Manuel Álvarez Chaves

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Employment History

2022 – ⋯	🔖	**Doctoral researcher** at the University of Stuttgart.
2018 – ⋯	🔖	**Independent consultant** in hydrology and hydraulic engineering.
2018 – 2019	🔖	**Researcher** at the Center for Research in Sustainable Development (CIEDES) of the University of Costa Rica.
2017 – 2018	🔖	**Civil design assistant** at DEHC Consulting Engineers, San José, Costa Rica.
2015 – 2017	🔖	**Teaching assistant** at the School of Civil Engineering of the University of Costa Rica.

Education

2022 – 2025	🔖	**Dr. Ing. from the University of Stuttgart** Thesis title: *Bridging Information Theory and Hydrological Modeling: The Role of Non-Parametric Methods* [in writing]
2019 – 2021	🔖	**M. Sc. in Flood risk management from IHE Delft** Thesis title: *Comparing physically-based with data-driven models for landslide susceptibility: A case study in the Catalan Pyrenees.*
2011 – 2018	🔖	**License in Civil Engineering from the University of Costa Rica** Thesis title: *Analysis of floods in the lower part of the Parrita river basin using a two-dimensional hydraulic model* (in Spanish).

Research Experience

Research Software

Note: the number between [brackets] refers to the publication in which it was used.

- UNITE toolbox: a set of tools for non-parametric estimation for information theory. Collects different non-parametric methods (kNN, KDE, binning) to estimate fundamental quantities in information theory [1, 2, 3].

- hybrid-models: scripts to training hybrid hydrological models. Extension of Hy2DL [1].

- information_hydrology: scripts to train and post-process probabilistic deep-learning rainfall-runoff models [2].

Consulting Experience

Consulting Projects

Since 2018, I have provided consulting services for development projects in Costa Rica, working both locally and remotely for a total of six years. My expertise focuses on hydrological and hydraulic engineering, with specialized projects centered on:

- Flood event estimation for critical infrastructure, including precise design analyses for culverts and bridges

- Hydrodynamic modeling of water flow and potential flood scenarios

- Scour evaluation using engineering guidelines from the Hydrologic Engineering Center of the United States Army Corps of Engineers, and Federal Highway Administration (FHWA).

Consulting Software

- frequency-analysis: a collection of routines to fit hydrological data to extreme value statistical distributions using SciPy.

Skills

Languages	▮	Spanish (native) - English (professional working proficiency)
Coding	▮	Python, VBA
DevOps	▮	Docker
Misc.	▮	AutoCAD Civil3D, QGIS

Miscellaneous

Awards and Achievements

2023	▮	**Outstanding Student Presentation Award (OSPA)** at the AGU Fall meeting of 2023.

Certification

- ▮ **Introduction to Computational Fluid Dynamics in High Performance Computing** from the High-Performance Computing Center Stuttgart (HLRS).

- ▮ **From Machine Learning to Deep Learning: a concise introduction** from the High-Performance Computing Center Stuttgart (HLRS).

- 2022 ▮ **Software Carpentry Workshop** from The Carpentries.

References

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