CURRICULUM VITAE

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EDUCATION & TRAINING

University of California, Davis	Business Development Program GSM.	Sept 2023-Present
University of California, Davis	**Ph.D. Civil and Environmental Eng.**	**Sep 2017-Dec 2022**
University of California, Davis	M.Sc. Civil and Environmental Eng.	Sep 2017-Jun 2020
Colombian School of Engineering Julio Garavito, Bogota, CO	B.S. Civil Eng.	Aug 2011-May 2016

RESEARCH & PROFESSIONAL EXPERIENCE

University of California, Davis, USA, Tahoe Environmental Research Center, Postdoctoral Scholar Researcher. Jan 2023 - Present

- lead the planning and development of a 3D numerical model to assess mercury transport and transformation for aquatic systems. Successfully organized and facilitated effective meetings, analyzed historic data for a comprehensive understanding of the mercury cycle, and implemented coding strategies for completing the model. These endeavors will enhance environmental monitoring practices and advance scientific understanding of mercury transport and transformations in aquatic systems, which are vital for ecosystem preservation.
- Design and implement experimental and observational measurements at Lake Tahoe and other aquatic systems to advance the understanding of water motions in lakes. This effort plays an important role in advancing overall ecosystem knowledge and informing strategies for the preservation of lake water quality.
- Data management, processing, and analysis of the Nearshore long-term real-time monitoring network in Lake Tahoe, resulting in a better understanding of the interplay between the nearshore and offshore zones. This has facilitated proactive identification of water quality changes, enabling the development of effective management strategies. This an ongoing effort since May 2019.
- Oversee and manage the 3D hydrodynamic model used for forecasting surface temperatures, currents, and waves on Lake Tahoe (lake conditions website). This model provides users with current and future conditions of the lake, playing a role in preventing potential risks such as exposure to fast currents and hypothermic temperatures.

University of California, Davis, USA, Tahoe Environmental Research Center, Graduate Student Researcher. Apr 2018 - Dec 2022

- Defined and implemented comprehensive observational measurements in shallow waters to assess water clarity changes induced by boating activity. This initiative resulted in the recognition of the critical depth of 3 m at which turbidity increases by boat activity, providing insights for the proper definition of no-wake zone policies.
- Post-processed and analyzed observational measurements isolating pressure changes induced by boats and winds. This detailed examination unveiled: waves induced by boats peaked at 10:00, contributing up to 40% of the total wave height in nearshore zones.

- Calibrated and validated the hydrodynamics of the 3D numerical model for multiple events encompassing Spring, Summer, and Fall seasons for 2 different years. This meticulous process resulted in a significant improvement in the model's accuracy, enhancing our ability to predict and analyze ecological processes, ultimately contributing to the assessment of algae growth, and nutrient cycle in Lake Tahoe.
- Successfully developed and validated the numerical model for the forecasting of the surface temperatures, currents, and waves for the website. This implementation resulted in a reliable and timely resource publicly available for users for the recognition of the current and future lake conditions.
- Provided strategic guidance on website design, data repository management, and model structure to ensure the accurate implementation of the numerical model, particularly under scenarios data scarcity for the correct use of the model.
- Implemented experimental observations on a physical model of the Lake Perris Outlet Tower for the validation of a 3D numerical model.

Alejandro Duran Engineering, Bogota, CO, Hydraulic Engineer. Sep 2016 - Sept 2017

- Conducted hydrologic and hydraulic studies of over 100 small lakes and wetlands in Cundinamarca, Colombia, aiming to establish natural rim conditions and identify potential levee constructions. The results were instrumental in developing strategies to prevent flooding in the region.
- Led highway hydraulic design for two secondary roads in Cundinamarca, Colombia, with a primary focus on establishing channel dimensions to optimize optimal highway operation conditions.

Innovatech Strategic Solutions S.A.S, Bogota, CO, Poject Engineer. Jan 2016 - Sep 2016

- Successfully planned and managed the construction of one portable reservoir to provide storage for contaminated fluids at an oil platform, ultimately ensuring efficient and environmentally responsible methods.
- Developed monitoring strategies, budget structuring, preparation of reports, progress, and traceability of projects.

RESEARCH PROJECTS

1. Boat-induced sediment resuspension and water clarity Project (Lake Tahoe, CA, USA).
    - Defined and implemented comprehensive observational measurements in shallow waters to assess water clarity changes induced by boating activity. This initiative resulted in the recognition of the critical depth of 3 m at which turbidity increases by boat activity, providing insights for the proper definition of no-wake zone policies.
    - Post-processed and analyzed observational measurements isolating pressure changes induced by boats and winds. This detailed examination unveiled: waves induced by boats peaked at 10:00, contributing up to 40% of the total wave height in nearshore zones.
2. 3D Ecological numerical model development project (Lake Tahoe, CA, USA).
    - Calibrated and validated the hydrodynamics of the 3D numerical model for multiple events encompassing Spring, Summer, and Fall seasons for 2 different years. This meticulous process resulted in a significant improvement in the model's accuracy, enhancing our ability to predict and analyze ecological processes, ultimately contributing to the assessment of algae growth, and nutrient cycle in Lake Tahoe.

3. Clear Lake monitoring and modeling project (Lake Tahoe, CA, USA).
    - Executed over 6 in-situ field measurements as part of the routine sampling strategy.
4. 3D numerical model development for Lake Conditions website (Lake Tahoe, CA, USA).
    - Successfully developed and validated the numerical model for the forecasting of the surface temperatures, currents, and waves for the website. This implementation resulted in a reliable and timely resource publicly available for users for the recognition of the current and future lake conditions.
    - Provided strategic guidance on website design, data repository management, and model structure to ensure the accurate implementation of the numerical model, particularly under scenarios data scarcity for the correct use of the model.
5. Creation and management of the reorganization and documentation of Si3D - a 3D hydrodynamic numerical model for lakes (Website).
    - Developed 95% of open-source scripts available for the ease of use of the numerical model.
    - Designed and elaborated the user manual.
    - Led and collaborated on the reorganization of the source code.
6. Lake Perris Outlet Tower Modifications Project (Riverside County, CA, USA).
    - Implemented experimental observations on a physical model of the Lake Perris Outlet Tower for the validation of a 3D numerical model.

PUBLICATIONS

Journal

1. **Sergio A. Valbuena**, Fabián A. Bombardelli, Alicia Cortés, John L. Largier, Derek C. Roberts, Alexander L. Forrest, and S. Geoffrey Schladow, 3D Flow Structures During Upwelling Events in Lakes of Moderate Size, Water Resour. Res. **58**, 1–35 (2022).
2. **Sergio A. Valbuena**, Fabián A Bombardelli, John L Largier, and Geoffrey Schladow, Deep Water Re-oxygenation from Lake Upwelling (Submitted to Limnology & Oceanography) (2023).
3. **Sergio A. Valbuena**, Fabián A. Bombardelli, John L. Largier, and S. Geoffrey Schladow, Determining the Threshold for Rotational Effects in Lake Upwelling (In preparation for Journal of Geophysical Research) (2023).

Conference

4. Federico Zabaleta, Fabián A. Bombardelli, and **Sergio A. Valbuena**, Preliminary Evaluation and Design of a New Energy Dissipation Stilling Basin via Numerical and Experimental Modeling, in *9th International Symposium on Hydraulic Structures*, October (2022).
5. **Sergio A. Valbuena**, Fabián A. Bombardelli, and S. Geoffrey Schladow, Boat induced sediment resuspension and water clarity in shallow flows, in *River Flow 2020 10th Conf. Fluv. Hydraul.*, edited by Wim Uijttewaal, Mário J. Franca, Daniel Valero, Victor Chavarrias, Clàudia Ylla Arbós, Ralph Schielen, and Alessandra Crosato (CRC Press, Delft, 2020) pp. 1333–1341.

Technical Reports

6. **Sergio A. Valbuena** and S Geoffrey Schladow, *Water Clarity and Boat Induced Waves in the Nearshore of Lake Tahoe*, Tech. Rep. (University of California Davis, 2023).

7. Alicia Cortés, S Geoffrey Schladow, Lidia Tanaka, **Sergio A. Valbuena**, Sean C. Trommer, Shohei Watanabe, John M Melack, Sudeep Chandra, and Erin K Suenaga, *Lake Tahoe Clarity Analysis and Modeling Phase I : Biogeochemical and Ecological Modeling*, Tech. Rep. (University of California Davis, 2022).
8. **Sergio A. Valbuena**, S Geoffrey Schladow, and Fabian A Bombardelli, *Boat Induced Sediment Resuspension and Water Clarity at Lake Tahoe*, Tech. Rep. (University of California Davis, 2019).
9. Fabián A. Bombardelli, Federico Zabaleta, Kara Carr, and **Sergio A. Valbuena**, *Lake Perris Outlet Tower Modifications Project. Report on results of the Numerical and Physical Models*, Tech. Rep. (University of California, Davis, Davis, CA, 2022).

CONFERENCE PRESENTATIONS WITHOUT PUBLICATION

1. Valbuena, S. A., Bombardelli, F. A., Largier, J. L., & Schladow, S. G. Rotational effects in lake upwelling and the thresholds for conceptual models. Physical Processes in Natural Waters 2023 - Oral presentation.
2. Valbuena, S. A., Bombardelli, F. A., Cortés, A., Largier, J. L., Roberts, D. C., Forrest, A. L., & Schladow, S. G. The Influence of the Coriolis Force During Upwelling in Lakes of Moderate Size. Physical Processes in Natural Waters 2022 - Oral presentation.
3. Valbuena, S. A., Bombardelli, F. A., Largier, J. L., & Schladow, S. G.. Forecasting water quality in lakes during upwelling events: The validity of the rotational and non-rotational upwelling setup conceptual models. ASLO Ocean Sciences 2022 - Oral presentation.
4. Valbuena, S. A., Bombardelli, F. A., Cortés, A., Largier, J. L., Roberts, D. C., Forrest, A. L., & Schladow, S. G. The Coriolis Force Effects During Upwelling in Rotationally Influenced Lakes. XXX Latin American Hydraulics Conference, IAHR 2022 - abstract.
5. Valbuena, S. A., Bombardelli, F. A., Cortés, A., Largier, J. L., Roberts, D. C., Forrest, A. L., & Schladow, S. G. Flow dynamics during upwelling events in rotationally influenced lakes: A numerical study. AGU Fall Meeting 2021 - Poster presentation.
6. Valbuena, S. A., Bombardelli, F. A., Largier, J. L., & Schladow, S. G. Boat Induced Sediment Resuspension and Water Clarity at Lake Tahoe. AGU, Fall meeting 2019 - Poster presentation.

TEACHING EXPERIENCE

University of California, Davis, Department of Civil and Environmental Engineering, Graduate Teaching Assistant. Engineering Hydraulics, Water Resources Simulation, and Spatial Data Analysis — 2017 - 2021

- Proctored and corrected exams for Engineering Hydraulics course on four separate occasions, handling a total of over 160 exams.
- Instructed and graded eight laboratory courses, delivering lessons to a diverse group of over 160 students.
- Collaborated on the reorganization and formatting of the Engineering Hydraulics laboratory instruction manual. Streamlined content flow, clarified procedures, and implemented a more user-friendly format. This effort contributed to a more efficient learning experience.

REVIEWER FOR JOURNALS

1. Journal Nature Water

    - Global lakes are warming slower than surface air temperature due to accelerated evaporation
2. LM - Journal of Lake and Reservoir Management
    - Impacts on sediment resuspension by various watercraft across multiple substrates, depths, and operating speeds in Indiana's largest natural lake
3. JHE - Journal of Hydraulic Engineering
    - Complex flow patterns in the Scheldt estuary: field measurements and validation of a hydrodynamic model
    - Three-dimensional hydrodynamic modeling for a tropical polymictic reservoir
4. RIBAGUA - Revista Iberoamericana del Agua
    - Daily maximum rain water level for the hydrologic design in centre and northern Argentina.
    - Obtaining a digital terrain model of a sector of the Mexico Valley basin, by means of genetic programming
    - Sedimentation prediction in a big and heterogeneous waterway
    - Direct numerical simulation for the turbulence of secondary flows in curve ducts

NUMERICAL MODELS AND CODES DEVELOPED

1. Three-dimensional mercury cycle module couple within the Si3D-L numerical model (in progress)
2. Three-dimensional suspended sediment module coupled within the Si3D-L numerical model
3. coupling of STWAVE within the SI3D-L numerical model
4. One-dimensional heat budget and eutrophication model for lakes
5. One-dimensional Saint-Venant solver
6. Code reorganization and documentation of 3D shallow-water equations model for lake flows, SI3D-L

LANGUAGES

English: Full professional proficiency
Spanish: Native