Fanny Sarrazin – Research Scientist at INRAE

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EDUCATION

2014–2018 **PhD in Water and Environmental Engineering**
Department of Civil Engineering, University of Bristol, UK
- *Understanding the sensitivity of karst groundwater recharge to climate and land cover changes at a large-scale*
- *Advisors: Prof. Dr. Thorsten Wagener, Dr. Francesca Pianosi*
- *Price for outstanding doctoral thesis 2018/19 in the Faculty of Engineering*

2011–2013 **MSc in Environmental and Land Planning Engineering ("Laurea Magistrale")**
Politecnico di Milano, Milano, Italy (Double degree programme with Ecole Centrale de Lyon)

2009–2014 **MSc in General Engineering ("Diplôme d'ingénieur généraliste")**
Ecole Centrale de Lyon, France

2007–2009 2-year programme to prepare for national competitive examinations to enter a "Grande Ecole" of Engineering ("Classe préparatoire MPSI-MP")
Lycée Champollion, Grenoble, France

EMPLOYMENT

2024–now **Research Scientist ("Chargée de recherche")**
HYCAR Research Unit, INRAE, Antony, France
- *Water resources and water use modelling, Climate adaptation*

2019–2023 (5 years) **Postdoctoral Researcher**
Department of Computational Hydrosystems, UFZ, Leipzig, Germany
- *Water quality (nutrient) modelling, Nutrient point and diffuse sources estimation*
- *Colleagues: Dr. Rohini Kumar, Prof. Dr. Sabine Attinger*

2018 (4 months) **Postdoctoral Researcher**
Department of Civil Engineering, University of Bristol, UK
- *Sensitivity analysis, Software development*
- *Colleagues: Prof. Dr. Thorsten Wagener, Dr. Francesca Pianosi*

ACADEMIC VISITS

2019 1-month visit at the University of Waterloo, Canada.
2016 1-month visit at the Chair of Hydrology, University of Freiburg, Germany

SUPERVISION

2025–now **PhD student (co-advisor)**, Matteo Rosales, *Modelling "natural" hydrology across Europe to support hydropower generation*

2024–now **PhD student (main advisor)**, Jules Michard, *Irrigation impact on streamflow across France*

2020–now **PhD student (co-advisor)**, Masooma Batool, *Long-term spatio-temporal patterns of nutrient surpluses and their sustainable management in European agriculture*

2025 **Master thesis**, Julia Dos Santos Da Silva, *Reservoir impact on flow regimes in catchments across France*

2022 **Master thesis**, Paromita Sarker, *Exploring the annual nitrogen load in point sources from wastewater in Europe from 1950–2019*

2020–2023 **Research assistants** *for the collection and processing of agricultural data*

2016–2024 **Internships**: Dimitri Rambourg (2016), Niklas Abele (2022), Thierno Demba Ndao (2024)

TEACHING

Sensitivity Analysis for modelling (course including theory and hands-on session)

2025	PhD students, engineers, scientists, 1-day course, HYCAR, INRAE
2022	Master students, 4.5-hour course, University of Dresden
2022	PhD students and scientists, 3-hour course, University of Cordoba
2021, 2022	PhD students and scientists, 1-day course, UFZ
2021	Short course, EGU 2021 (only theory)
2019	PhD students, 3-hour course, University of Freiburg

SERVICE

2022–2025	**Editorial board member** of Environmental Modelling & Software (handling of manuscripts: reviewer invitations, recommendation on the decision to the editor)
2022–2025	**Co-convener** of session on *Large-scale groundwater* at EGU
2016–now	Completion of more than **60 reviews** for 18 international scientific journals

CONTRIBUTION TO DATASET AND SOFTWARE

2025	Model to estimate nitrogen and phosphorus point sources from wastewater https://github.com/fannysarrazin/NP_point_sources_model
2018	Parsimonious integrated vegetation–recharge model for karst areas (V2Karst) https://github.com/fannysarrazin/V2Karst_model
2015–now	Package for sensitivity analysis in Matlab and Python (SAFE) https://safetoolbox.github.io/, https://github.com/SAFEtoolbox
2024	Dataset of gridded phosphorus diffuse sources (surplus) in Europe (1850–2019) https://doi.org/10.5281/zenodo.11351027
2023	Dataset of gridded nitrogen and phosphorus point sources in Germany (1950–2019) https://doi.org/10.5281/zenodo.10500535
2022	Dataset of gridded phosphorus diffuse sources (surplus) in Europe (1850–2019) https://doi.org/10.5281/zenodo.6581441

SELECTED PRESENTATIONS

OZCAR TERENO conference, Paris, France: 2025 (poster)

Nitrogen Workshop, Madrid, Spain: 2022 (oral)

Eurokarst, Neuchâtel, Switzerland: 2016 (oral)

European Geosciences Union General Assembly: 2015-2025 (poster/oral, highlighted oral in 2022)

American Geophysical Union Fall meeting: 2014, 2015, 2016, 2020 (poster)

PUBLICATIONS

Journal articles (peer reviewed)

1. Batool, M., **Sarrazin F. J.,** Musolff, M., Nguyen, T. V., Zhang, X., Attinger, S., Kumar R (2025). Scenario analysis of nitrogen surplus typologies in Europe shows that a 20% fertilizer reduction may fall short of 2030 EU Green Deal goals, *Nat. Food,* 6, 787–798, https://doi.org/10.1038/s43016-025-01210-2
2. Batool, M., **Sarrazin, F. J.**, Kumar, R. (2025). Century Long Reconstruction of Gridded Phosphorus Surplus Across Europe (1850–2019), *Earth Syst. Sci. Data*, 17, 881–916, https://doi.org/10.5194/essd-17-881-2025
3. **Sarrazin, F. J.**, Attinger, S., Kumar, R. (2024). Gridded dataset of nitrogen and phosphorus point sources from wastewater in Germany (1950–2019). *Earth Syst. Sci. Data,* 16 (10), 4673-4708, https://doi.org/10.5194/essd-16-4673-2024
4. Page, T., Smith, P., Beven, K., Pianosi, F., **Sarrazin, F. J.**, Almeida, S., Holcombe, L., Freer, J., Chappell, N., Wagener, T. (2023). Technical note: The CREDIBLE Uncertainty Estimation (CURE) toolbox: facilitating the communication of epistemic uncertainty. *Hydrol. Earth Syst. Sci.,* 27 (13), 2523-2534, https://doi.org/10.5194/hess-27-2523-2023

5. Ebeling, P., Kumar, R., Lutz, S. R., Nguyen, T., **Sarrazin, F. J.**, Weber, M., Büttner, O., Attinger, S., Musolff, A. (2022). QUADICA: water QUAlity, DIscharge and Catchment Attributes for large-sample studies in Germany. *Earth Syst. Sci. Data,* 14 (8), 3715-3741, https://doi.org/10.5194/essd-14-3715-2022
6. Batool, M., **Sarrazin, F. J.**, Attinger, S., Basu, N., B., Van Meter, K. J., Kumar, R. (2022). Long-term annual soil nitrogen surplus across Europe (1850–2019). *Sci. Data,* 9 (1), 612, https://doi.org/10.1038/s41597-022-01693-9
7. Nguyen, T. V., Kumar, R., Musolff, A., Lutz, S. R., **Sarrazin, F. J.**, Attinger, S., Fleckenstein, J. H. (2022). Disparate Seasonal Nitrate Export From Nested Heterogeneous Subcatchments Revealed With StorAge Selection Functions. *Water Resour. Res.,* 58 (3), https://doi.org/10.1029/2021WR030797
8. Lutz, S. R., Ebeling, P., Musolff, A., Nguyen, T. V., **Sarrazin, F. J.**, Van Meter, K. J., Basu, N. B., Fleckenstein, J. H., Attinger, S., Kumar, R. (2022). Pulling the rabbit out of the hat: Unravelling hidden nitrogen legacies in catchment-scale water quality models. *Hydrol. Process.,* 36 (10), https://doi.org/10.1002/hyp.14682
9. Nguyen, T. V., Dietrich, J., Dang, T. D., Tran, D. A., Doan, B. V., **Sarrazin, F. J.**, Abbaspour, K., Srinivasan, R. (2022). An interactive graphical interface tool for parameter calibration, sensitivity analysis, uncertainty analysis, and visualization for the Soil and Water Assessment Tool. *Environ. Model. Softw.,* 156, 105497, https://doi.org/10.1016/j.envsoft.2022.105497
10. Nguyen, T. V., **Sarrazin, F. J.**, Ebeling, P., Musolff, A., Fleckenstein, J. H., Kumar, R. (2022). Toward Understanding of Long-Term Nitrogen Transport and Retention Dynamics Across German Catchments. *Geophys. Res. Lett.,* 49 (24), https://doi.org/10.1029/2022GL100278
11. **Sarrazin, F. J.**, Kumar, R., Basu, N. B., Musolff, A., Weber, M., Van Meter, K. J., Attinger, S. (2022). Characterizing Catchment-Scale Nitrogen Legacies and Constraining Their Uncertainties. *Water Resour. Res.,* 58 (4), https://doi.org/10.1029/2021WR031587
12. Dehaspe, J., **Sarrazin, F. J.**, Kumar, R., Fleckenstein, J. H., Musolff, A. (2021). Bending of the concentration discharge relationship can inform about in-stream nitrate removal. *Hydrol. Earth Syst. Sci.,* 25 (12), 6437-6463, https://doi.org/10.5194/hess-25-6437-2021
13. Kumar, R., Heße, F., Suresh P., Rao, C., Musolff, A., Jawitz, J. W., **Sarrazin, F. J.**, Samaniego, L., Fleckenstein, J. H., Rakovec, O., Thober, S., Attinger, S. (2020). Strong hydroclimatic controls on vulnerability to subsurface nitrate contamination across Europe. *Nat. Com.,* 11 (1), 6302, https://doi.org/10.1038/s41467-020-19955-8
14. Pianosi, F., **Sarrazin, F. J.**, Wagener, T. (2020). How successfully is open-source research software adopted? Results and implications of surveying the users of a sensitivity analysis toolbox. *Environ. Model. Softw.* 124, 104579, https://doi.org/10.1016/j.envsoft.2019.104579
15. Noacco, V., **Sarrazin, F. J.**, Pianosi, F., Wagener T. (2019). Matlab/R workflows to assess critical choices in Global Sensitivity Analysis using the SAFE toolbox. *MethodsX,* 6, 2258-2280, https://doi.org/10.1016/j.mex.2019.09.033
16. **Sarrazin, F. J.**, Hartmann, A., Pianosi, F., Rosolem, R., Wagener T. (2018). V2Karst V1.1: a parsimonious large-scale integrated vegetation–recharge model to simulate the impact of climate and land cover change in karst regions. Geosci. Model Dev., 11 (12), 4933-4964, https://doi.org/10.5194/gmd-11-4933-2018
17. Khorashadi Zadeh, F., Nossent, J., **Sarrazin, F. J.**, Pianosi, F., van Griensven, A., Wagener, T., Bauwens W. (2017). Comparison of variance-based and moment-independent global sensitivity analysis approaches by application to the SWAT model. *Environ. Model. Softw.,* 91, 210-222, https://doi.org/10.1016/j.envsoft.2017.02.001
18. **Sarrazin, F. J.**, Pianosi, F., Wagener, T. (2016). Global Sensitivity Analysis of environmental models: Convergence and validation. *Environ. Model. Softw.,* 79, 135-152, https://doi.org/10.1016/j.envsoft.2016.02.005
19. Pianosi, F., **Sarrazin, F. J.**, Wagener, T. (2015). A Matlab toolbox for Global Sensitivity Analysis. *Environ. Model. Softw.,* 70, 80-85, https://doi.org/10.1016/j.envsoft.2015.04.009

Book chapter

1. **Sarrazin, F. J.**, Pianosi, F., Wagener, T. (2017). An Introduction to the SAFE Matlab Toolbox With Practical Examples and Guidelines. In: Sensitivity Analysis in Earth Observation Modelling. Elsevier, 363-378, https://doi.org/10.1016/B978-0-12-803011-0.00018-5