilean Hydraulics Congress, Chilean Society of Hydraulic Engineering. Viña del Mar, Chile (In Spanish)
- Monsalve, A., Link, O., Stehr, A., Bohle, G. (2009). Measurements and predictions of Itata's river temperature. Proceedings XIX Chilean Hydraulics Congress, Chilean Society of Hydraulic Engineering. Viña del Mar, Chile (In Spanish)
- Bohle, G., Link, O., Stehr, A., Monsalve, A. (2009). Climate change influence on the Lower Itata's river discharge Proceedings XIX Chilean Hydraulics Congress, Chilean Society of Hydraulic Engineering. Viña del Mar, Chile (In Spanish)

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#### **Scholarships/Awards (highest levels only)**

- Fondecyt Iniciación en Investigación, Project # 11200949, Including the spatial variability of boundary shear stress and grain size distribution in sediment transport predictions - applications to mountain streams – 2020 to 2023.
- (2010) Conicyt Scholarship (Becas Chile – Chile Scholarship) – For PhD Studies at the University Of Idaho.

- (2008) University of Concepción Graduate Department Scholarship – For Master of Sciences studies at the University of Concepción.
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### **Academic Experience**

Solid mechanics (Civil Engineering, 2016-S\*)

Fluid mechanics (Civil Engineering, 2016 to 2020-S/F\*)

Open Channels Hydraulics (Civil Engineering, 2016 to 2020-S/F\*)

Thermodynamics (Civil Engineering, 2016-F\*, 2017-F\*)

Open Channels Hydraulics Modeling (Civil Engineering, 2018 to 2020-S/F\*)

\* S: Spring semester, F: Fall semester, S/P: Spring and Fall semesters

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### **Computer Skills (highest skills only)**

- Programming languages: Matlab, C++, and Python.
  - CFD Modeling software and libraries: OpenFOAM, Ansys Fluent, FastMECH, NAYS2DH, NAYSEddy
  - Preferred OS: Linux (Mostly Debian based distributions)
  - Other software related to engineering: Autocad Civil 3D, ArcGIS, HecRas, Phabsim.
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**Other Interests** : Soccer, Music composition

Updated on: Jun 2021