

Qualifications & Research Interests

- Major research interests: 1) Proxy development (organic biomarkers and their C & H isotopes) and application to the reconstruction of climate and biogeochemical cycles. 2) Co-evolution of Earth and microorganisms. 3) Modern biogeochemistry and microbial ecology.
 - 42 peer-reviewed publications, 14 as first author.
 - Raised over 1.8 M € in external research funding.
 - Advised 3 PhD students, 2 Postdocs.
 - Experience in teaching a wide range of geoscience topics (introductory geology, climatology, geobiology, geochemistry, physical geography).
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Professional Experience

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| 2022-2025 | Visiting Professor in Environmental History
Department of Geography, Christian-Albrecht University of Kiel. |
| Since 2021 | Emmy Noether Research Group Leader
Leibniz-Laboratory for Radiometric Dating and Stable Isotope Research,
Christian-Albrecht University of Kiel. |
| 2016-2020 | Postdoctoral Fellow
Department of Earth and Planetary Sciences, Harvard University.
Advisor: Ann Pearson |
| 2015 | Postdoctoral Researcher
Center for Marine Environmental Sciences (MARUM), University of
Bremen. Advisor: Kai-Uwe Hinrichs |
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Career Breaks

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| 2020-2021 | Parental leave, full time & part time (7.5 months full-time equivalent) |
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Education

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| 2012-2015 | PhD in Geosciences (highest distinction), MARUM, University of Bremen
Thesis: <i>Factors controlling the lipid composition in marine planktonic Thaumarchaeota</i> . Advisor: Kai-Uwe Hinrichs |
| 2009-2012 | M. Sc. Marine Geosciences , University of Bremen |
| 2006-2009 | B. Sc. Geosciences , University of Bremen |

Grants

- 2023 **Deutsche Forschungsgemeinschaft, award #527682349** (50,377 €). *Climate change impacts on ocean nitrogen cycling during the Paleocene-Eocene Thermal Maximum.*
- 2022 **Kiel Marine Science seed funding** (20,000 €). *Algal toxins in the Baltic Sea paleo-record.*
- 2020 **Deutsche Forschungsgemeinschaft, Emmy Noether research group #441217575** (1,888,396 €). *Novel hydrological and carbon cycle constraints from the isotopic composition of archaeal lipid biomarkers.*
- 2018 **Deutscher Akademischer Austauschdienst RISE Fellowship #US-ES-4055** (~3,200 €). *Novel applications of archaeal lipid isotopic analysis. Providing 3 months of funding for an undergraduate lab assistant.*
- 2017 **National Science Foundation award OCE-1702262** (\$332,460). *Beyond ocean temperature: Extracting new dimensions of paleoclimatic information from archaeal lipids and their isotopic compositions.* Equal co-author, but employment designation prevented listing both Elling and Pearson as Co-PIs. PI: Ann Pearson.
- 2017 **Deutscher Akademischer Austauschdienst RISE Fellowship #US-ES-2997** (~3,200 €). *Lipid-based reconstruction of the Paleocene-Eocene carbon isotope excursion.* Providing 3 months of funding for an undergraduate lab assistant.
- 2015 **MARUM Extension Funding** (~8,150 €). Award for conclusion of manuscripts resulting from outstanding PhD theses.
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Awards

- 2023 **Ocean Emerging leader award, International Center for Deep Life Investigation.** Awarded for “groundbreaking work on the lipid biogeochemistry of marine microbes”.
- 2021 **Pieter Schenck Award, European Association of Organic Geochemists.** Awarded for „outstanding contributions in Organic Geochemistry”.
- 2020 **Certificate of Distinction in Teaching, Harvard University.** Awarded for achieving >90% positive evaluations for teaching undergraduate courses.
- 2018 **Thomas Hoopes Prize, Harvard University.** Awarded for “excellence in the art of teaching” in supervising an outstanding senior thesis.
- 2016 **MARUM Research Award for Marine Science.** Awarded for best PhD dissertation in marine sciences.
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Teaching Experience

- Since 2024 **Reconstructing Quaternary Environments** (MNF-eco-113, 4 SWS). Lecture & seminar. Quaternary paleoclimatology for M.Sc. students.
- Seminar Physische Geographie II** (MNF-geogr02-01a, 3 SWS). Seminar. Introduction to Earth sciences and physical geography for B.Sc. students.

- Since 2022 **Principles of Climate and Landscape Changes** (MNF-eco-102, 4 SWS). Lecture & seminar. Introduction to paleoclimatology for M.Sc. students.
- Since 2022 **Physische Geographie I** (MNF-Geogr-01, 3 SWS). Lecture. Introduction to Earth sciences and physical geography for B.Sc. students.
- 2022 **Seminar Physische Geographie I** (MNF-Geogr-01-BS, 3 SWS). Seminar. Introduction to Earth sciences and physical geography for B.Sc. students.
- Since 2021 **Seminar Wissenschaftliches Arbeiten** (MNF-geow-B502, 2 SWS). Seminar. Scientific writing and presentation skills for B.Sc. students.
- 2018 **The Fluid Earth: Atmospheres and Oceans** (EPS50). Seminar. Introductory course on oceanography and climatology for B.Sc. students.
- 2017, 2019 **How to Build a Habitable Planet** (GenEd1018). Seminar. History of the universe, earth, life, and climate for B.Sc. students.

Mentoring Experience

Supervision of PhD students and Postdocs

- 2025-2027 Unyime Umoh (Postdoc). Project: *Export of archaeal biomass in the ocean*
- 2024-2028 Wenyong Yao (PhD student). Project: *The archaeal lipidome*
- 2024 Matthias Kranner (Postdoc, co-supervised). Project: *Assessing the role of oxygen in ocean health and ocean biogeochemistry using past analogues*
- 2022/2024 Biswajit Roy (Postdoc, guest). Project: *Influence of elevation on brGDGT-based temperature reconstructions*
- 2022-2026 Xiaoxiao Zhao (PhD student). Project: *Climate change impacts on ocean nitrogen cycling during the Paleocene-Eocene Thermal Maximum*
- 2022-2025 Chris Rosendahl (PhD student). Project: *Hydrogen isotope fractionation in Thaumarchaeota as a novel paleohydrology proxy*
- 2022-2024 Jan Kleint (Postdoc). Project: *Construction of a spooling wire microcombustion interface for the analysis of archaeal lipid carbon isotopes*

Supervision of B.S. and M.S. thesis students

- 2023 Lina Bachmann (B.Sc.). Project: *Lipid adaptation in freshwater Thaumarchaeota*.
- 2018 Sebastian Gfellner (M.Sc.). Project: *Lipid recycling by energy-stressed archaea*
- 2017 Catherine Polik (B.Sc.). Project: *Effects of microbial ecology on paleotemperature records during Mediterranean sapropel formation*.
- 2017 Louise Kip (M.Sc.). Project: *Miocene-Holocene history of ocean temperature and biological productivity of the East Equatorial Pacific*.
- 2014 Andreas Greve (B.Sc.). Project: *Lipid adaptation to pH in Thaumarchaeota*.
- 2013 Nadine Smit (B.Sc.). Project: *Temperature adaptation in Thaumarchaeota*.

Supervision of undergraduate research students

Jacqueline Hartmann (2024), Jessica Heinze (2024), Lina Bachmann (2023), Ferris Güldner (2023), Paula Lürßen (2022), Sophie Webster (2019), Laura Kattein (2018), Claire Jasper (2017), Samuel McNichol (2017), Katiana Doeana (2017), Mirko Lange (2014).

Academic Service

Service in departmental committees (University of Kiel, University of Bremen)

University of Kiel: Member of examination board M. Sc. *Environmental Management* & M. Sc. *Applied Ecology* (3 years) • University of Bremen: Member of department board (3 years) • Graduate student representative (2 years) • Member of PhD admissions board (2 years) • Undergraduate student representative (3 years) • Member of committee for re-designing curricula of Geosciences BSc (2009) and MSc (2011) programs • Member of search committee (Professorship in Marine Geology).

Conference session co-chair

- 2025 *Microbial ecology and elemental cycling in terrestrial and aquatic systems: integrating biogeochemistry, geomicrobiology and modeling*, Goldschmidt Conference 2025, Prague, Czechia.
- 2023 *Organic geochemical tools to understand life, climate, and environments through time*, Goldschmidt Conference 2023, Lyon, France.
- 2022 *Organic geochemical tools for understanding climatic, chemical, and biological processes*, Goldschmidt Conference 2022, Honolulu, USA.
- 2021 *Organic geochemical tools for understanding the oceans and atmosphere now and through time*, Goldschmidt Conference 2021, Lyon, France.
- 2018 *Honoring John Hayes: Molecular and isotopic biogeochemistry across time and space*, Goldschmidt Conference 2018, Boston, USA.

Editorial board service

- Since 2025 Associate Editor at *Geochimica et Cosmochimica Acta*
- Since 2024 Handling editor at *Advances in Geochemistry and Cosmochemistry*

Manuscript reviewer (66 reviews in 2015-2024)

Archives of Microbiology • Biogeosciences • Chemical Geology • Climate of the Past • Communications Earth & Environment • Continental Shelf Research • Deep Sea Research • Environmental Microbiology • Environmental Microbiology Reports • Environmental Earth Sciences • Environmental Science & Technology • Frontiers in Earth Science • Frontiers in Microbiology • Genome Biology and Evolution • *Geochimica et Cosmochimica Acta* • Geology • *Geomicrobiology Journal* • *ISME Journal* • Journal of Geophysical Research - Biogeosciences • Limnology & Oceanography • Marine Chemistry • Nature Communications • Nature Ecology & Evolution • Organic Geochemistry • Paleooceanography & Paleoclimatology • Palaeogeography, Palaeoclimatology, Palaeoecology • Proceedings of the National Academy of Sciences • Science • Science Advances • Scientific Reports • Soil Biology & Biochemistry

Proposal reviewer:

Deutsche Forschungsgemeinschaft (DFG) • US National Science Foundation (NSF) • Dutch Research Council (NWO)

Outreach & Media Activities

I am engaged in science outreach through museums and science festivals. I use these opportunities to reach a diverse public audience, including underserved groups and children, and promote science literacy and foster enthusiasm for earth sciences.

- 2025 **Kieler Uni Live, Kieler Woche**, Hands-on activity on algae in the Baltic sea
- Public radio interview, RBB radioeins**, on the evolution of aerobic respiration
- 2024 **Kiel Festival of Science, Rent-a-Scientist: Wissenschaft macht Schule**, Two-day school project on the roles of microorganisms in biogeochemical cycles.
- 2019 **U.S. Intrepid Sea, Air & Space Museum**, New York (USA) Kids Week: Hands-on activities on marine sediments and microfossils as paleoclimate archives.
- 2019 **Cambridge Festival of Science**, Hands-on activities promoting beneficial aspects of microbes. Cambridge (USA)
- 2018-2019 **Microbial Life Exhibition**, Harvard Museum of Natural History, Cambridge (USA): 4 hours/month visitor interaction and experimental demonstrations on microbiology (e.g., microscopy of live microbes from fermented foods & soil).
- 2018 **Microbial Science Short Talk**, Harvard Museum of Natural History, Cambridge (USA): *What microbes can tell us about past climate*.
- 2013 **University of Bremen Open Day**, showcasing paleoclimate research performed at MARUM using sediment cores and microfossils.
- 2011 **Organizer of the academic open day**, Department of Geosciences, University of Bremen (Germany): lectures and social activities focused on geoscience career perspectives for students.
- 2010 **Co-organizer of paleoclimate project for secondary school students**, Cooperation between University of Bremen and Secondary School Wittstock (Germany) entitled: "Paleoclimate research enters the classroom: Drilling Lake El'gygytyn" (two days, 60 students).

Expeditions & Field Work

- 2019 **Black Sea**, RV *Poseidon* cruise POS539 (2 weeks). Biogeochemistry of the marine nitrogen cycle. Role: Organic geochemistry team leader.
- 2010 **Gulf of Mexico**, RV *Atlantis* cruise AT18-2 (4 weeks). Biogeochemistry of seafloor brine pools. Role: Organic geochemist & starboard observer during DSV *Alvin* dive 4658.
- 2010 **Svalbard**, Central Tertiary Basin (4 weeks). Sampling of bentonites as stratigraphic markers for the Paleocene-Eocene. Role: Sedimentologist & trip leader.
- 2009 **Western Alps**, Switzerland (3 weeks). Tectonic history of the Aiguilles Rouges external massif. Role: Geologist & trip leader.

Invited talks

2025	5th International Conference of Geobiology , Wuhan
2024	Shanghai Jiao Tong University , International Center for Deep Life Investigation
2024	Heidelberg University , Institute of Earth Sciences
2023	ETH Zurich , 2 nd international GDGT workshop
2022	Ocean University of China , Future Scientist Forum
2022	RWTH Aachen , Faculty of Georesources and Materials Engineering
2021	Heidelberg University , Institute of Earth Sciences
2021	University of Bristol , Organic Geochemistry Unit
2021	ETH Zürich , Climate Geology and Biogeosciences Groups
2021	Shanghai Ocean University , Deep Ocean Biogeochemistry Symposium
2020	University of Bremen , Organic Geochemistry group
2019	Massachusetts Institute of Technology , Summons lab
2018	Yale University , Department of Earth & Planetary Sciences

Publications

I have authored 46 peer-reviewed, published articles; 14 as first/co-first author, 3 as corresponding author of my advisee first-author; total citations (Google Scholar): 1911; *h*-index: 23. Five manuscripts are currently under review.

Google Scholar profile: <http://scholar.google.com/citations?user=RVNhsHMAAAAJ>

*Asterisks denote shared first-authorship. Advisees are underlined.

Peer-reviewed, published/accepted articles

46. Bijl, P.K., Sliwinska, K.K., Duncan, B., Huguët, A., Naeher, S., Rattanasriampaipong, R., Sosa-Montes de Oca, C., Auderset, A., Berke, M., Kim, B.S., Davtian, N., Dunkley Jones, T., Eefting, D., **Elling, F.J.**, O'Connor, L., Pancost, R.D., Peterse, F., Pierrick, F., Rice, A., Sluijs, A., Varma, D., Villanueva, L., Xiao, W., Zhang, Y. (2025). Best practices for the application of marine GDGTs as proxy for paleotemperatures: sampling, processing, analyses, interpretation, and archiving protocols. *Biogeosciences*.
45. Roy, B., Thiede, R., Simon, S., Kumar, A., Moharana, S., Dey, S., **Elling, F.J.** (2025). Elevation controls bacterial branched GDGT-based temperature proxies: A regional to global perspective. *Global and Planetary Change*.
44. Keller, K.J., Kopf, S., McFarlin, J., Maloney, A., Rhim, J.H., **Elling, F.J.**, Ashing-Giwa, K., Baker, I., Calhoun, A., Pearson, A. (2025). Compound-specific carbon and hydrogen isotope analysis traces archaeal lipid signatures in cold seep marine systems. *Geochimica et Cosmochimica Acta*. doi: [10.1016/j.gca.2025.08.017](https://doi.org/10.1016/j.gca.2025.08.017)
43. Spiegel, T., Dale, A.D., Lenz, N., Schmidt, M., Sommer, S., Becker, K., **Elling, F.J.**, Porz, L., Daewel, U., Fuhr, M., Kalapurakkal, H.T., Wallmann, K. (2025). Benthic POC cycling in the Skagerrak basin: The role of lateral POC input. *Continental Shelf Research* 293, 105536. doi: [10.1016/j.csr.2025.105536](https://doi.org/10.1016/j.csr.2025.105536)
42. Harris C.M., Kopf, S., Rhim, J.H., Cobban, A., **Elling, F.J.**, Feng, X., McFarlin, J., Weber, Y., Zhang, Y., Zhou, A., Pearson, A., Leavitt, W.D. (2025). Lipid hydrogen

isotopes primarily reflect growth water in the model archaeon *Sulfolobus acidocaldarius*. *Applied and Environmental Microbiology* 91, e01983-24. doi: [10.1128/aem.01983-24](https://doi.org/10.1128/aem.01983-24)

41. **Elling, F.J.**, Pierrel, F., Chobert, S.-C., Abby, S.S., Evans, T.W., Reveillard, A., Pelosi, L., Schnoebelen, J., Hemingway, J.D., Boumendjel, A. Becker, K.W., Blom, P., Cordes, J., Nathan, V., Baymann, F., Lückner, S., Spieck, E., Leadbetter, J.R., Hinrichs, K.-U., Summons, R.E., Pearson, A. (2025). A novel quinone biosynthetic pathway illuminates the evolution of aerobic metabolism. *Proceedings of the National Academy of Sciences of the United States of America* 122, e2421994122. doi: [10.1073/pnas.2421994122](https://doi.org/10.1073/pnas.2421994122)
40. Hoogakker, B.A.A., Davis, C., Wang, Y., Kusch, S., Nilsson-Kerr, K., Hardisty, D.S., Jacobel, A., Reyes Macaya, D., Glock, N., Ni, S., Sepúlveda, J., Ren, A., Auderset, A., Hess, A., Meissner, K., Cardich, J., Anderson, R., Castillo, A., Costa, K., Barras, C., Basak, C., Bradbury, H.J., Brinkmann, I., Cook, M., Choquel, C., Diz, P., Donnenfeld, J., **Elling, F.J.**, Erdem, Z., Filipsson, H.L., Garrido, S., Gottschalk, J., Govindankutty Menon, A., Groeneveld, J., Hallmann, C., Hendy, I., Hennekam, R., Lu, W., Lynch-Stieglitz, J., Matos, L., Martínez- García, A., Molina, G., Muñoz, P., Moretti, S., Morford, J., Nuber, S., Radionovskaya, S., Raven, M.R., Somes, C., Studer, A.S., Sweere, T., Tachikawa, K., Tapia, R., Tetard, M., Vollmer, T., Wu, S., Zhang, Y., Zheng, X., Zhou, Y. (2025). Review of proxies for low-oxygen paleoceanographic reconstructions. *Biogeosciences* 22, 863-957. doi: [10.5194/bg-22-863-2025](https://doi.org/10.5194/bg-22-863-2025)
39. De Jonge, C., Peterse, F., Nierop, K.G.J., Blattmann, T.M., Alexandre, M., Ansanay-Alex, S., Austin, T., Babin, M., Bard, E., Bauersachs, T., Blewett, J., Boehman, B., Castañeda, I.S., Chen, J., Conti, M.L.G., Contreras, S., Cordes, J., Davtian, N., van Dongen, B., Duncan, B., **Elling, F.J.**, Galy, V., Gao, S., Hefter, J., Hinrichs, K.-U., Helling, M., Hoorweg, M., Hopmans, E., Hou, J., Huang, Y., Huguet, A., Jia, G., Karger, C., Keely, B.J., Kusch, S., Li, H., Liang, J., Lipp, J.S., Liu, W., Lu, H., Mangelsdorf, K., Manners, H., Martinez-Garcia, A., Ménot, G., Mollenhauer, G., Naafs, B.D.A., Naeher, S., O'Connor, L.K., Pearce, E.M., Pearson, A., Rao, Z., Rodrigo-Gámiz, M., Rosendahl, C., Rostek, F., Rui, B., Sanyal, P., Schubotz, F., Scott, W., Sen, R., Sluijs, A., Smittenberg, R., Stefanescu, I., Sun, J., Sutton, P., Tierney, J., Tejos, E., Villanueva, J., Wang, H., Werne, J., Yamamoto, M., Yang, H., Zhou, A. (2024). Interlaboratory comparison of branched GDGT temperature and pH proxies using soils and lipid extracts. *Geochemistry, Geophysics, Geosystems* 25, e2024GC011583. doi: [10.1029/2024GC011583](https://doi.org/10.1029/2024GC011583)
38. Zhu, Q.-Z., Elvert, M., Meador, T.B., Schröder, J.M., Doeana, K.D., Becker, K.W., **Elling, F.J.**, Lipp, J.S., Heuer, V.B., Zabel, M., Hinrichs, K.-U. (2024). Comprehensive molecular-isotopic characterization of archaeal lipids in the Black Sea water column and underlying sediments. *Geobiology* 22, e1258. doi: [10.1111/gbi.12589](https://doi.org/10.1111/gbi.12589)
37. Hollingsworth, E.H., **Elling, F.J.**, Badger, M.P.S., Pancost, R.D., Dickson, A.J., Rees-Owen, R.L., Papadomanolaki, N.M., Pearson, A., Sluijs, A., Freeman, K.H., Baczynski, A.A., Foster, G.L., Whiteside, J.H., Inglis, G.N. (2024). Spatial and Temporal Patterns in Petrogenic Organic Carbon Mobilization during the Paleocene-Eocene Thermal Maximum. *Paleoceanography and Paleoclimatology* 39, e2023PA004773. doi: [10.1029/2023PA004773](https://doi.org/10.1029/2023PA004773)
36. Rhim, J.H., Zhou, A., Amenabar, M.J., **Elling, F.J.**, Weber, Y., Pearson, A., Boyd, E.S., Leavitt, W.D. (2024). Mode of carbon and energy metabolism shifts lipid composition in the thermoacidophile *Acidianus*. *Applied and Environmental Microbiology* 90, e01369-23. doi: [10.1128/aem.01369-23](https://doi.org/10.1128/aem.01369-23)

35. Chiu, B. K., Waldbauer, J., **Elling, F.J.**, Mete, Ö.Z., Pearson, A., Eggleston, E., Leavitt, W.D. (2023). Membrane lipid and expression responses of *Saccharolobus islandicus* REY15A to acid and cold stress. *Frontiers in Microbiology* 14. doi: [10.3389/fmicb.2023.1219779](https://doi.org/10.3389/fmicb.2023.1219779).
34. Leavitt, W.D., Kopf, S.H., Weber, Y., Chiu, B., McFarlin, J.M., **Elling, F.J.**, Hoeft-McCann, S., Pearson, A. (2023). Controls on the hydrogen isotope composition of tetraether lipids in a marine thaumarchaeon. *Geochimica et Cosmochimica Acta* 352, 194-210. doi: [10.1016/j.gca.2023.04.033](https://doi.org/10.1016/j.gca.2023.04.033)
33. **Elling, F.J.***, Kattein, L.*, Naafs, B.D., Lauretano, V., Pearson, A. (2023). Heterotrophic origin and diverse sources of branched glycerol monoalkyl glycerol tetraethers (brGMGTs) in peats and lignites. *Organic Geochemistry* 178, 104558. doi: [10.1016/j.orggeochem.2023.104558](https://doi.org/10.1016/j.orggeochem.2023.104558)
32. **Elling, F.J.**, Evans, T.W., Hemingway, J.D., Kharbush, J.J., Spieck, E., Summons, R.E., Pearson, A. (2022). Marine and terrestrial nitrifying bacteria are sources of diverse bacteriohopanepolyols. *Geobiology* 20, 399-420. doi: [10.1111/GBI.12484](https://doi.org/10.1111/GBI.12484)
31. Evans, T.W., **Elling, F.J.**, Li, Y., Pearson, A., Summons, R.E. (2022). A new and improved protocol for extraction of intact polar membrane lipids from archaea. *Organic Geochemistry* 165, 104353. doi: [10.1016/j.orggeochem.2021.104353](https://doi.org/10.1016/j.orggeochem.2021.104353)
30. Blewett, J., **Elling, F.J.**, Naafs, B.D.A., Kattein, L., Evans, T.W., Lauretano, V., Gallego-Sala, A.V., Pancost, R.D., Pearson, A. (2022). Metabolic and ecological controls on the stable carbon isotopic composition of archaeal (isoGDGT and BDGT) and bacterial (brGDGT) lipids in wetlands and lignites. *Geochimica et Cosmochimica Acta* 320, 1-25. doi: [10.1016/j.gca.2021.12.023](https://doi.org/10.1016/j.gca.2021.12.023)
29. **Elling, F.J.***, Hemingway, J.D.*, Kharbush, J.J., Becker, K.W., Polik, C.A., Pearson, A. (2021). Linking diatom-diazotroph symbioses to nitrogen cycle perturbations and deep-water anoxia: Insights from Mediterranean sapropel events. *Earth and Planetary Science Letters* 571, 117110. doi: [10.1016/j.epsl.2021.117110](https://doi.org/10.1016/j.epsl.2021.117110)
28. Lattaud, J., De Jonge, C., Pearson, A., **Elling, F.J.**, Eglinton, T.I. (2021). Microbial lipid signatures in Arctic deltaic sediments – insights into methane cycling and climate variability. *Organic Geochemistry* 157, 104242. doi: [10.1016/j.orggeochem.2021.104242](https://doi.org/10.1016/j.orggeochem.2021.104242)
27. Santoro, A.E., Bayer, B., **Elling, F.J.**, Pearson, A. (2021). *Candidatus Nitrosopelagicus*. In *Bergey's Manual of Systematics of Archaea and Bacteria* (eds M.E. Trujillo, S. Dedysh, P. DeVos, B. Hedlund, P. Kämpfer, F.A. Rainey and W.B. Whitman). doi: [10.1002/9781118960608.gbm01969](https://doi.org/10.1002/9781118960608.gbm01969)
26. **Elling, F.J.**, Hemingway, J.D., Evans, T.W., Kharbush, J.J., Spieck, E., Summons, R.E., Pearson, A. (2020). Vitamin B₁₂-dependent biosynthesis ties amplified 2-methylhopanoid production during oceanic anoxic events to nitrification. *Proceedings of the National Academy of Sciences of the United States of America* 117, 32996-33004. doi: [10.1073/pnas.2012357117](https://doi.org/10.1073/pnas.2012357117)
25. Cobban, A., Zhang, Y., Zhou, A., Weber, Y., **Elling, F.J.**, Pearson, A., Leavitt, W.D. (2020). Multiple environmental parameters impact lipid cyclization in *Sulfolobus acidocaldarius*. *Environmental Microbiology* 22, 4046-4056. doi: [10.1111/1462-2920.15194](https://doi.org/10.1111/1462-2920.15194)
24. Nigro, L.M., **Elling, F.J.**, Hinrichs, K.-U., Joye, S.B., Teske, A. (2020). Microbial diversity and biogeochemistry of hypersaline sediments in Orca Basin. *Plos One* 15(4), e0231676. doi: [10.1371/journal.pone.0231676](https://doi.org/10.1371/journal.pone.0231676)

23. Probst, A.J.*, **Elling, F.J.***, Castelle, C., Zhu, Q., Elvert, M., Birarda, G., Holman, H.-Y., Lane, K., Ladd, B., Ryan, M. C., Woyke, T., Hinrichs, K.-U., Banfield, J.F. (2020). Lipid analysis of CO₂-rich subsurface aquifers suggests an autotrophy-based deep biosphere with lysolipids enriched in CPR bacteria. *ISME Journal* 14, 1547-1560. doi: [10.1038/s41396-020-0624-4](https://doi.org/10.1038/s41396-020-0624-4).
22. **Elling, F.J.**, Gottschalk, J., Doeana, K.D., Kusch, S., Hurley, S.J., Pearson, A. (2019). Archaeal lipid biomarker constraints on the Paleocene-Eocene carbon isotope excursion. *Nature Communications* 10, 4519. doi: [10.1038/s41467-019-12553-3](https://doi.org/10.1038/s41467-019-12553-3).
21. Zhou, A., Chiu, B.K., Cobban, A.B., Weber, Y., **Elling, F.J.**, Pearson, A., Leavitt, W.D. (2019). Electron donor flux controls GDGT cyclization in the model thermoacidophile *Sulfolobus acidocaldarius*. *Environmental Microbiology* 22, 343-353. doi: [10.1111/1462-2920.14851](https://doi.org/10.1111/1462-2920.14851)
20. Hurley, S.J., Close, H.G., **Elling, F.J.**, Jasper, C.E., Gospodinova, K., McNichol, A.P., Pearson, A. (2019). CO₂-dependent carbon isotope fractionation in Archaea, Part II: The marine water column. *Geochimica et Cosmochimica Acta* 261, 383-395. doi: [10.1016/j.gca.2019.06.043](https://doi.org/10.1016/j.gca.2019.06.043)
19. Pearson, A., Hurley, S.J., **Elling, F.J.**, Wilkes, E.B. (2019). CO₂-dependent carbon isotope fractionation in Archaea, Part I: Modeling the 3HP/4HB pathway. *Geochimica et Cosmochimica Acta* 261, 368-382. doi: [10.1016/j.gca.2019.06.042](https://doi.org/10.1016/j.gca.2019.06.042)
18. Polik, C.A., **Elling, F.J.**, Pearson, A. (2018). Impacts of paleoecology on the TEX₈₆ sea surface temperature proxy in the Pliocene-Pleistocene Mediterranean Sea. *Paleoceanography and Paleoclimatology* 33, 1472-1489. doi: [10.1029/2018PA003494](https://doi.org/10.1029/2018PA003494)
17. Becker, K.W. *, **Elling, F.J.***, Schröder, J.M., Lipp, J.S., Goldhammer, T., Zabel, M., Elvert, M., Overmann, J., Hinrichs, K.-U. (2018). Isoprenoid quinones resolve the stratification of microbial redox processes in a biogeochemical continuum from the photic zone to deep anoxic sediments of the Black Sea. *Applied and Environmental Microbiology* 84, e02736-17. doi: [10.1128/AEM.02736-17](https://doi.org/10.1128/AEM.02736-17)
16. Hemingway, J.D., Kusch, S., Shah Walter, S.R., Polik, C.A., **Elling, F.J.**, Pearson, A. (2018). A novel method to measure the ¹³C composition of intact bacteriohopanepolyols. *Organic Geochemistry* 123, 144-147. doi: [10.1016/j.orggeochem.2018.07.002](https://doi.org/10.1016/j.orggeochem.2018.07.002)
15. **Elling, F.J.**, Könneke, M., Nicol, G.W., Stieglmeier, M., Bayer, B., Spieck, E., de la Torre, J.R., Becker, K.W., Thomm, M., Prosser, J.I., Herndl, G.J., Schleper, C., Hinrichs, K.-U. (2017). Chemotaxonomic characterisation of the thaumarchaeal lipidome. *Environmental Microbiology* 19, 2681-2700. doi: [10.1111/1462-2920.13759](https://doi.org/10.1111/1462-2920.13759)
14. Hurley, S.J.*, **Elling, F.J.***, Könneke, M., Buchwald, C., Wankel, S.D., Santoro, A.E., Lipp, J.S., Hinrichs, K.-U., Pearson, A. (2016). Influence of ammonia oxidation rate on thaumarchaeal lipid composition and the TEX₈₆ temperature proxy. *Proceedings of the National Academy of Sciences of the United States of America* 113, 7762-7767. doi: [10.1073/pnas.1518534113](https://doi.org/10.1073/pnas.1518534113)
13. Zhu, C., Wakeham, S.G., **Elling, F.J.**, Basse, A., Mollenhauer, G., Versteegh, G.J.M., Könneke, M., Hinrichs, K.-U. (2016). Stratification of archaeal membrane lipids in the ocean and implications for adaptation and chemotaxonomy of planktonic archaea. *Environmental Microbiology* 18, 4324-4336. doi: [10.1111/1462-2920.13289](https://doi.org/10.1111/1462-2920.13289)

12. Becker, K.W., **Elling, F.J.**, Yoshinaga, M.Y., Söllinger, A., Urich, T., Hinrichs, K.-U. (2016). Unusual butane- and pentanetriol-based tetraether lipids in *Methanomassiliicoccus luminyensis*, a representative of the seventh order of methanogens. *Applied and Environmental Microbiology* 82, 4505-4516. doi: [10.1128/AEM.00772-16](https://doi.org/10.1128/AEM.00772-16)
11. **Elling, F.J.***, Becker, K.W.*, Könneke, M., Schröder, J.M., Kellermann, M.Y., Hinrichs, K.-U. (2016). Respiratory quinones in *Archaea*: phylogenetic distribution and application as biomarkers in the marine environment. *Environmental Microbiology* 18, 692-707. doi: [10.1111/1462-2920.13086](https://doi.org/10.1111/1462-2920.13086)
10. Zhuang, G.-C.*, **Elling, F.J.***, Nigro, L.M., Samarkin, V., Joye, S.B., Teske, A., Hinrichs, K.-U. (2016). Multiple evidence for methylotrophic methanogenesis as the dominant methanogenic pathway in deep-sea hypersaline sediments. *Geochimica et Cosmochimica Acta* 187, 1-20. doi: [10.1016/j.gca.2016.05.005](https://doi.org/10.1016/j.gca.2016.05.005)
9. Liu, X.-L., Birgel, D., **Elling, F.J.**, Sutton, P.A., Lipp, J.S., Zhu, R., Zhang, C., Könneke, M., Peckmann, J., Rowland, S.J., Summons, R.E., Hinrichs, K.-U. (2016). From ether to acid: a plausible degradation pathway of glycerol dialkyl glycerol tetraethers. *Geochimica et Cosmochimica Acta* 183, 138-152. doi: [10.1016/j.gca.2016.04.016](https://doi.org/10.1016/j.gca.2016.04.016)
8. Widderich, N., Czech, L., **Elling, F.J.**, Könneke, M., Stöveken, N., Pittelkow, M., Riclea, R., Dickschat, J.S., Heider, J., Bremer, E. (2016). Strangers in the archaeal world: osmostress-responsive biosynthesis of ectoine and hydroxyectoine by the marine thaumarchaeon *Nitrosopumilus maritimus*. *Environmental Microbiology* 18, 1227-1248. doi: [10.1111/1462-2920.13156](https://doi.org/10.1111/1462-2920.13156)
7. Yao, M., **Elling, F.J.**, Jones, C., Sulung, N., Long, C.P., Crowe, S.A., Antoniewicz, M.R., Hinrichs, K.-U., Maresca, J.A. (2016). Heterotrophic bacteria from an extremely phosphate-poor lake have conditionally reduced phosphorus demand and utilize diverse sources of phosphorus. *Environmental Microbiology* 18, 656-667. doi: [10.1111/1462-2920.13063](https://doi.org/10.1111/1462-2920.13063)
6. **Elling, F.J.**, Spiegel, C., Estrada, S., Davis, D.W., Reinhardt, L., Henjes-Kunst, F., Allroggen, N., Dohrmann, R., Piepjohn, K., Lisker, F. (2016). Origin of bentonites and detrital zircons of the Paleocene Basilika Formation, Svalbard. *Frontiers in Earth Science* 4, 73. doi: [10.3389/feart.2016.00073](https://doi.org/10.3389/feart.2016.00073)
5. **Elling, F.J.**, Könneke, M., Mußmann, M., Greve, A., Hinrichs, K.-U. (2015). Influence of temperature, pH, and salinity on membrane lipid composition and TEX₈₆ of marine planktonic thaumarchaeal isolates. *Geochimica et Cosmochimica Acta* 171, 238-255. doi: [10.1016/j.gca.2015.09.004](https://doi.org/10.1016/j.gca.2015.09.004)
4. Lü, X., Liu, X.-L., **Elling, F.J.**, Yang, H., Xie, S., Song, J., Li, X., Yuan, H., Li, N., Hinrichs, K.-U. (2015). Hydroxylated isoprenoidal GDGTs in China coastal seas and their potential as paleotemperature proxy in mid-to-low latitude marginal seas. *Organic Geochemistry* 89-90, 31-43. doi: [10.1016/j.orggeochem.2015.10.004](https://doi.org/10.1016/j.orggeochem.2015.10.004)
3. Coban, H., Miltner, A., **Elling, F.J.**, Hinrichs, K.-U., Kästner, M. (2015). The contribution of biogas residues to soil organic matter formation and CO₂ emissions in an arable soil. *Soil Biology & Biochemistry* 86, 108-115. doi: [10.1016/j.soilbio.2015.03.023](https://doi.org/10.1016/j.soilbio.2015.03.023)
2. **Elling, F.J.**, Könneke, M., Lipp, J.S., Becker, K.W., Gagen, E.J., Hinrichs, K.-U. (2014). Effects of growth phase on the membrane lipid composition of the thaumarchaeon *Nitrosopumilus maritimus* and their implications for archaeal lipid distributions in the marine environment. *Geochimica et Cosmochimica Acta* 141, 579-597. doi: [10.1016/j.gca.2014.07.005](https://doi.org/10.1016/j.gca.2014.07.005)

1. Meador, T.B., Zhu, C., **Elling, F.J.**, Könneke, M., Hinrichs, K.-U. (2014). Identification of isoprenoid glycosidic glycerol dibiphytanol diethers and indications for their biosynthetic origin. *Organic Geochemistry* 69, 70-75. doi: [10.1016/j.orggeochem.2014.02.005](https://doi.org/10.1016/j.orggeochem.2014.02.005)

Selected Conference Contributions

- 2025 **Elling, F.J.**, Pierrel, F., Chobert, S.-C., Abby, S.S., Evans, T.W., Reveillard, A., Pelosi, L., Schnoebelen, J., Hemingway, J.D., Boumendjel, A. Becker, K.W., Blom, P., Cordes, J., Nathan, V., Baymann, F., Lückner, S., Spieck, E., Leadbetter, J.R., Hinrichs, K.-U., Summons, R.E., Pearson, A. *32nd International Meeting on Organic Geochemistry*, Porto, Portugal. *Plenary oral presentation*
- 2022 **Elling, F.J.** Nitrogen cycle perturbation at the Paleocene-Eocene boundary. *12th International Conference on Climatic and Biotic Events of the Paleogene (CBEP12)*, Bremen, Germany. *Oral presentation*
- 2021 **Elling, F.J.**, Evans, T.W., Hemingway, J.D., Kharbush, J.J., Nathan, V., Bayer, B., Santoro, A.E., Spieck, E., Summons, R.E., Pearson, A. Marine and Terrestrial Nitrifying Bacteria are Sources of Diverse Bacteriohopanepolyols. *30th International Meeting on Organic Geochemistry*, Montpellier, France. *Oral presentation*
- 2019 **Elling, F.J.**, Hemingway, J.D., Evans, T.W., Kharbush, J.J., Spieck, E., Summons, R.E., Pearson, A. Cobalamin-dependent biosynthesis of 2-methylhopanoids in nitrite-oxidizing bacteria: Implications for the geologic record of hopanoids. *AGU Fall Meeting*, San Francisco, USA. *Oral presentation*
- 2019 **Elling, F.J.**, Hemingway, J.D., Polik, C.A., Pearson, A. Nitrogen loss and carbon cycle feedbacks during past marine anoxia. *Goldschmidt Conference*, Barcelona, Spain. *Oral presentation*
- 2019 **Elling, F.J.**, Gottschalk, J., Doeana, K., Kusch, S., Hurley, S. J., Pearson, A. Archaeal lipid biomarker constraints on the Paleocene-Eocene carbon isotope excursion. *13th International Conference on Paleooceanography*, Sydney, Australia. *Poster presentation*
- 2018 **Elling, F.J.**, Doeana, K., Kusch, S., Pearson, A. Magnitude of the marine carbon isotope excursion during the Paleocene-Eocene Thermal Maximum constrained through archaeal biomarkers. *Goldschmidt Conference*, Boston, USA. *Oral presentation*
- 2016 **Elling, F.J.**, Kusch, S., Pearson, A. Constraining the magnitude of the Paleocene-Eocene marine carbon isotope excursion using intact GDGTs. *Gordon Research Conference on Organic Geochemistry*, Holderness, USA. *Poster presentation*
- 2015 **Elling, F.J.**, Könneke, M., Hurley, S., Lipp, J.S., Mußmann, M., Pearson, A., Hinrichs, K.-U. The influence of temperature and other factors on membrane lipid composition and TEX₈₆ in thaumarchaeal pure cultures. *27th International Meeting on Organic Geochemistry*, Prague, Czech Republic. *Oral presentation*
- 2015 **Elling, F.J.**, Becker, K.W., Könneke, M., Schröder, J.M., Hurley, S.J., Mußmann, M., Pearson, A., Hinrichs, K.-U. Physiological and ecological constraints on TEX₈₆ and GDGT provenance revealed by pure culture experiments and quinone biomarkers. *Goldschmidt Conference*, Prague, Czech Republic. *Oral presentation*

- 2014 **Elling, F.J.**, Könneke, M., Lipp, J.S., Hinrichs, K.-U. Influence of growth phase, temperature and salinity on the membrane lipid composition in the marine ammonia-oxidizing archaeon *Nitrosopumilus maritimus*. *GDGT Workshop 2014*, Texel, Netherlands. *Oral presentation*
- 2014 **Elling, F.J.**, Könneke, M., Lipp, J.S., Mußmann, M., Hinrichs, K.U. Effect of environmental and physiological parameters on the membrane lipid composition of marine ammonia-oxidizing archaea. *Gordon Research Conference on Organic Geochemistry*, Holderness, USA. *Poster presentation*
- 2013 **Elling, F.J.**, Könneke, M., Lipp, J.S., Gagen, E., Thomm, M., Hinrichs, K.-U. Response of membrane lipid composition to growth conditions in the marine ammonia-oxidizing archaeon *Nitrosopumilus maritimus*. *26th International Meeting on Organic Geochemistry*, Costa Adeje, Spain. *Poster presentation*
- 2013 **Elling, F.**, Könneke, M., Lipp, J.S., Hinrichs, K.-U. Growth phase-dependent membrane lipid composition of the marine ammonia-oxidizing archaeon *Nitrosopumilus maritimus*. *Annual Conference of the Association for General and Applied Microbiology*, Bremen, Germany. *Poster presentation*