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Professional employment

Since 2020. Postdoc. Technical University of Denmark, National Institute for Aquatic Resources.
2018-2020. Postdoc. Chalmers University of Technology, Architecture and Civil Engineering.
2014-2017. PhD student. Technical University of Denmark, National Institute for Aquatic Resources.

Education

2018. PhD, Technical University of Denmark, Kongens Lyngby, Denmark. Title: Resolving the chemical structures responsible for the UV-visible spectroscopic properties of dissolved organic matter in aquatic environments. Advisor: Dr. Colin A. Stedmon.
2014. M.Sc., Biotechnology, University of Applied Sciences Bremerhaven, Germany.
2011. B.Sc., Biotechnology, University of Applied Sciences Bingen, Germany.

Awarded grants and scholarships

Grants

2023. Independent Research Fund Denmark (335k EUR): A new approach to laccase discovery from the sea
2022. FORMAS, Sweden (co-applicant, 146k SEK): New eyes on old GAC
2021. FORMAS, Sweden (co-applicant, 26k SEK): Oxidation Demand and Rate (ODaR) as a sensitive proxy of biostability in drinking water
2019. Åforsk Foundation (40k EUR, project PI): Enhancing Biogeochemical Fingerprints of Natural Organic Matter with Data Fusion.
2019. Vinnova, Swedish Governmental Agency for Innovation Systems (47k EUR, co-applicant): An optical sensor for reducing biocide dependence in chemical manufacturing.

Scholarships

2019. Carl Triggers Stiftelse 2-year postdoctoral scholarship (55k EUR).
2018. National Science Foundation & National Oceanic and Atmospheric Administration. Stipend for participation in the Dissertations Symposium in Chemical Oceanography.
2018. International Humic Substances Society student travel award.
2017. Otto Mønsted Fond. Scholarship for conference participation.
2015. Kaj og Hermilla Ostenfeld's Fond. Scholarship for external research stay.

Teaching and supervision activities

Teaching

2023. Main teacher: Business Development and Innovation (12 students, M.Eng.)
Since 2018. Teacher: Parallel Factor Analysis for DOM fluorescence (25 PhD students & researchers).
2021-present. Lecturer: M.Sc. courses "Aquatic Field work" and "Chemical Oceanography".
2018-2019. Tutor: Introduction to Chemistry for Civil Engineers (220 students, B.Eng.)
2018. Tutor: Urban spaces and functions for Civil Engineers (250 students, B.Eng.).

PhD students

2019-2023. Xianyu Kong (PhD student), Alfred Wegener Institute (Germany), role: Thesis advisory committee and PhD defense committee member.
2019-2023. Anders Dalhoff Bruhn Jensen (PhD candidate), DTU Aqua (Denmark), role: Co-supervisor.
2018-2021. Nashita Moona (PhD student), Chalmers (Sweden), role: Co-supervisor.

Bachelor and Master students

2023. Dirk Bremmers (M.Eng. thesis), DTU Aqua, role: Co-supervisor
2022. Emilie Tage Andresen (B.Eng. thesis), DTU Kemi, role: Co-supervisor
2022. Linea Gry Ebbesen (B.Eng. thesis), DTU Sustain, role: Co-supervisor
2022. Synne Spjelkavik (M.Eng. special course). DTU Aqua, role: Co-supervisor
2022. Signe Melbye Andersen (M.Eng. thesis), DTU Aqua (Denmark), role: Co-supervisor.
2021. Laila Vinther & Cecilie Hjelm Hvas Hansen (M.Eng.), DTU Sustain (Denmark), role: Co-supervisor in special course.
2021. Evelyn Namuga Kasule (B.Eng.), DTU Sustain (Denmark), role: Co-supervisor.

Publications

23 publications (8 as lead, 15 as co-author). Citations: 969 (Google Scholar), 756 (Scopus). H-index: 12 (Scopus). Field-weighted Citation Impact score: 2.31, > 78% are within the top 25% most cited publications and journals.

List of 10 publications

Wünsch, U.J., Murphy, K.R. (2021). A simple method to isolate fluorescence spectra from small dissolved organic matter datasets. *Water Research*. 190(116730):1-9.
Roles & contributions: Idea conception, sample collection, experimental design, data analysis, manuscript drafting.

Wünsch, U., Hawkes, J. (2020). Mathematical Chromatography Deciphers the Molecular Fingerprints of Dissolved Organic Matter. *Analyst*. 145(5):1789-1800
Roles & contributions: Idea conception including approaching the collaborator at a workshop, data analysis, manuscript drafting.

Wünsch, U.J., Bro, R., Stedmon, C.A., Wenig, P., Murphy K.R. (2019). Emerging patterns in the global distribution of dissolved organic matter fluorescence. *Analytical Methods*. 11, 888–893.
Roles & contributions: Data analysis incl. algorithm design, manuscript drafting.

Wünsch, U.J., Acar, E., Koch, B.P., Murphy K.R., Schmitt-Kopplin, P., Stedmon. C. A. (2018). The molecular fingerprint of fluorescent natural organic matter offers insight into biogeochemical sources and diagenetic state. *Analytical Chemistry*. 90 (24): 14188-14197.
Roles & contributions: Expedition planning, sample collection, analytical measurements, decision on data fusion strategy & data analysis, manuscript drafting.

Paradina-Fernández, L.; Wünsch, U.; Bro, R.; Murphy, K. (2023). Direct Measurement of Organic Micropollutants in Water and Wastewater Using Fluorescence Spectroscopy. *ACS EST Water*
Roles & contributions: Secured the funding for the main author, contributed to discussions about algorithms, commenting on manuscript draft.

Emily Seelen; Van Liem-Nguyen; Urban Wünsch; Zofia Baumann; Robert Mason; Ulf Skyllberg; Erik Björn. (2023). Dissolved Organic Matter Thiol Concentrations Determine Methylmercury Bioavailability across the Terrestrial-Marine Aquatic Continuum. *Nature Communications* 2023.
Roles & contributions: Initiated contact with main author at dissertation symposium, conducted part of the analytical measurements and corresponding data analysis, commented on manuscript drafts.

Bruhn, A. D., Wünsch, U.J., Osburn, C. L., Rudolph, J., Stedmon, C. A. Lignin Phenol Quantification from Machine Learning-assisted Decomposition of Liquid Chromatography-absorbance Spectroscopy Data. *Limnology & Ocean Methods* 2023
Roles & contributions: Co-supervised the main author (PhD student) including (but not limited to) laboratory work and data analysis approach. Commented on the manuscript draft.

Hanson, B., Wünsch, U.J., Buckley, S., Fischer, S., Leresche, F., Murphy, K., D'Andrilli, J., and Rosario-Ortiz, F. L. (2022). DOM Molecular Weight Fractionation and Fluorescence Quantum Yield Assessment Using a Coupled In-Line SEC Optical Property System. *ACS EST Water* 2(12):2491-2501.
Roles & contributions: Co-supervised the PhD student (main author) including a four-week visit at the University of Colorado (Boulder) to establish analytical framework of the publication. Commented on the manuscript draft.

Berggren, M., Guillemette, F., Bieroza, M., Buffam, I., Deininger, A., Hawkes, J. A., Kothawala, D. N., LaBrie, R., Lapierre, J., Murphy, K. R., Al-Kharusi, E. S., Rulli, M. P. D., Hensgens, G., Younes, H., & Wünsch, U. J. (2022). Unified understanding of intrinsic and extrinsic controls of dissolved organic carbon reactivity in aquatic ecosystems. *Ecology* 103(9).
Roles & contributions: Participated as invited speaker at the workshop "Predicting the interactivity of DOM across terrestrial and aquatic ecosystems" in Lund and contributed to the discussions that formed the basis of the manuscript. Contributed to and commented on the manuscript draft.

A.-R. Schittich, U.J. Wünsch, H. Kulkarni, M. Battistel, H. Bregnhøj, C. A. Stedmon and U. S. McKnight (2018). Investigating fluorescent organic matter composition as a key predictor for arsenic mobility in groundwater aquifers. *Environmental Science and Technology*. 52 (22): 13027–13036.
Roles & contributions: Conception of the main part of the laboratory-based analytical work together with PhD student (main author). Prior to that, co-supervision of Master-thesis work that led to the publication. Commented on the manuscript draft and designed the publication figures.

Innovation

Software

2020. The Environmental Data Fusion toolbox (EDF toolbox) for MATLAB.
2018-present. Decomposition routines for Emission-Excitation Matrices (drEEM). A Matlab toolbox for the processing and data analysis of fluorescence datasets describing dissolved organic matter.
2017. LC Addon for drEEM. A toolbox for the processing of liquid-chromatography fluorescence datasets that integrates data into an existing data analysis toolbox.
2015. Matlab toolbox for the determination of apparent quantum yields of DOM (aquaDOM).

Patents

In progress. Notification of invention. Employer has taken the legal rights to the invention and patent application submitted.

Conference activity / participation

Three most recent conferences

2023. Photosensitivity of fluorescent dissolved organic matter across the arctic ocean, Aquatic Sciences Meeting 2023 (Mallorca, Spain)
2021. Combining Physical and Mathematical Chromatography to Decipher the Molecular Fingerprints of Dissolved Organic Matter, 20th Conference of the International Humic Substances Society (online)
2021. Mathematical chromatography deciphers the molecular fingerprints of dissolved organic matter, Aquatic Sciences Meeting 2021 (online).

Invited talks

2018. From fluorescence to chemical composition of organic matter: Multidetector analysis of DOM. International workshop: Predicting the interactivity of dissolved organic matter across terrestrial and aquatic ecosystems (Lund, Sweden)
2018. Resolving the chemical structures responsible for the UV-visible spectroscopic properties of dissolved organic matter in aquatic environments, Dissertations Symposium in Chemical Oceanography (Kona, USA)
2018. Supramolecular organic matter assembly in light of multidetector data analyses, 19th International Conference of International Humic Substances Society (Albena Resort, Bulgaria)
2018. Data fusion bridges the gaps between heterogeneous environmental chemistry datasets, Three-way Methods in Chemistry and Psychology (Angel Fire, NM, USA)

Session organizer

2018. Ocean Sciences Meeting. New Approaches to Opening DOM's "Black Box" Using Its Optical and Chemical Properties.

References

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Relationship: former Postdoc host