

# William Kumler

POSTDOCTORAL SCHOLAR

Seattle, WA

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## PROFESSIONAL SUMMARY

Postdoc with a PhD in chemical oceanography focusing on marine microbial metabolomics under Dr. Anitra Ingalls. Expertise in automated and untargeted liquid chromatography mass spectrometry, with significant experience developing computational tools for mass spectrometry data analysis and visualization. Fieldwork consisting of cruise planning, two months total ship time, and both wet and dry lab operations onboard during the Simons Collaboration on Ocean Processes and Ecology (SCOPE) project.

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## EDUCATION

<b>Ph.D. in Chemical Oceanography</b> , University of Washington	2019 - 2025
• First graduate in the Data Science Option	
<b>M.Sc. in Oceanography</b> , University of Washington	2019 - 2023
<b>B.A. in Marine Science</b> , University of California, Berkeley	2014 - 2018
<b>B.S. in Molecular and Environmental Biology</b> , University of California, Berkeley	2014 - 2018

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## WORK EXPERIENCE

<b>Ph.D. student</b> , Ingalls Lab, University of Washington, Seattle	2019 - 2025
<ul style="list-style-type: none"><li>• Published papers on marine microbial metabolomics with a focus on automated and untargeted methods</li><li>• Developed existing and novel mass spectrometry tools for analysis and visualization</li><li>• Fieldwork in the North Pacific Subtropical Gyre and California Current</li><li>• Mentored graduate and undergraduate students in metabolomics</li><li>• Trained on Thermo Q Exactive HF and Orbitrap Astral with HILIC and reversed-phase chromatographies</li></ul>	
<b>Lab Manager</b> , Koehl Lab, University of California, Berkeley	2018 - 2019
<ul style="list-style-type: none"><li>• Maintained live cultures of choanoflagellates and protozoa</li><li>• Managed and organized lab members, materials, and safety protocols</li><li>• Assisted visiting researchers with statistical analyses</li><li>• Tutored undergraduates in ImageJ and R programming</li></ul>	
<b>Lab Manager</b> , Edwards Lab, University of California, Berkeley	2018 - 2019
<ul style="list-style-type: none"><li>• Developed and maintained a lipidomics pipeline for data handling and statistical analysis</li><li>• Educated undergraduates in R programming and SLURM cluster usage</li></ul>	

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## PUBLICATIONS

- E.A. Seelen, S.J. Gleich, **W. Kumler**, H.S. Anderson, X. Bian, K.M. Bjorkman, D.A. Caron, S.T. Dyhrman, S. Ferrón, Z.V. Finkel, S.T. Haley, Y. Hy, A.E. Ingalls, A.J. Irwin, D.M. Karl, K.P. Kong, D. Lowenstein, A. Salazar Estrada, E. Townsend, J.C. Tracey, K. Turk-Kubo, B.A.S. Van Mooy & S.G. John (2025). Nitrogen and phosphorus differentially control marine biomass production and stoichiometry. *Nature Communications*, 16, 5713. DOI:10.1038/s41467-025-61061-0
- **W. Kumler**, W. Qin, R.A. Lundeen, B. Barone, L.T. Carlson & A.E. Ingalls (2024). Metabolites reflect variability introduced by mesoscale eddies in the North Pacific Subtropical Gyre. *Frontiers in Marine Science*, 11:1481409. DOI:10.3389/fmars.2024.1481409
- **Kumler, W.**, Hazelton, B.J. & Ingalls, A.E. (2023). Picky with peakpicking: assessing chromatographic peak quality with simple metrics in metabolomics. *BMC Bioinformatics*, 24:404. DOI:10.1186/s12859-023-05533-4

- **Kumler, W.** & Ingalls, A.E. (2022). Tidy data neatly resolves mass-spectrometry's ragged arrays. *R Journal*, 14(3), 193-202. DOI:10.32614/RJ-2022-050
- Boysen, A.K., Durham, B.P., **Kumler, W.**, et al. (2022). Glycine betaine uptake and metabolism in marine microbial communities. *Environmental Microbiology*, 24(5), 2380-2403. DOI:10.1111/1462-2920.16020
- **Kumler, W.E.**, Jorge, J., Kim, P.M., et al. (2020). Does formation of multicellular colonies by choanoflagellates affect their susceptibility to capture by passive protozoan predators? *Journal of Eukaryotic Microbiology*, 67(5), 555-565. DOI:10.1111/jeu.12808

In review:

- **Kumler, W.**, LaRue, S., & Ingalls, A.E. (In review with *Journal of Proteome Research*) Databases are an effective and efficient method for storage and access of mass-spectrometry data.
- P. Louail, C. Brunius, **W. Kumler**, N. Storz, J. Stanstrup, H. Treutler, P. Vangeenderhuysen, M. Witting, S. Neumann, & J. Rainer. (In review with *Analytical Chemistry*) xcms at 20 and still in peak form: Anchoring a complete metabolomics data preprocessing and analysis software ecosystem.

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## CONFERENCE PROCEEDINGS

- **W. Kumler** & A.E. Ingalls. Databases are a speedy, small, and simple solution for mass-spectrometry data storage and access. Presented as a poster at the *2025 Annual International Conference of the Metabolomics Society*, Prague, Czechia.
- P. Louail, **W. Kumler**, P. Vangeenderhuysen, C. Brunius, M. Witting, S. Neumann, RforMassSpectrometry contributors & J. Rainer. xcms at 20 and still in Peak form: Now anchoring a complete ecosystem for metabolomics data preprocessing and analysis. Presented at the *2025 Annual International Conference of the Metabolomics Society*, Prague, Czechia.
- **W. Kumler**, L.T. Carlson & A.E. Ingalls plus the PARAGON team. Differences in 15N use by source during the PARAGON cruise in the NPSG. Presented as a poster at the *2024 Simons Collaboration on Ocean Processes and Ecology*, New York, NY.
- J. Rainer, P. Louail, A. Vicini, R. Gine, J. Badia, M. Stravs, M. Garcia-Aloy, C. Huber, L. Salzer, J. Stanstrup, N. Shahaf, C. Panse, T. Naake, **W. Kumler**, P. Vangeenderhuysen, C. Brunius, H. Hecht, S. Neumann, M. Witting, S. Gibb, & L. Gatto (2024). An Open Software Development-based Ecosystem of R Packages for Metabolomics Data Analysis. Presented as a poster at the *2024 Annual International Conference of the Metabolomics Society*, Osaka, Japan. DOI: 10.5281/zenodo.13347220.
- S. Garcia, F.X. Ferrer-González, J.S. Sacks, **W. Kumler**, L.T. Carlson, & A.E. Ingalls (2024). Characterizing the quality and quantity of metabolite production in phytoplankton cultures and the environment through endo- and exometabolomics. Presented as a poster at the Gordon Research Conference on Marine Microbes, Les Diablerets, Switzerland. Poster #8.
- Y. Wang, **W. Kumler**, I. Kern, E. Seelen, S.G. John, & A.E. Ingalls (2023). Community metabolomes respond to nutrient supply in a mesocosm study in the North Pacific Subtropical Gyre. Presented as a poster at the *2023 Ocean Sciences Meeting*, New Orleans, LA. Poster #OB14B-0682.
- **W. Kumler**, L.T. Carlson, & A.E. Ingalls plus the PARAGON team (2023). Metabolic fate of dissolved nitrogen in the NPSG. Presented as a poster at the *2023 Ocean Sciences Meeting*, New Orleans, LA. Poster #OB14B-0702
- **W. Kumler**, L.T. Carlson, & A.E. Ingalls plus the PARAGON team (2023). Metabolic fate of dissolved nitrogen during PARAGON. Presented as a poster at the *2023 Simons Collaboration on Ocean Processes and Ecology*, New York, NY.
- **W. Kumler** (2022). Unmasking the POC/Ness Monster: Depth and Mesoscale Features Drive Variability in Particulate Metabolite Profiles of the MESOSCOPE transect. Presented as a virtual poster at the *2022 Simons Collaboration on Ocean Processes and Ecology*, New York, NY.
- **W. Kumler** (2022). Depth, diel, and eddy direction: The effect of three environmental factors on metabolite composition in the North Pacific Subtropical Gyre. Presented as a virtual poster at the *2021 Simons Collaboration on Ocean Processes and Ecology*, New York, NY.
- **W. Kumler** & A.E. Ingalls (2021). RaMS: R-based Access to Mass-Spectrometry Data. Presented as a poster at the *2021 Annual Conference of the Metabolomics Society (virtual)*. Poster #298.
- **W. Kumler**, H. Fredricks, J. Ossolinski, A. Allen, K. Thamatrakoln, K. Bidle, B. Van Mooy, & B. Edwards (2019). Sign of the times: the lipid signature of a collapsing phytoplankton bloom. Presented as a poster at the *2019 Aquatic Sciences Meeting*, San Juan, Puerto Rico. Poster #411.

- **W. Kumler & M.A.R. Koehl** (2018). Evolution of multicellularity: Capture of unicellular vs colonial choanoflagellates by a protozoan predator. Presented as a poster at the *2018 Society of Integrative and Comparative Biology Annual Meeting*, San Francisco, CA. Poster #P1-115.

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## TALKS GIVEN

- **Building a robust model of peak quality for untargeted mass-spectrometry** 2023
  - Seminar given at UW's eScience Seminar (watch [here](#))
  - Seminar given at UW's Quantitative Science Seminar
- **Data Visualization** 2022
  - Workshop led at the Graduate Climate Conference
- **Profiling R code and identifying performance bottlenecks** 2019
  - Invited speaker at FSH 507 (Super-advanced R)

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## TECHNICAL PROJECTS

- **RaMS**: R package for reading and tidying mass-spectrometry data. Now implemented in Metabolomics Workbench. Available on [CRAN](#) and [GitHub](#).
- **pylgrams**: Python language gloss of the RaMS package. Available on [PyPI](#) and [GitHub](#).
- **squallms**: R package for interactive multi-file annotation of chromatographic feature quality. Available on [Bioconductor](#) and [GitHub](#).
- **MESOSCOPE visualization application**: Data aggregation and interactive visualization for three cruises during the 2015-2018 MESOSCOPE project (Microbial Ecology of the Surface Ocean - Simons Collaboration on Ocean Processes and Ecology). Used for multi-lab dataset overlap comparison and manuscript preparation at the 2022 SCOPE meeting in New York. Emphasis was placed on realtime data ingestion via APIs and web-scraping. Application deployed at <https://wkumler/shinyapps.io/mswebapp>.
- **planetan**: Personal project implementing a 3D multiplayer R Shiny game with a ruleset similar to Settlers of Catan. Available on GitHub and as a live demo at <https://wkumler.shinyapps.io/planetan>. Will be submitted to the R Shiny Contest 2025.

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## TECHNICAL SKILLS

- **Coding**: Ten years of experience in R. Expertise with full-pipeline construction including data ingestion, tidying, analysis, visualization, and sharing via reproducible documents, interactive web applications, and R packages published to both CRAN and Bioconductor. Three years of experience with Python largely centered around reverse-engineering mass-spectrometry file formats. Recent experience with database management systems and HTML/CSS. Extensive collaboration with international groups via Github.
- **Scientific analysis**: Univariate and multivariate statistics with a focus on dimensionality reduction, permutational methods, false discovery rate estimation, and machine learning (regularized regression, random forests, autoencoders).
- **Fieldwork and ship time**: Estimated 50 days at sea across both multi-week cruises and short-term time series sampling, one cruise as chief scientist. Experience with cruise planning, CTD operations, float deployments and recoveries, incubations, and real-time data ingestion and visualization. Two weeks of land-based fieldwork involving sample collection and small-volume chemostat-style mesocosms.

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## AWARDS

- Achievement Rewards for College Scientists ([ARCS](#))
- [Mary C. Landsteiner Student Award](#)

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## VOLUNTEER WORK

- eScience Institute Software Carpentries instructor 2023 - 2025

- Both R and Python tracks
- Emphasis on teaching data access and visualization
- Data Science in Oceanography Summer Program 2022 - 2024
  - Two-week in-person workshop for college students considering graduate school and interested in expanding their data science skills
  - Lectured on chemical oceanography and access to publicly available datasets
- SEAS Annual Aquatic Sciences Open House 2022 - 2025
  - Organized booths for 20+ individual labs
  - Facilitated media coverage and 1,000+ attendees yearly from the greater Seattle area
  - Ran the Marine Microbial Research Center booth with natural seawater visualization under a microscope
- Seattle Aquarium interpreter 2019 - 2025
  - 100+ hours of engagement and interpretation at evening events
  - Particular emphasis on stewardship events such as Splash!, which brought in over half a million dollars from donors

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## REFERENCES

Dr. Anitra E. Ingalls, Ph.D. Advisor. [aingalls@uw.edu](mailto:aingalls@uw.edu), (206) 940-6755

Laura T. Carlson, Ingalls Lab Manager. [truxal@uw.edu](mailto:truxal@uw.edu), (412) 554-5093