ANDREA CITRINI

Environmental Studies
University of California, Santa Barbara (UCSB)
Goleta, CA, USA
Email: acitrini@ucsb.edu | **Personal website:** https://thewatertable.earth/

CURRENT ACADEMIC POSITION

Postdoctoral Fellow | UC, Santa Barbara (UCSB), California, US (from Jul 2026)
Research focused on surface water–groundwater interactions, river–aquifer systems, and the impacts of climate change on water resources, with the aim of improving sustainable water resources management from watershed to global scales.

- Mentor: Rafael J.P. Schmitt RS^3 lab website: https://www.riversystem.science/

EDUCATION

University of Milan (UNIMI), Milan, Italy May 2024
Ph.D. in Earth Science, with a focus on Hydrology and Hydrogeology

- Mentors: Corrado A.S. Camera, Giovanni P. Beretta
- Dissertation title: Modelling current and future water resources availability in an alpine catchment exploited for hydropower production

University of Milan (UNIMI), Milan, Italy Dec 2016
M.S. in Earth Sciences

- Mentor: T. Apuani
- Dissertation title: Assessment and zoning of rockfall hazard and risk along the Gallivaggio cliff (San Giacomo Filippo – SO)

University of Milan (UNIMI), Milan, Italy Oct 2014
B.S. in Geological Sciences

RESEARCH INTERESTS

Hydrological and water resource assessments, groundwater–surface water interactions, hydrological and hydrogeological modelling, groundwater sustainability, climate change impacts on water resources, drought and flood risk assessment, snow hydrology, integrated water resources management.

RESEARCH AND WORK EXPERIENCE

Postdoctoral Fellow | Carnegie Institution for Science at Stanford University, California, US (from Jun 2024 to Jun 2026)
Research aimed to investigate the impacts of climate change on water resources, water scarcity issues especially related to irrigated agriculture and energy systems at global level.

- Mentor: Lorenzo Rosa

Research fellow | University of Milan, Milan, Italy (from Feb 2024 to May 2024)
Fellowship studying the groundwater resources of the Valserina (northern Italy), with particular emphasis on karst springs.

- Mentors: Corrado A.S. Camera, Giovanni P. Beretta

Visiting PhD student – Erasmus traineeship | The Cyprus Institute, Nicosia, Cyprus (May-Jul 2022 and Feb-Mar 2023)

Period abroad in the context of the Ph.D. project to gain knowledge to handle statistical downscaling techniques and weather radar corrections.

- Mentors: Adriana Bruggeman, George Zittis

Junior Research Fellow | University of Milan, Milan, Italy (from Jan 2018 to Dec 2019)

Two-year fellowship studying the groundwater resources of the middle Valseriana (northern Italy), with particular reference to the Nossana and Ponte del Costone springs.

- Mentor: Giovanni P. Beretta

Geologist | Idrotecna – Geological consulting, Vimercate, Italy (from Feb 2017 to Dec 2017)

Fieldwork and elaboration of technical reports on environmental and geotechnical issues, dealing with technical design of wells for agriculture and heat pump. Elaboration of multichannel analysis of surface waves (MASW).

Trainee | Studio Cancelli Associato SCA, Milan, Italy (from May 2016 to Sep 2016)

2D and 3D modelling of rockfall events in collaboration with the Regional Environmental Agency of Lombardy (Italy).

Visiting Master student – Erasmus + program| Universitat de Barcelona, Barcelona, Spain (from Sep 2015 to Feb 2016)

Period abroad following classes focused on hydrology, hydrogeology, GIS and remote sensing and Natural risk management (floods and landslide)

PUBLICATIONS

In preparation

- K.F. Davis, E.A. Kebede, **A. Citrini**, [...], L. Rosa. Global dynamics and drivers of blue water gaps in the 21st century.
- **A. Citrini**, R.J.P. Schmitt. Global assessment of groundwater–river interactions in irrigated alluvial systems.
- C. Casarotto, T. Apuani, **A. Citrini**, A. Morcioni, C. Camera. Engineering geological map of the Sasso Maurigno area (northern Italy) as a spatial framework for numerical stress–strain modelling.

Under review

[15] E.A. Kebede, A. Zhu, **A. Citrini,** [...], K.F. Davis. Exposure of Global Nutrition to Rising Water Scarcity. *Under review.*

[14] S. Ruehr, **A. Citrini,** Wendland E., Dukes, L. Rosa. Multicropping increases water scarcity and irrigation demand in Brazilian croplands. *Under review.*

[13] **A. Citrini,** L. Rosa. One third of livestock production experiences conditions of local unsustainable blue-water consumption. *Under review.*

[12] **A. Citrini,** M. Sangiorgio, L. Rosa. Disentangling the roles of future scenarios and climate/hydrological models in global water gap projections. *Under review.*

In Press

[11] L. Rosa, **A. Citrini**, T. Terlouw. Water footprint and scarcity risks of low-carbon fuels. *Environmental Science & Technology, Accepted.*

Published

[10] **A. Citrini**, B.R. Scanlon, A. Rateb, G. Zhao, M. Sangiorgio, L. Rosa. Global managed aquifer recharge potential as a solution to water scarcity. Nature Water. 1-14. **2026**. https://doi.org/10.1038/s44221-026-00672-3

[9] F. La Vigna, C. Camera, R.M. Gafà, M. Roma, **A. Citrini**, L. Martarelli, G.M. Monti, A. Silvi, V. Vitale, C. Fiori, M. Masetti, F. Pascarella, R. Proietti, S. Lo Faro, M.P. Congi, M. Gerardi, S. Tersigni, T. Baldoni, S. Ramberti, G. Barbato, P. Mercogliano, G.P. Beretta. Groundwater of Italy: hydrogeological mapping

at 1: 500,000 scale." Journal of Maps 22, no. 1. 2666964. **2026**. https://doi.org/10.1080/17445647.2026.2666964

[8] L. Rosa, **A. Citrini**, T. Terlouw, S. Mingolla. Water Scarcity Risks in Ammonia Fertilizer Production Pose a Threat to Global Food Security. Environmental Science & Technology **2025**. https://pubs.acs.org/doi/10.1021/acs.est.5c14489

[7] **A. Citrini,** A. Bruggeman, I. Sofokleous, G. Zittis, G. Lazoglou, G.P. Beretta, C. Camera. Streamflow Projections in Valgrosina Valley: Climate Change Calls for Adaptation in the Alpine Region. **2025**. Hydrological Processes, 39(10), e70276. https://doi.org/10.1002/hyp.70276.

[6] **A. Citrini,** M. Sangiorgio, L. Rosa. Global multi-model trends of unsustainable irrigation under climate change scenarios. Environmental Research Letters. **2025**. https://iopscience.iop.org/article/10.1088/1748-9326/adfcee

[5] G.P. Beretta, F. La Vigna, C. Camera, R.M. Gafà, **A. Citrini**, L. Martarelli, G.M. Monti, M. Roma, A. Silvi, V. Vitale, C. Fiori, M. Masetti, F. Pascarella, R. Proietti, S. Lo Faro, M.P. Congi, M. Gerardi, S. Tersigni, T. Baldoni, S. Ramberti, G. Barbato, P. Mercogliano, G. Giugliano. **2025**. Hydrogeological Map of Italy 1:500.000 scale. 4 Sheets, Supplementary Notes and online tables. ISPRA - Geological Survey of Italy. Roma. https://sinacloud.isprambiente.it/portal/apps/sites/#/idrogeologia/pages/cartaidrogeologica500k

[4] **A. Citrini**, G. Lazoglou, A. Bruggeman, G. Zittis, G.P. Beretta, C. Camera. **2024**. Advancing Hydrologic Modelling Through Bias Correcting Weather Radar Data: The Valgrosina Case Study in the Italian Alps. Hydrological Processes, 38(11), e15339. https://doi.org/10.1002/hyp.15339

[3] **A. Citrini**, A. Mayer, C. Camera, A. Erőss, J. Sültenfuß, G. Pezzera, G.P. Beretta. **2024**. Hydrogeochemical and isotopic characterization of the main karst aquifers of the middle Valseriana (Northern Italy): Nossana and Ponte del Costone springs. Applied Geochemistry, 169, 106046. https://doi.org/10.1016/j.apgeochem.2024.106046

[2] **A. Citrini**, C. Camera, F. Alborghetti, G.P. Beretta. **2021**. Karst groundwater vulnerability assessment: application of an integrative index-based approach to main catchments of middle Valseriana springs (Northern Italy). DOI: https://doi.org/10.1007/s12665-021-09860-8. In Environmental Earth Sciences vol. 80 (17)

[1] **A. Citrini**, C. Camera, G.P. Beretta. **2020**. Nossana Spring (Northern Italy) under Climate Change: Projections of Future Discharge Rates and Water Availability. DOI: https://doi.org/10.3390/w12020387. In WATER vol. 12 (2)

EDITORIALS AND COLUMNS

[3] **A. Citrini,** D. Lepore, D. Sartirana. 2025. Innovation and the Future of Hydrogeology: the point of view of ECHN-Italy. *Acque Sotterranee-Italian Journal of Groundwater*, *14*(1). https://doi.org/10.7343/as-2025-867.

[2] R.M. Gafà, F. La Vigna, C.A.S. Camera, L. Martarelli, G.M. Monti, M. Roma, A. Silvi, V. Vitale, M.P. Congi, S. Lo Faro, **A. Citrini**, G.P. Beretta. 2024. The activity plan for the realization of the Hydrogeological Map of Italy at 1: 500,000 scale. Acque Sotterranee-Italian Journal of Groundwater, 13(1), 127-130. https://doi.org/10.7343/as-2024-758.

[1] A. Di Giovanni, **A. Citrini,** E. Edigio. 2024. ECHN-Italy: overview of activities from the last year and future challenges. Acque Sotterranee-Italian Journal of Groundwater, 13(1), 123-125. https://doi.org/10.7343/as-2024-756.

CONFERENCE PRESENTATIONS & INVITED TALKS

[26]* 2026. **A. Citrini**, G. Zhao, R.J.P. Schmitt. Seasonal and long-term patterns of groundwater–streamflow interaction direction across irrigated river systems worldwide. **AGU 2026**, San Francisco, USA.

[25]* 2026. **A. Citrini**, B.R. Scanlon, A. Rateb, G. Zhao, M. Sangiorgio, L. Rosa. Global managed aquifer recharge potential under hydrologic extremes as a climate adaptation strategy for sustainable irrigated agriculture. **AGU 2026**, San Francisco, USA (**Invited**).

[24]* 2026. E.A. Kebede, A. Zhu, **A. Citrini**, B. Demeke, O. Mialyk, …, K.F. Davis. Exposure of Global Nutrition to Rising Water Scarcity. **AGU 2026**, San Francisco, USA.

[23]* 2026. S. Ruerh, **A. Citrini**, E. Wendland, J. S. Dukes, L. Rosa. Multiple cropping increases irrigation demand and water scarcity in Brazilian soy-maize systems. **AGU 2026**, San Francisco, USA.

[22]* 2026. K.F. Davis, E.A. Kebede, **A. Citrini**, L. Rosa. Global evolution and drivers of blue water gaps in the 21st century. **AGU 2026**, San Francisco, USA.

[21] 2026. S. Ruerh, **A. Citrini**, E. Wendland, J. S. Dukes, L. Rosa. Multicropping increases water scarcity and irrigation demand in Brazilian croplands. https://doi.org/10.5194/egusphere-egu26-14882. **EGU 2026**, Vienna, Austria.

[20] 2026. Water in the West. https://web.cvent.com/event/5eff4972-703a-423d-92f0-01af483dfb5c/websitePage:8ea86f28-fa4f-455a-a4b2-7147451c0dff

[19] 2026. **A. Citrini**, L. Rosa. Feeding billions under water scarcity: global unsustainable irrigation and adaptation via Managed Aquifer Recharge. **12th Annual Stanford Global and Planetary Health Research Convening**, Stanford, California, USA.

[18] 2025. **A. Citrini**. Kick-off meeting. **TRIEM – Tritium Release Information Exchange Meeting.** (Online).

[17] 2025. C. Casarotto, **A. Citrini,** A. Morcioni, C.A.S. Camera. Field, geomechanical and laboratory investigations to develop and parametrize a numerical stress-strain model for the reconstruction of the Sasso Maurigno instability events (Valgrosina, northern Italy). https://doi.org/10.5194/egusphere-egu25-11430. **EGU 2025**, Vienna, Austria.

[16] 2024. **A. Citrini**, M. Sangiorgio, L. Rosa. Projected timelines of water depletion in world's major irrigated agriculture hotspots. **AGU 2024**, Washington, D.C., USA.

[15] 2024. **A. Citrini**. Internal Talk Series. **MC³ – Max Planck Center** (https://mc-3.org/)**.** (Online).

[14] 2023. **A. Citrini,** G.P. Beretta, C. Camera. Unveiling the hydrological response to climate change in the alpine environment: the case study of Valgrosina (northern Italy). **AGU 2023**, San Francisco, USA.

[13] 2023. A. Morcioni, T. Apuani, **A. Citrini,** F. Cecinato, M. Veveakis. Prediction of the evolution of a large landslide under different climate scenarios: a physics-based model applied to the Ruinon Landslide (Italian Alps). **World Landslide Forum**, Florence, Italy.

[12] 2023. **A. Citrini,** G.P. Beretta, C. Camera. Weather radar precipitation as functional input for the operative calculation of potential infiltration water volume: the pilot case of the Lombardy Region. **Flowpath 2023**, St. Julian, Malta.

[11] 2023. C. Camera, **A. Citrini,** A. Morcioni, C. Casarotto, G.P. Beretta. Verification of snow-pillow measures through snow stratigraphy profiles for the determination of the Snow Water Equivalent in Valgrosina (northern Italy). **Flowpath 2023**, St. Julian, Malta.

[10] 2023. **A. Citrini,** G. Lazoglou, A. Bruggeman, G. Zittis, G.P. Beretta, C. Camera. Correction of hourly radar precipitation data based on rain-gauges values: what is the most efficient method for hydrologic modeling purposes?. DOI: https://doi.org/10.5194/egusphere-egu23-15902. **EGU 2023**, Vienna, Austria.

[9] 2022. **A. Citrini,** C. Camera, S. Bertocchi, G.P. Beretta. The exploitation of the middle Valseriana springs (northern Italy): current situation, studies undertaken, and next challenges. **Sustain Valencia 2022**, Valencia, Spain.

[8] 2022. **A. Citrini,** C. Camera, S. Bertocchi, G.P. Beretta. Preservation of drinking water: examples and applications of new technologies for the quality and quantitative monitoring of the resource. **Food Safety and Healthy Living FSHL**, Brasov, Romania and Online (**Invited**).

[7] 2022. **A. Citrini,** C. Camera, L. Marini, G.P. Beretta. Preliminary results regarding the simulation of a streamflow strongly influenced by anthropogenic use in an alpine context: the case of the Grosina

valley (northern Italy). DOI: https://doi.org/10.5194/egusphere-egu22-1882. **EGU 2022**, Vienna, Austria.

[6] 2021. **A. Citrini,** C. Camera, F. Alborghetti, G.P. Beretta. The COPA+K method: an index-based approach for the karst groundwater vulnerability assessment. The Valseriana springs case (Northern Italy). **Flowpath 2021**, Naples, Italy.

[5] 2021. **A. Citrini,** A. Mayer, C. Camera, A. Erőss, G.P. Beretta. Characterization of the main karst aquifers of the middle Valseriana (northern Italy) based on isotopic and hydrogeochemical data: Nossana and Ponte del Costone springs. **48th IAH congress**, Brussels, Belgium.

[4] 2021. **A. Citrini,** C. Camera, F. Alborghetti, G.P. Beretta. Vulnerability assessment of karst aquifers using the COPA+K index based method: the case of the Valseriana springs (Northern Italy). **International Symposium on Geofluids**, Online.

[3] 2021. **A. Citrini**. Climate Change and karst water resources: the Nossana spring case (northern Italy). **Jo.In Hydrocafe**, Online (**Invited**).

[2] 2020. C. Camera, **A. Citrini**, G.P. Beretta. Effects of climate change on the Nossana karst spring (northern Italy): future discharge projections and water distribution system sustainability. DOI: https://doi.org/10.5194/egusphere-egu2020-3448. **EGU 2020**, Vienna, Austria.

[1] 2019. **A. Citrini,** C. Camera, and G.P. Beretta. Nossana Karst Spring Behaviour under future Climate Change Scenarios. **Flowpath 2019**, Milan, Italy

***** Accepted presentations (oral and poster) scheduled for AGU26, December 7–11, 2026, San Francisco, CA, USA.

TEACHING EXPERIENCE

Invited seminar

Jun 2026 – "**Methods and tools for studying water resources in a changing climate**". Invited seminar open to the university community, presenting research methods and projects developed throughout my career, with a common focus on understanding and preserving water resources in a changing climate. University of Pavia, Pavia, Italy.

Teaching and Teaching Assistant Experience

M.S. Earth and Environmental Sciences (University of Pavia) – **2026**. *Applied Hydrogeology*. Designed and delivered a 4-hour hands-on teaching module including geostatistical analysis of piezometric levels and aquifer transmissivity (2 h) and the development of a simplified groundwater flow model (2 h).

M.S. Environmental Science (University of Milan - UNIMONT) – **2023**. *Filed trip of Environmental geology for mountain areas*.

M.S. Earth Sciences (University of Milan) – **2019**, **2020**, **2021**, **2022**. *Groundwater Exploration and Management with Laboratory*.

M.S. Earth Sciences (University of Milan) – **2019**, **2020**, **2021**, **2023**. *Geotechnical and Hydrogeological Survey and Laboratory*.

B.S. Environmental Science and Policy (University of Milan) – **2021**, **2024**. *Environmental and Landscape Geology*. GIS courses.

Tutoring for Bachelor and Master thesis

[13] Anna Giulia **De Biaggi** – M.S. Student (University of Milan) – "Streamflow scenario to an alpine catchment exploited for hydropower purposes: the case of Valgrosina (SO) under different levels of global warming", **2025**

[12] Christian **Casarotto** – M.S. Student (University of Milan) – "*Modelling the Cima Piazzi Rockfall events*", **2024**

[11] Alessandro Maria **Borrelli** – M.S. Student (University of Milan) – "*Groundwater resources of Piedmont region and Aosta Valley region*", **2024**

[10] Greta **Tornaghi** – M.S. Student (University of Milan) – "*Groundwater resources of Lombardy region*", **2024**

[9] Matilde **Di Nardo** – M.S. Student (University of Milan) – "*Creation of a raster dataset of hourly precipitation (1 km x 1 km) from the integration of data from stations and radars for Lombardy region (2005-2020)*", **2023**

[8] Lorenzo **De Simoni** – M.S. Student (University of Milan) – "*Groundwater resources of Tuscany region*", **2022**

[7] Lorenzo **Marini** – M.S. Student (University of Milan) – "*Hydrological characterization and modeling of an anthropized mountain basin for hydropower purposes: the case of Valgrosina (SO)*", **2022**

[6] Massimiliano **Francone** – B.S. Student (University of Milan) – "*Correlation between the Lambro, Olona and Seveso floods and changes in the water table*", **2021**

[5] Lucia **Mauri** – M.S. Student (University of Milan) – "*Groundwater resources of Sardinia region - prototype hydrogeological mapping.*", **2021**

[4] Daniele **Buggio** – B.S. Student (University of Milan) – "*Organization of a hydro-meteorological climate data archive in Valchiavenna (SO) and analysis of temperature variation trends*", **2021**

[3] Alicia **Garcin** – M.S. Student (University of Milan & Avignon University) – External internship supervised within a collaboration agreement between Université d'Avignon and Università degli Studi di Milano, focusing on karst springs, **2019**.

[2] Lucie **Bryon** – M.S. Student (University of Milan and Avignon University) – External internship supervised within a collaboration agreement between Université d'Avignon and Università degli Studi di Milano, focusing on karst springs, **2019**.

[1] Francesca **Alborghetti** – M.S. Student (University of Milan) – "*Hydrogeological study and vulnerability to pollution of the Ponte del Costone spring basin (Seriana Valley - BG)*", **2019**

WORKSHOPS AND TRAINING ATTENDED

Tritium Release Information Exchange Meeting (TRIEM), workshop 1 – CERN, 1-4 December 2025 (online). The initiative was established to foster international collaboration and knowledge exchange on tritium-related topics at accelerator facilities. Key areas: Estimation of tritium production using Monte Carlo simulation codes, and Assessment of tritium diffusion in materials and facility environments.

Every Semester Needs a Plan – ncfdd, November 2025. "Every Semester Needs a Plan is broader than just a professor approaching a semester, as the organizational, time management, and prioritization skills are applicable to any role, academic or otherwise." Led by Lisa Hanasono, Bowling Green State University.

Mentoring 101 – ncfdd, March 2026. "Mentoring 101 includes how to approach mentoring from a mentee's perspective and how to network effectively for your career as a researcher." Led by Rachel McLaren, University of Iowa.

Building a publishing pipeline: concrete strategies for increasing your writing productivity – ncfdd, March 2026. Led by Erin Furtak, University of Colorado.

RESEARCH FELLOWSHIPS AND FUNDING

2020–2024 | Ph.D. Research Scholarship – University of Milan, Italy.

Scholarship funded by the Italian Ministry of University and Research (MUR) through the Departments of Excellence program, under the project "The Geosciences for Society: Resources and Their Evolution" (Georesources research area).

2018–2019 | Junior Research Fellowship – University of Milan, Italy.
Competitive research fellowship funded by UniAcque S.p.A., the integrated water utility serving the Bergamo area, supporting research on groundwater resources and karst aquifers in northern Italy.

HONORS & AWARDS

"*Elio Botti – Come Acqua Saliente*" Prize (Jury Honorable Mention), for the *Hydrogeological Map of Italy (1:500,000)* (University of Milan–CMCC–ISPRA–ISTAT), Padua, Italy, Feb 2026. (Team award; contribution: data harmonization / hydrogeologic synthesis).

ACADEMIC SERVICE AND OUTREACH

Co-chair and member of

ECHN-IAH Italy (from Jan 2024): Early Career Hydrogeologists' Network of International Association of Hydrogeologists, Italian chapter (https://www.iahitaly.it/echn-members)

CIPA at BSE Stanford campus (from Sep 2025 to Jun 2026): the Carnegie Institution Postdoctoral Association at the Biosphere Sciences & Engineering based at Staford. It is an organization composed of all postdocs at Carnegie Science and serves to build community amongst campus postdocs, share useful resources, and collectively advocate for BSE postdoc-specific issues (https://carnegiescience.edu/about/working/postdoctoral-fellow-opportunities).

Editor for

Acque Sotterranee - Italian Journal of Groundwater

Reviewed manuscripts for

Water Resources Research, Acque Sotterranee - Italian Journal of Groundwater, International Soil and Water Conservation Research, Communications Earth & Environment, Environmental Research: Food Systems, EGUsphere, Hydrological Processes, Environmental Science and Technology.

Media coverage

2026-03-12. **World Economic Forum**. "Another conflict, another reminder of the fragility of the world's food supply". https://www.weforum.org/stories/2026/03/fertilizer-urea-middle-east-war-food-security/

2025-07-13. **La Stampa**. "Pronta la nuova mappa delle riserve idriche italiane; «Parte da Milano il progetto di misurazione delle falde da cui proviene l'85% dell'acqua potabile»". https://www.lastampa.it/milano/2025/07/13/news/pronta_la_nuova_mappa_delle_riserve_idriche_italiane-15230667/?ref=LSHRT-NOR-Pnull-S1-T1

2023-04-15. **L'Eco di Bergamo**. "*Sorgente Nossana, lo studio dei geologi della Statale con Uniacque: «Fasi critiche destinate a crescere»*". https://www.ecodibergamo.it/stories/premium/valle-brembana/sorgente-nossana-studio-dei-geologi-della-statale-uniacque-fasi-critiche-o_1467666_11/

COMPUTATIONAL AND SOFTWARE TOOLS

R code, Python, MATLAB, MODFLOW code.
QGIS, ArcGIS.

LANGUAGES

Italian: native
English: fluent (C1)
Spanish: fluent (B2/C1)

EXTRACURRICULAR ACTIVITIES

I have a deep passion for sports, including soccer, running, tennis, climbing, and hiking. Over the years, I have consistently been involved in both individual and team sports, which have strengthened my perseverance and shaped my collaborative mindset. Playing soccer since the age of six and earning a black belt in Karate-Do (1998–2004) have taught me discipline, resilience, and respect for others. These experiences have made me a committed team player, both on the field and in my professional life, where I value working collaboratively toward shared goals while taking on leadership roles with fairness and integrity.