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• PERSONAL INFORMATION

Nationality: Italian

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• EDUCATION

- 2004-2008 **Ph.D.** in Hydrology (*highest honor*), Department of Water Management, Delft University of Technology (TU-Delft) (Netherlands), Thesis title: “Understanding catchment behaviour through model concept improvement”. Supervisor: Prof. H.H.G. Savenije.
- 1994-2001 **M.Sc.** in Environmental engineering (*highest honor*), University “La Sapienza”, Rome (Italy).

• CURRENT POSITION

- 2014 – present **Group Leader** (tenured since 2017) in “Hydrological Modelling”, SIAM department, Swiss Federal Institute of Aquatic Science and Technology (Eawag), Dübendorf, Switzerland.

• PREVIOUS POSITIONS

- 2013 – 2014 **Project Leader** in Hydrological Modelling, Centre de Recherche Public – Gabriel Lippmann (CRP-GL), Luxembourg.
- 2009 – 2013 **Researcher** in Environmental Modelling at CRP-GL, Luxembourg.
- 2011 – 2014 **Researcher/Lecturer**, Department of Water Management, TU-Delft (Netherlands).
- 2008 – 2009 **PostDoc**, Department of Water Management, TU-Delft (Netherlands).
- 2002 – 2004 **Visiting Scientist**, Department of Water Management, TU-Delft (Netherlands).
Fellowships from (i) Nuffic organization (Netherlands) (ii) “La Sapienza” University of Rome (Italy) and (iii) the “Antonio Ruberti” foundation (Italy).

• PROJECTS

- 2023 – 2026 Main applicant of the postdoc project “From flexible models to process-based networks in hydrology: Using Machine Learning to improve predictions without sacrificing interpretability”. Funding agency: SNSF (Switzerland). Amount: CHF 332 000.
- 2023 – 2027 Co-applicant of the project “Why are some river catchments more sensitive to environmental change than others?”. Funding agency: NWO (Netherlands). Amount: EUR 641 000.
- 2017 – 2021 Co-applicant of the project “Water Distribution”. Funding agency: SNSF (Switzerland). Amount: CHF 554 000.
- 2017 – 2020 Co-applicant of the PhD project “Calibrating stochastic hydrological models to signatures”. Funding agency: SNSF (Switzerland). Amount: CHF 174 000.
- 2016 – 2020 Main applicant of the PhD project “Hypothesis testing using controlled experiments to characterize diffuse pollution in small agricultural catchments”. Funding agency: SNSF

(Switzerland). Amount: CHF 237 000.

2011 – 2014 Principal Investigator of the “Catchments as organized systems” (CAOS) project, subproject A. Funding agency: FNR (Luxembourg). Total project amount: €3.2 million.

- **(CO-) SUPERVISION OF PHDs and POSTDOCS**

- Postdocs:

- Raphaël Reynouard (Eawag), 2024-2027
- Marvin Höge (Eawag), 2020-2023
- Clement Fabre (Eawag), 2021-2022
- Cristina Prieto (HS Cantabria), 2020-2021
- Reynold Chow (Eawag), 2019-2021

- PhDs:

- Thiago Nascimento (Eawag), 2023-2027
- Marco Dal Molin (Eawag), graduated in 2021
- Lorenz Ammann (Eawag), graduated in 2020
- Anna Scaini (Lancaster University), graduated in 2017
- Shervan Gharari (TU-Delft), graduated in 2016
- Hongkai Gao (TU-Delft), graduated in 2015

- **TEACHING ACTIVITIES**

2006 – present Guest lecturer of "Hydrological modelling" (CT4431) at TU-Delft.

2017 – present Organizer of the international short course on “Principles of catchment-scale hydrological models” (occasionally sponsored by EGU), various locations.

2012 – 2016 Organizer of the international short course on “Model building, inference and hypothesis testing in hydrology”, LIST, Luxembourg.

2010 Lecturer and moderator of the “Vienna Catchment Science Symposium 2010”.

2005 – 2006 Organizer and lecturer of a TU-Delft/CRP-GL summer school in hydrology, Luxembourg.

- **CONSULTING**

2018 Basque Water Agency (Agencia Vasca del Agua). Investigation of opportunities for improving the model structure and numerical implementation of the hydrological modelling systems.

- **SERVICE**

- Journal Editor of Hydrology and Earth System Sciences (2012 – present).
- Journal reviewer for the major hydrological journal (e.g. Hydrology and Earth System Sciences, Water Resources Research, Hydrological Processes, Journal of Hydrology, Environmental Modelling & Software, Advances in Water Resources, Hydrological Sciences Journal, Physics and Chemistry of the Earth, PLOS ONE), and multidisciplinary journals (e.g. Science, Nature).
- Regular reviewer of project proposals for DFG (Germany) and SFI (Ireland)
- Convener of several sessions at international conferences (6 EGU sessions, 1 IAHS session); Organizer of the EGU Leonardo conference “Looking at Catchments in Colors”, Luxembourg, 2010.
- Leader of the IAHS (international association of hydrological sciences) Working Group on the

History of Hydrology, “history of hydrological models” initiative (current).

- Member of the IAHS task force for the definition of the “Panta Rhei” decade 2013-2022.

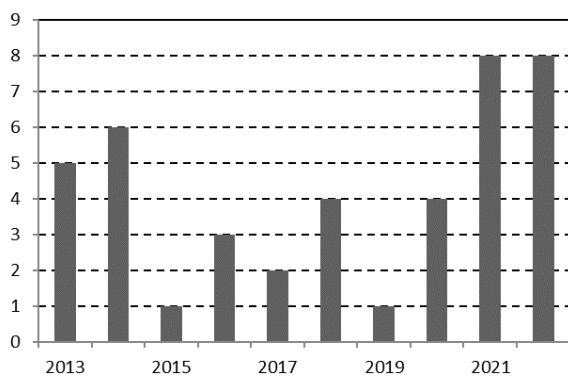
• AWARDS

- 2012 Award for Outstanding Scientific Publication (paper title: “Elements of a flexible approach for conceptual hydrological modeling: 1. Motivation and theoretical development”), National Research Fund (FNR), Luxembourg.
- 2006 Best Student Paper Award, AGU, San Francisco (Based on work at Oregon State University, with Prof. Jeff McDonnell).
- 2001 Best M.Sc. Thesis in 2000 – 2001 in the field of Water Management and Soil Protection. University “La Sapienza”, Rome, Italy (Based on work at BOKU-Vienna, with Prof. Hans-Peter Nachtnebel).

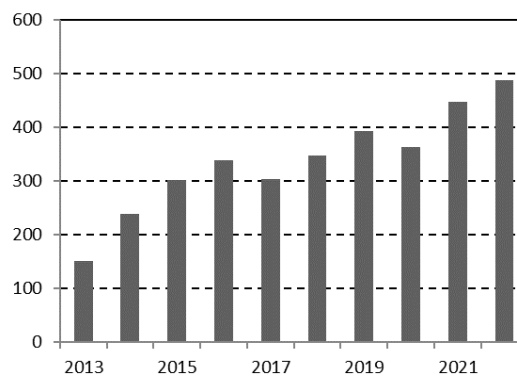
• PUBLICATIONS OVERVIEW

- 65 articles in ISI journals (17 as 1st author), 1 book, and 4 conference proceedings
- H-index = 30, Total number of citations = 4200 (source Scopus, February 2024)

Published items in each year



Citations in each year



• PUBLICATIONS

Journal papers

- Gao, H., **F. Fenicia**, and H. H. G. Savenije (2023), HESS Opinions: Are soils overrated in hydrology?, *Hydrol. Earth Syst. Sci.*, 27(14), 2607-2620, doi: 10.5194/hess-27-2607-2023.
- Höge, M., et al. (2023), CAMELS-CH: hydro-meteorological time series and landscape attributes for 331 catchments in hydrologic Switzerland, *Earth Syst. Sci. Data*, 15(12), 5755-5784, doi: 10.5194/essd-15-5755-2023.
- Shen, C., et al. (2023), Differentiable modelling to unify machine learning and physical models for geosciences, *Nature Reviews Earth & Environment*, 4(8), 552-567, doi: 10.1038/s43017-023-00450-9.
- Dal Molin, M., D. Kavetski, C. Albert, and **F. Fenicia** (2023), Exploring Signature-Based Model Calibration for Streamflow Prediction in Ungauged Basins, *Water Resour Res.*, 59(7), e2022WR031929, doi: <https://doi.org/10.1029/2022WR031929>.
- Chow, R., S. Spycher, R. Scheidegger, T. Doppler, A. Dietzel, **F. Fenicia**, and C. Stamm (2023), Methods comparison for detecting trends in herbicide monitoring time-series in streams, *Sci Total Environ.*, 891, 164226, doi: <https://doi.org/10.1016/j.scitotenv.2023.164226>.
- Fabre, C., T. Doppler, R. Chow, **F. Fenicia**, R. Scheidegger, A. Dietzel, and C. Stamm (2023), Challenges of spatially extrapolating aquatic pesticide pollution for policy evaluation, *Sci Total Environ.*, 875, 162639, doi: <https://doi.org/10.1016/j.scitotenv.2023.162639>.

- Prieto, C., N. Le Vine, D. Kavetski, **F. Fenicia**, A. Scheidegger, and C. Vitolo (2022), An Exploration of Bayesian Identification of Dominant Hydrological Mechanisms in Ungauged Catchments, *Water Resour Res*, 58(3), e2021WR030705, doi: <https://doi.org/10.1029/2021WR030705>.
- Höge, M., A. Scheidegger, M. Baity-Jesi, C. Albert, and **F. Fenicia** (2022), Improving hydrologic models for predictions and process understanding using neural ODEs, *Hydrol. Earth Syst. Sci.*, 26(19), 5085-5102, doi: 10.5194/hess-26-5085-2022.
- Zhang, X., H. Yang, W. Zhang, **F. Fenicia**, H. Peng, and G. Xu (2022), Hydrologic impacts of cascading reservoirs in the middle and lower Hanjiang River basin under climate variability and land use change, *Journal of Hydrology: Regional Studies*, 44, 101253, doi: <https://doi.org/10.1016/j.ejrh.2022.101253>.
- Gao, H., C. Han, R. Chen, Z. Feng, K. Wang, **F. Fenicia**, and H. Savenije (2022), Frozen soil hydrological modeling for a mountainous catchment northeast of the Qinghai–Tibet Plateau, *Hydrol. Earth Syst. Sci.*, 26(15), 4187-4208, doi: 10.5194/hess-26-4187-2022.
- Fenicia, F.**, and J. J. McDonnell (2022), Modeling streamflow variability at the regional scale: (1) perceptual model development through signature analysis, *J Hydrol*, 605, 127287, doi: <https://doi.org/10.1016/j.jhydrol.2021.127287>.
- Fenicia, F.**, D. Meißner, and J. J. McDonnell (2022), Modeling streamflow variability at the regional scale: (2) Development of a bespoke distributed conceptual model, *J Hydrol*, 605, 127286, doi: <https://doi.org/10.1016/j.jhydrol.2021.127286>.
- David, P. C., P. L. B. Chaffe, V. B. P. Chagas, M. Dal Molin, D. Y. Oliveira, A. H. F. Klein, and **F. Fenicia** (2022), Correspondence Between Model Structures and Hydrological Signatures: A Large-Sample Case Study Using 508 Brazilian Catchments, *Water Resour Res*, 58(3), e2021WR030619, doi: <https://doi.org/10.1029/2021WR030619>.
- Bacci, M., M. Dal Molin, **F. Fenicia**, P. Reichert, and J. Šukys (2022), Application of stochastic time dependent parameters to improve the characterization of uncertainty in conceptual hydrological models, *J Hydrol*, 612, 128057, doi: <https://doi.org/10.1016/j.jhydrol.2022.128057>.
- Fenicia, F.**, and D. Kavetski (2021), Behind every robust result is a robust method: Perspectives from a case study and publication process in hydrological modelling, *Hydrological Processes*, 35(8), e14266, doi: <https://doi.org/10.1002/hyp.14266>.
- Ammann, L., C. Stamm, **F. Fenicia**, and P. Reichert (2021), Quantifying the Uncertainty of a Conceptual Herbicide Transport Model With Time-Dependent, Stochastic Parameters, *Water Resources Research*, 57(8), e2020WR028311, doi: <https://doi.org/10.1029/2020WR028311>.
- Bouaziz, L. J. E., **F. Fenicia**, . . . M. Hrachowitz (2021), Behind the scenes of streamflow model performance, *Hydrology and Earth System Sciences*, 25(2), 1069-1095, doi: 10.5194/hess-25-1069-2021.
- Dal Molin, M., D. Kavetski, and **F. Fenicia** (2021), SuperflexPy 1.2.0: an open source Python framework for building, testing and improving conceptual hydrological models, *Geosci. Model Dev.*, 2020, 1-39, doi: 10.5194/gmd-2020-409.
- Gharari, S., H. V. Gupta, M. P. Clark, M. Hrachowitz, **F. Fenicia**, P. Matgen, and H. H. G. Savenije (2021), Understanding the Information Content in the Hierarchy of Model Development Decisions: Learning From Data, *Water Resources Research*, 57(6), e2020WR027948, doi: <https://doi.org/10.1029/2020WR027948>.
- Lee, J., F. Ju, A. Maile-Moskowitz, K. Beck, A. Maccagnan, C. S. McArdell, M. Dal Molin, **F. Fenicia**, . . . H. Bürgmann (2021). Unraveling the riverine antibiotic resistome: The downstream fate of anthropogenic inputs. *Water Research*, 197, 117050, doi: <https://doi.org/10.1016/j.watres.2021.117050>.
- McDonnell, J. J., C. Gabrielli, A. Ameli, J. Ekanayake, **F. Fenicia**, J. Freer, . . . R. Woods (2021), The Maimai M8 experimental catchment database: Forty years of process-based research on steep, wet hillslopes, *Hydrological Processes*, 35(5), e14112, doi: <https://doi.org/10.1002/hyp.14112>.
- Reichert, P., L. Ammann, and **F. Fenicia** (2021), Potential and Challenges of Investigating Intrinsic Uncertainty of Hydrological Models With Stochastic, Time-Dependent Parameters, *Water Resources Research*, 57(3), e2020WR028400, doi: <https://doi.org/10.1029/2020WR028400>.
- Hostache, R., D. Rains, K. Mallick, M. Chini, R. Pelich, H. Lievens, **F. Fenicia**, G. Corato, N. E. C. Verhoest, and P. Matgen (2020), Assimilation of Soil Moisture and Ocean Salinity (SMOS) brightness temperature into a large-scale distributed conceptual hydrological model to improve soil moisture predictions: the Murray–Darling basin in Australia as a test case, *Hydrology and Earth System Sciences*, 24(10), 4793-4812, doi: 10.5194/hess-24-4793-2020.

- Ammann, L., T. Doppler, C. Stamm, P. Reichert, and **F. Fenicia** (2020), Characterizing fast herbicide transport in a small agricultural catchment with conceptual models, *Journal of Hydrology*, 586, 124812, doi: <https://doi.org/10.1016/j.jhydrol.2020.124812>.
- Chow, R., R. Scheidegger, T. Doppler, A. Dietzel, **F. Fenicia**, and C. Stamm (2020), A review of long-term pesticide monitoring studies to assess surface water quality trends, *Water Research X*, 9, 100064, doi: <https://doi.org/10.1016/j.wroa.2020.100064>.
- Dal Molin, M., M. Schirmer, M. Zappa, and **F. Fenicia** (2020), Understanding dominant controls on streamflow spatial variability to set up a semi-distributed hydrological model: the case study of the Thur catchment, *Hydrology and Earth System Sciences*, 24(3), 1319-1345, doi: 10.5194/hess-24-1319-2020.
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- Scaini, A., C. Hissler, **F. Fenicia**, J. Juilleret, J. F. Iffly, L. Pfister, and K. Beven (2018), Hillslope response to sprinkling and natural rainfall using velocity and celerity estimates in a slate-bedrock catchment, *Journal of Hydrology*, 558, 366-379, doi: 10.1016/j.jhydrol.2017.12.011.
- Scaini, A., M. Audebert, C. Hissler, **F. Fenicia**, L. Gourdol, L. Pfister, and K. J. Beven (2017), Velocity and celerity dynamics at plot scale inferred from artificial tracing experiments and time-lapse ERT, *Journal of Hydrology*, 546, 28-43, doi: 10.1016/j.jhydrol.2016.12.035.
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- Fenicia, F.**, D. Kavetski, H. H. G. Savenije, and L. Pfister (2016), From spatially variable streamflow to distributed hydrological models: Analysis of key modeling decisions, *Water Resources Research*, 52(2), 954-989, doi: 10.1002/2015WR017398.
- Gao, H. K., M. Hrachowitz, N. Sriwongsitanon, **F. Fenicia**, S. Gharari, and H. H. G. Savenije (2016), Accounting for the influence of vegetation and landscape improves model transferability in a tropical savannah region, *Water Resources Research*, 52(10), 7999-8022, doi: 10.1002/2016WR019574.
- Ley, R., H. Hellebrand, M. C. Casper, and **F. Fenicia** (2016), Comparing classical performance measures with signature indices derived from flow duration curves to assess model structures as tools for catchment classification, *Hydrology Research*, 47(1), 1-14, doi: 10.2166/nh.2015.221.
- Wrede, S., **F. Fenicia**, N. Martínez-Carreras, J. Juilleret, C. Hissler, A. Krein, H. H. G. Savenije, S. Uhlenbrook, D. Kavetski, and L. Pfister (2015), Towards more systematic perceptual model development: a case study using 3 Luxembourgish catchments, *Hydrological Processes*, 29(12), 2731-2750, doi: 10.1002/hyp.10393.
- Fenicia, F.**, D. Kavetski, H. H. G. Savenije, M. P. Clark, G. Schoups, L. Pfister, and J. Freer (2014), Catchment properties, function, and conceptual model representation: is there a correspondence?, *Hydrological Processes*, 28(4), 2451-2467.
- Gao, H., M. Hrachowitz, **F. Fenicia**, S. Gharari, and H. H. G. Savenije (2014), Testing the realism of a topography-driven model (FLEX-Topo) in the nested catchments of the Upper Heihe, China, *Hydrology and Earth System Sciences*, 18(5), 1895-1915.
- Gao, H., M. Hrachowitz, S. J. Schymanski, **F. Fenicia**, N. Sriwongsitanon, and H. H. G. Savenije (2014), Climate controls how ecosystems size the root zone storage capacity at catchment scale, *Geophysical Research Letters*, 41(22), 2014GL061668.
- Gharari, S., M. Hrachowitz, **F. Fenicia**, H. Gao, and H. H. G. Savenije (2014), Using expert knowledge to increase realism in environmental system models can dramatically reduce the need for calibration, *Hydrology and Earth System Sciences*, 18(12), 4839-4859.

- Gharari, S., M. Shafiei, M. Hrachowitz, R. Kumar, **F. Fenicia**, H. V. Gupta, and H. H. G. Savenije (2014), A constraint-based search algorithm for parameter identification of environmental models, *Hydrol. Earth Syst. Sci.*, 18(12), 4861-4870.
- Euser, T., H. C. Winsemius, M. Hrachowitz, **F. Fenicia**, S. Uhlenbrook, and H. H. G. Savenije (2013), A framework to assess the realism of model structures using hydrological signatures, *Hydrology and Earth System Sciences*, 17(5), 1893-1912.
- Gharari, S., M. Hrachowitz, **F. Fenicia**, and H. H. G. Savenije (2013), An approach to identify time consistent model parameters: sub-period calibration, *Hydrology and Earth System Sciences*, 17(1), 149-161.
- Hrachowitz, M., et al. (2013), A decade of Predictions in Ungauged Basins (PUB), a review, *Hydrological Sciences Journal-Journal Des Sciences Hydrologiques*, 58(6), 1198-1255.
- Kayastha, N., J. Ye, **F. Fenicia**, V. Kuzmin, and D. P. Solomatine (2013), Fuzzy committees of specialized rainfall-runoff models: further enhancements and tests, *Hydrology and Earth System Sciences*, 17(11), 4441-4451.
- van Esse, W. R., C. Perrin, M. J. Booij, D. C. M. Augustijn, **F. Fenicia**, D. Kavetski, and F. Lobligeois (2013), The influence of conceptual model structure on model performance: a comparative study for 237 French catchments, *Hydrology and Earth System Sciences*, 17(10), 4227-4239.
- Clark, M. P., D. Kavetski, and **F. Fenicia** (2012), Reply to comment by K. Beven et al. on "Pursuing the method of multiple working hypotheses for hydrological modeling", *Water Resources Research*, 48, W11802.
- Fenicia, F.**, L. Pfister, D. Kavetski, P. Matgen, J. F. Iffly, L. Hoffmann, and R. Uijlenhoet (2012), Microwave links for rainfall estimation in an urban environment: Insights from an experimental setup in Luxembourg-City, *Journal of Hydrology*, 464, 69-78.
- Matgen, P., **F. Fenicia**, S. Heitz, D. Plaza, R. de Keyser, V. R. N. Pauwels, W. Wagner, and H. Savenije (2012), Can ASCAT-derived soil wetness indices reduce predictive uncertainty in well-gauged areas? A comparison with in situ observed soil moisture in an assimilation application, *Advances in Water Resources*, 44, 49-65.
- Clark, M. P., D. Kavetski, and **F. Fenicia** (2011), Pursuing the method of multiple working hypotheses for hydrological modeling, *Water Resources Research*, 47(9), W09301, DOI 10.1029/2010wr009827.
- Fenicia, F.**, D. Kavetski, and H. H. G. Savenije (2011), Elements of a flexible approach for conceptual hydrological modeling: 1. Motivation and theoretical development, *Water Resources Research*, 47(11), W11510.
- Kavetski, D., and **F. Fenicia** (2011), Elements of a flexible approach for conceptual hydrological modeling: 2. Application and experimental insights, *Water Resources Research*, 47(11), W11511.
- Gharari, S., M. Hrachowitz, **F. Fenicia**, and H. H. G. Savenije (2011), Hydrological landscape classification: investigating the performance of HAND based landscape classifications in a central European meso-scale catchment, *Hydrology and Earth System Sciences*, 15(11), 3275-3291.
- Hellebrand, H., C. Muller, P. Matgen, **F. Fenicia**, and H. Savenije (2011), A process proof test for model concepts: Modelling the meso-scale, *Physics and Chemistry of the Earth*, 36(1-4), 42-53.
- Kavetski, D., **F. Fenicia**, and M. P. Clark (2011), Impact of temporal data resolution on parameter inference and model identification in conceptual hydrological modeling: Insights from an experimental catchment, *Water Resources Research*, 47(5), W05501.
- Fenicia, F.**, S. Wrede, D. Kavetski, L. Pfister, L. Hoffmann, H. H. G. Savenije, and J. J. McDonnell (2010), Assessing the impact of mixing assumptions on the estimation of streamwater mean residence time, *Hydrological Processes*, 24(12).
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- Pfister, L., J. J. McDonnell, S. Wrede, D. Hlubikova, P. Matgen, **F. Fenicia**, L. Ector, and L. Hoffmann (2009), The rivers are alive: on the potential for diatoms as a tracer of water source and hydrological connectivity, *Hydrological Processes*, 23(19), 2841-2845.

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- Fenicia, F.**, H. H. G. Savenije, and H. C. Winsemius (2008), Moving from model calibration towards process understanding, *Physics and Chemistry of the Earth*, 33(17-18), 1057-1060.
- Fenicia, F.**, H. H. G. Savenije, P. Matgen, and L. Pfister (2008), Understanding catchment behavior through stepwise model concept improvement, *Water Resources Research*, 44(1), W01402.
- Fenicia, F.**, H. H. G. Savenije, P. Matgen, and L. Pfister (2007), A comparison of alternative multiobjective calibration strategies for hydrological modeling, *Water Resources Research*, 43(3), W03434.
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- Fenicia, F.**, H. H. G. Savenije, P. Matgen, and L. Pfister (2006), Is the groundwater reservoir linear? Learning from data in hydrological modelling, *Hydrology and Earth System Sciences*, 10(1), 139-150.
- Fenicia, F.**, G. P. Zhang, T. Rientjes, L. Hoffmann, L. Pfister, and H. H. G. Savenije (2005), Numerical simulations of runoff generation with surface water-groundwater interactions in the Alzette river alluvial plain (Luxembourg), *Physics and Chemistry of the Earth*, 30(4-5), 277-284.
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- Zhang, G. P., **F. Fenicia**, T. H. M. Rientjes, P. Reggiani, and H. H. G. Savenije (2005), Modeling runoff generation in the Geer river basin with improved model parameterizations to the REW approach, *Physics and Chemistry of the Earth*, 30(4-5), 285-296.

Books

- Pfister, L., **F. Fenicia**, H. H. G. Savenije (2009), Leonardo Da Vinci's Water Theory: On the origin and fate of water, International Association of Hydrological Sciences (IAHS), ISBN 978-1-901502-34-3.