

PD Dr. Elisabeth Marie-Louise Janssen

Research Group Leader | DEPARTMENT OF ENVIRONMENTAL CHEMISTRY

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Research Focus: Environmental Chemistry and Effects of Biomolecules

- Natural Toxins, Peptide-based Pharmaceuticals, Extracellular Enzymes
- Environmental fate processes, Photochemistry, Oxidative and Enzymatic Transformations
- Mass Spectrometry, Site-Specific Molecular Damage, reference data(base) curation

Current appointments

Deputy Head of Department of Environmental Chemistry, Eawag (CH)	04/2023-present
Research Group Leader in Dept. of Environmental Chemistry, Eawag (CH)	07/2016-present
Lecturer in Dept. of Environmental Systems Science, ETH Zürich (CH)	02/2012-present
Board Member of Water Chemistry Division of the German Chemistry Society (GDCh)	2023-present
Editorial Advisory Board Member for Environmental Science & Technology	2021-present
Vice president of the Swiss Society of Mass Spectrometry (SGMS)	2020-present

Past appointments

Senior Scientist	Environmental Chemistry, ETH Zürich (CH)	2014-2016
Postdoctoral Associate	Dept. of Environmental Systems Science, ETH Zürich (CH)	2012-2014
Postdoctoral Associate	Dept. of Civil & Env. Engineering, Stanford University (USA, CA) and Natural History Museum London (UK)	2011

Education

P.D.	Private docent, ETH, Dept. Environmental Systems Sciences Habilitation Thesis: Environmental Chemistry of Biomolecules	08/2022
Ph.D.	Environmental Science and Engineering Dept. of Civil & Environmental Engineering, Stanford University (USA, CA) Thesis Title: <i>Measurement and modeling of polychlorinated biphenyl availability from contaminated sediment and evaluation of ecosystem recovery.</i> Advisor: Prof. R.G. Luthy.	2007-2010
M.Sc.	Environmental Science and Engineering , Stanford University (USA, CA)	2006-2007
B.Sc.	Water Sciences: Chemistry, Analytics, & Microbiology Universität Duisburg-Essen (Germany)	2002-2005

Project Management and Research Grants

2024-2028	SNF IZCCZ0-223136/1 Role: Co-PI Relational accountability	243'756 CHF
2023-2025	InnoSuisse Role: Co-PI Cyanotoxin BioSensor technology development	206'831 CHF
2021-2026	SNF Sinergia CRSII5_202290 Role: Co-PI Eawag, University Fribourg <i>Why do toxic cyanobacteria bloom? – A gene to ecosystem approach.</i>	1'781'682 CHF
2022-2025	Research Grant WVZ & Eawag funding CyanO ₃ Role: Co-PI <i>Cyanopeptides during water treatment with ozone</i>	510'900 CHF
2021-2026	Blue-Green-Biodiversity ETH Board CyanoLichen Role: Co-PI with WSL <i>Blue-Green Cyanobacteria: Diversity, Toxins and alpine Tourism.</i>	480'000 CHF
2022-2023	LéXPLORE Grant CyanoSense Role: collaborator <i>Remote sensing and risk assessment of toxic cyanobacteria in Lake Geneva.</i>	40'000 CHF
2021-2022	LéXPLORE Grant CyanoFun Role: collaborator <i>Diversity, functioning & toxin production of cyanobacteria in Lake Geneva.</i>	30'000 CHF
2019-2021	Discretionary Fund by Eawag Natural Toxins Role: PI <i>Analytical methods and occurrence of cyanopeptides beyond microcystins.</i>	248'000 CHF
2017-2020	Marie Skłodowska-Curie Actions EU ITN #722493 Role: Co-PI <i>Natural Toxins and Drinking Water Quality: From Source to Tap. (NaToxAq)</i>	325'000 EUR

2015-2019	Swiss National Science Foundation SNSF #200020-159809 <i>Environmental photochemistry of amino acid-based biomolecules.</i> Role: Co-PI with K. McNeill (ETH), advisor for 1 of 2 PhD students	571'739 CHF
2015-2019	Swiss National Science Foundation SNSF #200021-15198 <i>Electron transfer properties of photoexcited natural organic matter.</i> Role: Collaborator with K. McNeill (ETH), advisor for 1 of 2 PhD students	524'692 CHF

Teaching and Supervision

Ecotoxicology	ETH Zürich (CH), M.Sc., 24hrs, No. 701-1312-00	2013-present
Environmental Chemistry	Univ. Zürich (CH), B.Sc., 2hrs, No CHE 104	2018-2021
Environmental Organic Chemistry	ETH Zürich (CH), M.Sc., 8hrs, No 701-1314-00	2017
Env. Organic Chemistry	ETH Zürich (CH), B.Sc., 18hrs	2014
Chemistry II Tutorial	ETH Zürich (CH), B.Sc., 10hrs	2014

Doctoral student (* indicating students who already graduated successfully)

Larissa Passos	<i>Toxicity in Zebrafish of cyano-metabolites (visiting from USP, Brazil)</i>	2024-2025
Juliana Oliveira	<i>Lichenomics – cyanobacterial toxins of lichen in the Alps</i>	2022-2026
Xuejian Wang	<i>Toxins and bioactive metabolites that define CyanoHABs</i>	2022-2026
Antonella Migliore	<i>LCMS suspect screening of Cyanotoxins (visiting from Uni. Naples, IT)</i>	2023
Mariana Torres*	<i>Toxicity in Zebrafish of cyano-metabolites (co-advisor, USP, Brazil)</i>	2021-2023
Regiane S. Natumi*	<i>Production dynamics and fate processes of cyanobacterial peptides</i>	2017-2021
Daria Filatova*	<i>Natural Toxins across climate gradients (co-advisor, Univ. Barcelona)</i>	2019-2021
Christine M. Egli*	<i>Assessing the stability of aquatic extracellular enzymes</i>	2015-2019
Caroline A. Davis*	<i>Photochemical oxidation mechanisms of selected drugs</i>	2015-2019

Postdoctoral Researcher and Senior Scientists

Dr. Oliver Brandenberg	<i>Toxin-sensor based on Aptamer/CRISPRs technology</i>	2022-2025
Dr. Valentin Rougé	<i>CyanO₃: Advanced treatment of emerging cyanotoxins</i>	2022-2025
Dr. Francesca Pittino	<i>Genetic diversity of cyanobacterial lichen in the Alps</i>	2021-2023
Dr. Chris Sarnowski	<i>Site-Specific damage in oxygenases (co-PI)</i>	2021-2022
Dr. Martin Jones	<i>Analytical methods in cyanobacterial metabolomics</i>	2019-2021

Scientific Research staff

Daniela Martens	<i>Mobilization of Cyanotoxins from Lichen in Alps</i>	2024
Anne Dax	<i>CyanO₃: Advanced treatment of emerging cyanotoxins</i>	2022-2024
Simon Wullschleger	<i>Toxins and bioactive metabolites that define CyanoHABs</i>	2022-2024

M.Sc. and B.Sc. thesis student

Tobias Duft	M.Sc.	Cyanotoxins and their mobilization from Lichen in Swiss Alps	2024
Anita Lopes	M.Sc.	Transformation product pathways of emerging cyanopeptides	2024
Andrea Ingold	M.Sc.	Biotransformation of cyanopeptides	2023
Christoph Diezinger	B.Sc.	Reaction kinetics of cyanopeptides (*publication #28)	2020
Elizabeth Kitching	M.Sc.	<i>Analysis of abiotic transformation of micropollutants (co-advised)</i>	2019
Julian Bosshard	M.Sc.	<i>Cyanobacterial metabolites in Swiss surface waters</i>	2019
Sandro Marcotullio	M.Sc.	<i>Phototransformation of natural toxins (*publication #24)</i>	2019
Simon Wullschleger	M.Sc.	<i>Tracing site-specific modifications in extracellular enzymes</i>	2018
Judith Riedo	M.Sc.	<i>Biodegradability of veterinary antibiotics in surface waters</i>	2017
Anne Dax	M.Sc.	<i>Photochemical Stability of veterinary antibiotics in surface waters</i>	2017
Evelyne Vonwyl	M.Sc.	<i>Production, Identification and Stability of Cyanotoxins</i>	2017
Alexandra Büchler	M.Sc.	<i>Environmental photoinactivation kinetics of extracellular glucosidase</i>	2016
Ladina Birolini	B.Sc.	<i>Photochemical transformation of anti-inflammatory drugs</i>	2016
Evelyn Mühlhofer	B.Sc.	<i>Photochemical decay of veterinary drugs in aquaculture waters</i>	2015
Remo Röthlin	B.Sc.	<i>Photochemical reactivity of Diphenylamines</i>	2015
Joanna Houska	B.Sc.	<i>Envi. photoinactivation kinetics of extracellular aminopeptidase</i>	2015
Emily Marron	M.Sc.	<i>Photochemical degradation of pollutants (*publication #13)</i>	2014
Hannah Bruderer	B.Sc.	<i>Influence of UVB light and humic acids on alk. phosphatase activity</i>	2012

Jaqueline Augusiak M.Sc. Polychlorinated Biphenyl accumulation in benthic invertebrates 2008

Awards and Scholarships

Young Investigator Recognition by Environmental Science & Technology, Virtual issue 2019
Outstanding Reviewer for Environmental Science: Processes & Impacts 2017
Best Poster Award: Gordon Research Conference: Water 2014
Best Poster Award: SedNet Conference, Hamburg 2009
Fellowship for Graduate Studies, Stanford University 2006-2007
DAAD Scholarship and Henkel (KGaA) Bachelor Award and for B.Sc. Thesis 2005

Services

Regular peer-Reviewer: Environmental Science and Technology (Letters), Water Research, Environment Science Processes and Impacts, Hazmat, STOTEN, PlosOne, mSystems etc.

Evaluator for doctoral dissertation: Sahar Naim, ETH Zurich, Switzerland (2024) – Sarah Partanen, ETH Zurich, Switzerland (2022) – Massimo Picardo, University Barcelona, Spain (2021) – Libor Jaša, Masaryk University, Czech Republic (2020) – Yi Cai, Aarhus University, Denmark (2019)

Evaluator for Tenure Track academic position: The Czech Academy of Science (2023)

Research Proposal Reviewer: Czech Science Foundation (2021) – AquaticPollutants Joint Transnational Call Europe (2020/2021) – Natural Sciences and Engineering Research Council of Canada (2021/2022)

List of Publications

*Corresponding authors are indicated with *. Researchers advised by Elisabeth Janssen are underlined.*

Articles to be submitted in the next 2 months (complete drafts available upon request)

39. Juliana Oliveira, Francesca Pittino, Sabine Fink, Christoph Scheidegger, Elisabeth Janssen*. Genetic and metabolic diversity of cyanobacteria on rock-water interface in Alpine mountains. **2024, to be submitted to Environmental Science and Technology.**

Articles under review or revision (complete drafts available upon request)

38. Till Steiner, Franziska Schanbacher, Wolfram Lorenzen, Heike Enke, Elisabeth M.-L. Janssen, Timo H.J. Niedermeyer, Karl Gademann. UV-Vis Absorbance spectra, molar extinction coefficients and circular dichroism spectra for the two cyanobacterial metabolites Anabaenopeptin A and Anabaenopeptin B, **2024, in review.**
37. Xuejian Wang, Simon Wullschleger, Martin Jones, Francesco Pomati, Elisabeth Janssen*. Tracking cyanotoxins in five-year lake survey and identifying specific indicator metabolites of cyanobacterial taxa. **2024, in review.**
36. Franecsca Pittino, Sabine Fink, Juliana Oliveira, Elisabeth M.-L. Janssen, Christoph Scheidegger*. Lithic bacterial communities: ecological aspects focusing on *Tintenstrich* communities. **2024, in review.**

Peer-reviewed Journal Articles

35. Valentin Rouge, Urs von Gunten*, Elisabeth M.-L. Janssen*. Reactivity of cyanobacteria metabolites with ozone: Multi-compound competition kinetics. *Environmental Science and Technology*, **2024, open access.** <https://doi.org/10.1021/acs.est.4c02242>
34. Mariana de Almeida Torres, Anne Dax, Ingrid Grand, Colette vom Berg, Ernani Pinto, Elisabeth M.-L. Janssen*. Lethal and behavioral effects of microcystins, micropeptin and apolar compounds from cyanobacteria on freshwater microcrustacean *Thamnocephalus platyurus*. *Aquatic Toxicology*, Vol. 273, 106983, **2024, open access.** <https://doi.org/10.1016/j.aquatox.2024.106983>
33. Janssen, Elisabeth M.-L., Jones, Martin R., Pinto, Ernani, Torres, Mariana, Dörr, Fabiane, Rios Jacinavicius, Fernanda, Mazur-Marzec, Hanna, Szubert, Kaarina, Konkel, Robert, Tartaglione, Luciana, Dell'Aversano, Carmen, Miglione, Antonella, Beach, Daniel G., McCarron, Pearce, Miles, Christopher O., Sivonen, Kaarina, Fewer, David P., Jokela, Jouni, Wahlsten, Matti, Niedermeyer, Timo H.J., Schanbacher, Franziska, Leão, Pedro, Preto, Marco, D'Agostino, Paul M., Baunach, Martin, Dittmann,

- Elke, Reher, Raphael, CyanoMetDB - Comprehensive database of secondary metabolites from cyanobacteria. Dataset Version02, Zenodo deposition S75, May 2023, <https://doi.org/10.5281/zenodo.7922070>
32. Mariana de Almeida Torres, Martin R. Jones, Colette vom Berg, Ernani Pinto, Elisabeth M.-L. Janssen*. Lethal and sublethal effects towards zebrafish larvae of microcystins and other cyanopeptides produced by cyanobacteria. *Aquatic Toxicology*, Vol. 263, 106689, 2023, <https://doi.org/10.1016/j.aquatox.2023.106689>. OPEN ACCESS.
 31. Carolin Seller, Laura Varga, Elizabeth Börgardts, Bernadette Vogler, Elisabeth Janssen, Heinz Singer, Kathrin Fenner*, Mark Honti. Do biotransformation data from laboratory experiments reflect micropollutant degradation in a large river basin? *Water Research* (235) pp. 119908, 2023, **open access**. <https://doi.org/10.1016/j.watres.2023.119908>
 30. Francesca Pittino, Juliana Oliveira, Mariana DeAlmeida Torres, Sabine Fink, Elisabeth M.L. Janssen, Christoph Scheidegger*. Cyanobacteria: Extreme Environments and Toxic Metabolites. , *CHIMIA*, 76, pp. 967–969, 2022, **open access**. <https://doi.org/10.2533/chimia.2022.967>
 29. Jones M. R., Janssen E.M.-L.* Quantification of multi-class cyanopeptides in Swiss lakes with automated extraction, enrichment and analysis by online-SPE HPLC-HRMS/MS. *CHIMIA*, 76, No 1/2, 2022, **open access**. <https://doi.org/10.2533/chimia.2022.1>
 28. Natumi R.S., Dieziger Chr., Janssen E.M.-L.* Cyanobacterial toxins and cyanopeptide transformation kinetics by singlet oxygen and pH-dependence in sunlit surface waters. *Environmental Science and Technology*, 55(22), pp. 15196–15205, 2021, **open access**. <https://doi.org/10.1021/acs.est.1c04194>
 27. van Santen J. A., Poynto E., Iskakova D., McMann E., Alsup T., Clark T., Fergusson C., Fewer D., Hughes, A., McCadden C., Parra Villalobos J., Soldatou S., Rudolf J, Janssen E.M.-L., Duncan K., Lington R.* The Natural Products Atlas 2.0: a database of microbially-derived natural products. *Nucleic Acid Research*, *gkab941*, 2021, **open access**. <https://doi.org/10.1093/nar/gkab941>
 26. Jones M. R., Pinto E., Torres M. A., Dörr F., Mazur-Marzec H., Szubert K., Tartaglione L., Dell'Aversano C., Miles Ch. O., Beach D. G., McCarron P., Sivonen K., Fewer D. P., Jokela J., Janssen E. M.-L.* CyanoMetDB, a comprehensive database of secondary metabolites from cyanobacteria. *Water Research* (196) 117017. 2021, **open access**. <https://doi.org/10.1016/j.watres.2021.117017>
 25. Filatova D., Jones M. R., Haley J., Núñez O., Farré M., Janssen E.M.-L.* Cyanobacteria and their secondary metabolites in three freshwater reservoirs in the United Kingdom. *Environmental Sciences Europe*, 33 (29), 2021, **open access**. <https://doi.org/10.1186/s12302-021-00472-4>
 24. Natumi R.S., Marcotullio S., Janssen E.M.-L.* Phototransformation kinetics of cyanobacterial toxins and secondary metabolites in surface waters. *Environmental Sciences Europe* 33(26), 2021, **open access**. <https://doi.org/10.1186/s12302-021-00465-3>
 23. Egli C.M., Stravs M.A., Janssen E.M.-L.* Inactivation and site-specific oxidation of aquatic extracellular enzymes by singlet oxygen. *Environmental Science and Technology*, 54(22), pp. 14403-14412, 2020. <https://doi.org/10.1021/acs.est.0c04696>.
 22. Kiefer K., Bader T., Minas N., Sahli E., Wiget R., Janssen E.M.-L., von Gunten U., Hollender J.* Chlorothalonil Transformation Products in Drinking Water Resources: Widespread and Challenging to abate. *Water Research*, 183, pp. 116066, 2020. <https://doi.org/10.1016/j.watres.2020.116066>
 21. Natumi R.S., Jones M., Janssen E.M.-L.* Production dynamics of cyanobacterial peptides by *Microcystis aeruginosa* and *Dolichospermum flos-aquae*. *Environmental Science and Technology*, 54(19), pp. 6063-6072, 2020, **open access**. <https://doi.org/10.1021/acs.est.9b07334>
 20. Egli C.M., Natumi R.S., Jones M., Janssen E.M.-L.* Inhibition of aquatic extracellular enzymes by cyanobacterial metabolites. *CHIMIA* 74(3), pp. 122-128, 2020 **open access**. <https://doi.org/10.2533/chimia.2020.122>
 19. Davis C.A. and Janssen E.M.-L.* Environmental Fate Processes of Antimicrobial Peptides Daptomycin, Bacitracin, and Polymyxins. *Environment International*, 134, 2020, **open access**. <https://doi.org/10.1016/j.envint.2019.105271>
 18. Janssen E. M.-L.* Cyanobacterial Peptides beyond Microcystins: A review on co-occurrence, toxicity, and challenges for risk assessment. *Water Research* 151, pp. 488-499, 2019 **open access**. doi.org/10.1016/j.watres.2018.12.048

17. Davis C.A., McNeill K.*, **Janssen E.M.-L.*** Non-singlet oxygen kinetic solvent isotope effect in aquatic photochemistry. *Environmental Science and Technology*, 17, pp. 9908-9916, **2018**, **open access**. <https://doi.org/10.1021/acs.est.8b01512>
16. Egli C.M. and **Janssen E.M.-L.*** Proteomics approach to trace site-specific damage in aquatic extracellular enzymes during photoinactivation. *Environmental Science and Technology*, 52 (14), pp. 7671-7679, **2018**, **open access**. <https://doi.org/10.1021/acs.est.7b06439>
15. Schiessl K., **Janssen E.M.-L.**, Kreamer S., McNeill K., Ackermann M.* Magnitude and Mechanism of Siderophore-Mediated Competition at Low Iron Solubility in the *Pseudomonas aeruginosa* Pyochelin System. *Frontiers of Microbiology*, **2017**, **open access**. <https://doi.org/10.3389/fmicb.2017.01964>
14. Davis C.A., Erickson P.R., McNeill K.*, **Janssen E.M.-L.*** Environmental Photochemistry of Fenamate NSAIDs and their Radical Intermediates. *Environmental Science: Processes and Impacts*, 24;19(5), pp. 656-665, **2017**. <https://doi.org/10.1039/C7EM00079K>.
13. **Janssen E.M.-L.**, Marron E., McNeill K.* Aquatic photochemical kinetics of benzotriazole and structurally related compounds. *Environmental Science: Processes and Impacts*, 17, pp. 939-946, **2015**. <https://doi.org/10.1039/C5EM00045A>.
12. **Janssen E.M.-L.** and McNeill K.* Environmental photooxidation of extracellular phosphatase and the effects of dissolved organic matter. *Environmental Science and Technology*, 49 (2), pp. 889-896, **2015**. <https://doi.org/10.1021/es504211x>
11. **Janssen E.M.-L.**, Erickson P.R., McNeill K.* Dual roles of dissolved organic matter as sensitizer and quencher in the photooxidation of tryptophan. *Environmental Science and Technology*, 48(9), pp. 4916-24, **2014**. <https://doi.org/10.1021/es500535a>
10. Lundeen R.A., **Janssen E.M.-L.**, Chu C., McNeill K.* Environmental photochemistry of amino acids, peptides and proteins. *Chimia*, 68 (11), pp. 814-817, **2014** **review article**. <https://doi.org/10.2533/chimia.2014.812>
9. Thomas C., Lampert D., **Janssen E.M.-L.**, Luthy R.G., Reible D.* Remedy performance monitoring at contaminated sediment sites using profiling solid phase microextraction (SPME) polydimethylsiloxane (PDMS) fibers. *Environmental Science: Processes and Impacts*, 16, pp. 445-452, **2014**. <https://doi.org/10.1039/C3EM00695F>.
8. **Janssen E.M.-L.***, Beckingham B. Biological response to activated carbon amendments in sediment remediation. *Environmental Science and Technology*, 7(14), pp. 4916-24-2863, **2013**, **review article**. <https://doi.org/10.1021/es401142e>
7. **Janssen E.M.-L.**, Choi Y., Luthy R.G.* Assessment of non-toxic, secondary effects of sorbent amendment to sediment on the deposit-feeding organism *Neanthes arenaceodentata*. *Environmental Science and Technology*, 46 (7), pp. 4134-4141, **2012**. <https://doi.org/10.1021/es204066g>
6. **Janssen E.M.-L.**, Thompson J.K., Luoma S.N., Luthy R.G.* PCB-induced changes of a benthic community and expected ecosystem recovery following in-situ sorbent amendment. *Environmental Toxicology and Chemistry*, 30(8), pp. 1819-26, **2011**. <https://doi.org/10.1002/etc.574>
5. Oen A.M.P., **Janssen E.M.-L.**, Cornelissen G., Breedveld G., Eek E., Luthy R.G.* In-situ measurement of PCB pore water concentration profiles in activated carbon-amended sediment using passive samplers. *Environmental Science and Technology*, 45 (9), pp. 4053-4059, **2011**. <https://doi.org/10.1021/es200174v>
4. **Janssen E. M.-L.**, Oen A.M.P., Luoma S. N., Luthy R. G.* Assessment of field-related influences on polychlorinated biphenyl exposures and sorbent amendment using polychaete bioassays and passive sampler measurement. *Environmental Toxicology and Chemistry*, 30 (1), pp. 173-180, **2011**. <https://doi.org/10.1021/es901632e>
3. **Janssen E.M.-L.**, Croteau M.-N., Luoma S.N., Luthy R.G.* Measurement and modeling of polychlorinated biphenyl bioaccumulation from sediment for the marine polychaete *Neanthes arenaceodentata* and response to sorbent amendment. *Environmental Science and Technology*, 44, pp. 2857-2863, **2010**. <https://doi.org/10.1021/es901632e>
2. Rhoads K.R., **Janssen E.M.-L.**, Luthy R.G., Criddle C.S.* Aerobic Biotransformation and Fate of N-Ethyl Perfluorooctane Sulfoneamidoethanol (N-EtFOSE) in Activated Sludge. *Environmental Science and Technology*, 42, pp. 2873-2878, **2008**. <https://doi.org/10.1021/es702866c>

1. Susanto H., Arafat H., **Janssen E.M.-L.**, Ulbricht M.* Ultrafiltration of polysaccharide-protein mixtures: Elucidation of fouling mechanisms and fouling control by membrane surface modification. *Separation and Purification Technology*, 63 (3), pp. 558-565, **2008**. <https://doi.org/10.1016/j.seppur.2008.06.017>

Book Chapters

Cho Y.-M., Werner D., **Janssen E.M.-L.**, Luthy R.G. In Situ Treatment for Control of Hydrophobic Organic Contaminants Using Sorbent Amendment: Theoretical Assessments. Book Chapter in *“Processes, Assessment and Remediation of Contaminated Sediments”*. SERDP ESTCP Environmental Remediation Technology, Volume 6, pp. 305-323, **2014**. DOI 10.1007/978-1-4614-6726-7.