

Curriculum vitae di *Sara Bonetti*

Sottosettori ERC primari:

E10_17 Hydrology, hydrogeology, engineering and environmental geology, water and soil pollution;

PE10_13 Physical geography, geomorphology;

PE10_21 Earth system modelling and interactions

PERSONAL DETAILS

Family name, First name: Bonetti, Sara

Birthdate: 14.03.1987

Researcher unique identifier(s): Google Scholar ([N5Y7cJQAAAAJ](#)), OrcID ([0000-0001-8856-3438](#))

URL for web site: <https://change.epfl.ch/>

• **Education and key qualifications**

- | | |
|------------|--|
| 11/07/2018 | PhD
Dept. of Civil and Environmental Engineering, <i>Duke University</i> , Durham (NC), USA
PhD Supervisor: <i>Prof. A. Porporato</i> |
| 2011 | Master in Civil Engineering,
Dept. of Civil, Environmental and Architectural Engineering, <i>University of Padova</i> ,
Padova, Italy |
| 2009 | Bachelor in Civil Engineering,
Dept. of Civil, Environmental and Architectural Engineering, <i>University of Padova</i> ,
Padova, Italy |

• **Current position**

- 09.2022 - Present **Assistant Professor**, School of Architecture, Civil and Environmental Engineering,
École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland

• **Previous positions**

- | | |
|-------------------|---|
| 03.2021 - 06.2022 | Assistant Professor , Soil Physics and Land Management Group,
<i>Wageningen University</i> , Wageningen, the Netherlands |
| 02.2020 - 07.2021 | Research Fellow , Institute for Sustainable Resources,
<i>University College London</i> , London, UK |
| 08.2018 - 07.2020 | Postdoctoral Researcher , Dept. of Environmental Systems Science,
<i>ETH Zürich</i> , Zürich, Switzerland |
| 09.2017 - 06.2018 | Visiting Graduate Student , Dept. of Civil and Environmental Engineering,
<i>Princeton University</i> , Princeton (NJ), USA |
| 05.2014 - 07.2014 | Research Assistant , Dept. of Civil and Environmental Engineering,
<i>University of Padova</i> , Padova, Italy |
| 11.2012 - 11.2013 | Research Assistant , Nicholas School of the Environment,
<i>Duke University</i> , Durham (NC), USA |
| 05.2012 - 10.2012 | Research Assistant , Dept. of Mathematics,
<i>University of Padova</i> , Padova, Italy |
| 03.2012 - 09.2012 | Staff Engineer , <i>M3E Mathematical Methods and Models for Engineering</i> ,
Padova, Italy |

RESEARCH ACHIEVEMENTS AND PEER RECOGNITION

Research achievements

Peer-review manuscripts: 35

H-index: 21 (WoS, accessed: 05.04.2026)

Number of citations: 1141 (WoS, accessed: 05.04.2026)

Ten selected publications:

1. Lian T., Fatichi, S., Stähli, M., and **Bonetti, S.** (2025). Assessing spatial patterns of carbon and nutrient dynamics in catchments of complex topography, *Water Resources Research*, 61, e2025WR040260, <https://doi.org/10.1029/2025WR040260>.

Personal contribution: conceptualization, investigation, methodology, model development, writing (original draft, review and editing), supervision.

Significance: develops a novel coupled ecohydrological-soil biogeochemical model capturing catchment scale water, carbon, and nutrient dynamics, and highlights the value of spatially-distributed modelling for understanding landscape-scale biogeochemical cycling.

2. Bassani, F., Fatichi, S., Rinaldo, A. and **Bonetti, S.** (2024). Toward a metabolic theory of catchments: Scaling of water and carbon fluxes with size. *Proceedings of the National Academy of Sciences*, 121(42), p.e2410736121, <https://doi.org/10.1073/pnas.2410736121>.

Personal contribution: conceptualization, investigation, methodology, model development, writing (original draft, review and editing), supervision.

Significance: establishes a scaling framework linking vegetation structure to catchment-scale water and carbon fluxes, revealing invariant behavior with biomass and linear scaling with basin size, and advancing a generalized theory of ecohydrological functioning supported by models and observations.

3. Weber, T. K. D., Weihermüller, L., Nemes, A., Bechtold, M., Degré, A., Diamantopoulos, ..., and **Bonetti, S.** (2024). Hydro-pedotransfer functions: A roadmap for future development, *Hydrology and Earth System Sciences*, 28, 3391-3433, <https://doi.org/10.5194/hess-28-3391-2024>.

Personal contribution: conceptualization, investigation, methodology, writing (original draft, review and editing), supervision.

Significance: provides a critical synthesis of limitations in current pedotransfer functions, highlighting gaps in representation, process understanding, and scale applicability; proposes a roadmap to systematically improve PTF development and use, guiding more robust soil hydraulic modelling across scales.

4. **Bonetti, S.**, Sutanudjaja, E., Mabhaudhi, T., Slotow, R., and Dalin, C. (2022). Climate change impacts on water sustainability of South African crop production. *Environmental Research Letters*, 17(8), 084017, <https://doi.org/10.1088/1748-9326/ac80cf>.

Personal contribution: conceptualization, investigation, methodology, model development, formal analysis, writing (original draft, review and editing).

Significance: assesses how climate change impacts water availability and sustainability in South African crop production, offering insights for managing water resources and food security under future conditions.

5. **Bonetti, S.**, Wei, Z., and Or, D. (2021). A framework for quantifying hydrologic effects of soil structure across scales. *Communications Earth & Environment*, 2(1), 1-10, <https://www.nature.com/articles/s43247-021-00180-0>.

Personal contribution: conceptualization, investigation, methodology, model development, formal analysis, writing (original draft, review and editing).

Significance: introduces a systematic approach to incorporate soil structural effects into hydraulic parameterization using vegetation metrics, improving hydrological modelling of soil–water interactions.

6. Gupta, S., Lehmann, P., **Bonetti, S.**, Papritz, A., and Or, D. (2021). Global prediction of soil saturated hydraulic conductivity using random forest in a Covariate-based GeoTransfer Function (CoGTF) framework. *Journal of Advances in Modeling Earth Systems*, 13, e2020MS002242, <https://doi.org/10.1029/2020MS002242>.

Personal contribution: conceptualization, investigation, methodology, writing (review and editing).

Significance: develops global maps of soil saturated hydraulic conductivity using machine learning and remote sensing, capturing soil structure and spatial variability for improved hydrological modelling.

7. **Bonetti, S.**, Hooshyar, M., Camporeale, C., and Porporato, A. (2020). Channelization cascade in landscape evolution. *Proceedings of the National Academy of Sciences*, 117 (3), 1375-1382, <https://doi.org/10.1073/pnas.1911817117>.

Personal contribution: conceptualization, investigation, methodology, model development, formal analysis, writing (original draft, review and editing).

Significance: shows how a minimalist landscape evolution model can generate complex ridge–valley networks, identifying conditions for channel formation, and linking landscape evolution to self-organization and turbulence-like behavior.

8. **Bonetti S.**, and Porporato, A. (2017). On the dynamic smoothing of mountains. *Geophysical Research Letters*, 44, 5531–5539, <https://doi.org/10.1002/2017GL073095>.

Personal contribution: conceptualization, investigation, methodology, model development, formal analysis, writing (original draft, review and editing).

Significance: shows how mountain slopes evolve following a universal statistical pattern encoding landscape age, and links slope distributions to erosion and diffusion processes for predictive landscape modeling.

9. **Bonetti, S.**, Manoli, G., Manes, C., Porporato, A., and Katul, G. G. (2017). Manning’s formula and Strickler’s scaling explained by a co-spectral budget model. *Journal of Fluid Mechanics*, 812, 1189-1212, <https://doi.org/10.1017/jfm.2016.863>.

Personal contribution: conceptualization, investigation, methodology, model development, formal analysis, writing (original draft, review and editing).

Significance: provides a theoretical foundation for Manning’s formula using a co-spectral budget model, clarifying its link to turbulence and wall roughness.

10. Manoli, G., **Bonetti, S.**, Domec, J. C., Putti, M., Katul, G. G., and Marani, M. (2014). Tree root systems competing for soil moisture in a 3D soil–plant model. *Advances in Water Resources*, 66, 32-42, <https://doi.org/10.1016/j.advwatres.2014.01.006>.

Personal contribution: conceptualization, investigation, methodology, model development, formal analysis, writing (original draft, review and editing).

Significance: presents a new 3D soil–plant model capturing root water uptake, transpiration, and photosynthesis, providing new insights into how root competition shapes plant water dynamics.

Peer recognition

Invited talks (selected):

- **S. Bonetti**, *On the role of topographic complexity and small-scale soil features in catchment-scale ecohydrological processes*, Atmospheric and Climate Science Colloquium, 16.10.2025, [ETH Zürich](#), Zürich, Switzerland.
- **S. Bonetti**, *Linking form and function: towards an eco-hydro-geomorphic approach to catchment science*, Geomorphology and Hydrology Colloquium, 04.06.2025, [Univ. of Bern](#), Bern, Switzerland.
- **S. Bonetti**, *Crop Production, Climate, and Environmental Sustainability - Challenges and Opportunities*, Green Academy Seminar #5 Food, from land to data, 18.11.2024, School of Life Sciences and SV Sustainability, [EPFL](#), Lausanne, Switzerland.
- **S. Bonetti**, *On the form and function of drainage basins*, IDYST/ISTE Seminar Series, 06.05.2024, [Univ. of Lausanne](#), Lausanne, Switzerland.
- **S. Bonetti**, *Soil structure effects on hydrological and biogeochemical processes: current advances, challenges, and opportunities*. Geoscience Colloquium, 08.11.2023, [Univ. of Basel](#), Basel, Switzerland.
- **S. Bonetti**, *Effects of small-scale soil structure features on hydrological, biogeochemical, and geomorphological processes*. *Workshop* on “Numerical analysis, porous media and water resources: a fruitful contamination”, 3-5.07.2023, Bari (Italy).
- **S. Bonetti**, *On the representation of small-scale soil biophysical features for large-scale applications*. Session on Understanding, identifying, and modelling hydrological processes and regularities in light of climate variability and change (HS2.4.2), 27 Apr. 2023, [EGU General Assembly 2023](#), Vienna (Austria).
- **S. Bonetti**, *On the form and function of drainage basins*. Seminar at the Systems Analysis, Integrated Assessment and Modelling department, [Swiss Federal Institute of Aquatic Science and Technology](#) (EAWAG), 15.11.2022, online.
- **S. Bonetti**, *Hillslope-channel network cascading processes*. Seminar on “Cascading hydrogeomorphic processes and compound hazards in mountain catchments under environmental change”, 13-16.09.2022, [Univ. of Padova](#), Italy.

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- **S. Bonetti**, *Soil structure effects on infiltration-runoff partitioning across scales*. Webinar on the “Role of soil and microorganisms in affecting the global carbon and water cycles”, 18.03.2021, [iLEAPS Lite conference](#) (online).

Prizes, awards, fellowships, elected academic memberships:

- Since 2026: member of the *Swiss Hydrological Commission* (National Academy of Natural Sciences).
- Mar. 2018: “*Professor Senol Utku*” award (highest distinction) for best pre-Ph.D. peer-reviewed journal paper (*Bonetti and Porporato, On the dynamic smoothing of mountains, GRL, 2017*), awarded by the Dept. of Civil and Environmental Engineering, Duke University.
- May 2013: “*Guglielmo Marin*” prize, awarded by the Istituto Veneto di Scienze Lettere ed Arti, Venice (Italy), research fellowship (EURO: 10K) to visit Duke University.
- Dec. 2011: *Magna Cum Laude* distinction, University of Padova, Padova (Italy).
- Sep. 2009: *Magna Cum Laude* distinction, University of Padova, Padova (Italy).

ADDITIONAL INFORMATION

Other contributions to the research community

Organization of conferences and workshops:

- 16-21 Aug. 2026: **Symposium co-organizer** (with P. Perona, G. De Cesare, A. Amini, G. Calvani, H. Peter, M. Musa, C. Ancey, EPFL; L.G.M. Silva, D. Vetsch, ETHZ) – *XVI International Symposium on Ecohydraulics*, Lausanne, Switzerland, <https://isc2026.epfl.ch/>.
- 06.2026: **Co-convener** (with G. Bertoldi, X. Feng) of session 2 (*Computational Ecohydrology*) at the Conference on Computational Methods in Water Resources (CMWR), 28 Jun-2 Jul. 2026, Bologna, Italy
- 05.2026: **Lead convener** (co-conveners: J. Klaus, C. Hinz, G. Vico) of session HS10.1 (*General Ecohydrology*) at the *EGU General Assembly*, 3-8 May 2026, Vienna, Austria.
- 12.2025: **Co-convener** (with S. Cerasoli, S. K. Anand, B. Morgan, S. Calabrese) of session H127 (*Root-Soil-Water Nexus: Integrating Perspectives Across Scales and Disciplines*) at *AGU General Assembly*, 15-19 December 2025, New Orleans, USA.
- 04.2025: **Lead convener** (co-conveners: F. Bassani, J. Klaus, O.L. Llanos Paez, C. Hinz, S. Fatichi, G. Vico) of session HS10.1 (*General Ecohydrology*) at the *EGU General Assembly 2025*, Vienna, Austria.
- 04.2025: **Co-convener** (with P. Benard, S. Di Bert, S. Bickel, D. Or, E. Blagodatskaya) of session SSS4.2 (*Biotic interactions shaping soil physical and biogeochemical processes*) at the *EGU General Assembly*, 14–19 April 2025, Vienna, Austria.
- 2-7 Mar. 2025: **Workshop co-organizer** (with A. Carminati, P. Lehmann, ETHZ; C. Grossiord, EPFL; B. Stocker, University of Bern) – *Missing links in drought research: linking plant physiology, soil hydrology, and climate science across scales*, Monte Verità, Ascona, Switzerland, <https://www.zhydro.ch/monteverita2025/>. Supported by Congressi Stefano Franscini.
- 04.2024: **Lead convener** (co-conveners: C. Hinz, J. Klaus, W. Liu, Q. Feng, C. Zhang, M. Zhu) of session HS10.1 (*General Ecohydrology*) at the *EGU General Assembly 2024*, Vienna, Austria.
- 04.2024: **Co-convener** (with P. Benard, F. Leuther, O. Sauzet, S. Bickel, D. Or) of session SSS4.4 (*Soil Biophysics - processes, mechanisms, and feedbacks*) at *EGU General Assembly*, 14-19 April 2024, Vienna, Austria.
- 04.2024: **Co-convener** (with K. Fowler, S. Gnann, W. Berghuijs, G. Burns, D. Duethmann, L. Trotter) of session HS2.4.4 (*Understanding and modelling hydrological response under climate variability and change*) at the *EGU General Assembly*, 14-19 April 2024, Vienna, Austria.
- 13-15 Sept. 2023: **Workshop co-organizer** (with G. Manoli, EPFL) – *Form and Function of Complex Systems: workshop on transport, metabolism, and design in Nature and Society*, Lausanne, Switzerland, <https://www.epfl.ch/labs/urbes/workshop-2023/>.
- 04.2023: **Co-convener** (with R. Baatz, M. Haddad, M. Siena, M. Peli, S. Barontini, S. Ferraris) of session HS8.3.1 (*Vadose zone hydrology: advances and future perspectives in soil hydrologic processes*) at the *EGU General Assembly*, 23-28 April 2023, Vienna, Austria.
- 04.2023: **Co-convener** (with C. Hinz, J. Klaus, S. Calabrese, F. Vinatier, G. Vico) of session HS10.1 (*General Ecohydrology*) at the *EGU General Assembly 2023*, 23-28 April 2023, Vienna, Austria.

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Reviewer and editorial activities:

- **Associate Editor** (since 2024) for *ARC Geophysical Research*.
- **Topic Editor** (since 2025) for *Tellus*.
- **Guest Editor** (2022-2023) for “Soil Moisture and Land Surface Processes: Observation, Modeling and Coupling Analysis”, special issue of *Land*.
- **Peer-reviewer** for several international journals (*Nat. Comm.*, *Proc. Natl. Acad. Sci.*, *Glob. Change Biol.*, *Water Resour. Res.*, *Hydrol. Earth Syst. Sci.*, *Hydrol. Process.*, *Agric. For. Meteorol.*, *Hydrol. Sci. J.*).
- **Proposal reviewer** for the US National Science Foundation (NSF), since 2025.
- **Proposal reviewer** for the Leverhulme Trust (UK), Spring 2024.
- **Proposal reviewer** for the Italian Ministry for Universities and Research, specifically for the *PRIN 2020* (*research Projects of Relevant National Interest – 2020*) call for proposals.

Institutional responsibilities, memberships, working groups, committees:

- **Co-Head, Diversity Office** at the School of Architecture, Civil and Environmental Engineering (EPFL).
- **Active member** of the European Geophysical Union and American Geophysical Union.
- **Active member** of the “*Pedotransfer functions and land surface parameterization*” working group in the International Soil Modeling Consortium (ISMC).
- **Active member** of the “*Understanding drivers & feedbacks of soil moisture variability*” working group of the International Association of Hydrological Sciences (IAHS).
- **Faculty search committee member**, position in Geotechnical and Geosystems Engineering, EPFL (2023).
- **Member of the selection committee** for incoming PhD students at the Soil and Terrestrial Environmental Physics group, ETH Zürich (2018) and at the Soil Physics and Land Management Group, Wageningen University (2022); for incoming research fellows at the Civil, Environmental and Geomatic Engineering and at the Bartlett School of Environment, Energy and Resources, University College London (2021).
- **Active member** of the ETH Women Professors Forum.
- **Professional license** to practice as civil engineer in Italy (obtained in 2013).

Outreach activities and news coverage:

- 11 November 2025: **Panelist** at “*Unseen Insights 2025: environment, data and society engagement*”, EPFL+ECAL Lab, Renens, Switzerland
- 29 October 2025: **News article** “[Will corn still be a worthwhile crop in Europe in 2100?](#)”, *EPFL News*.
- 21 May 2025: **Speaker** at 2025 [Pint of Science](#) in Lausanne (*Many shades of green: the quest for sustainable agriculture*).
- December 2024: **PNAS article commentary** of our work by Marquet and Gaxiola, “[Metabolic scaling from cells to catchments](#)”.
- April 2024: **News article** “[London’s transport system helped capital grow like a ‘tumour’](#)”, *The Telegraph* (also covered by [The Guardian](#)).
- April 2023: **Presentation** of CHANGE Lab activities at the [EPFL Open Days](#).
- Fall 2023: **Contribution** to “[Ten billion mouths to feed by 2050](#)”, *EPFL Dimensions*.
- 1 Jun. 2023: **Panelist** at “[FAO Event: Sustainably feeding 10 billion people in 2050](#)”. Presented jointly by the EPFL Integrative Food and Nutrition Center and the EssentialTech Centre, EPFL Lausanne.
- 26 Oct. 2021: **Blog contribution** for *Together for climate action campaign for Net Zero - COP26*: “[What are ‘scenarios’ scientists use when thinking about what might happen in the future with climate change?](#)”, by A.S.A. Chapman, S. Bonetti, C. Dalin, P. Drummond, and P. Ekins.
- 23 Jun. 2021: **Featured Soil Modeller**, “[Modeling soil processes across scales: from roots to landscapes](#)”, *ISMC News*.
- 6 Jun. 2021: **Blog article** for *Springer Nature Sustainability Community*: “[The legacy of plant roots affects large scale hydrological processes](#)” by S. Bonetti.
- Sept. 2020: **News article** “[Window for Slowing COVID’s Spread was Smaller than Projected](#)”, *Duke University News* (also covered by other media outlets, including [Fox News](#), [Miami Herald](#)).

Career breaks, diverse career paths and major life events

Maternity leave (2021-2022)