

Helmholtz Centre for Environmental Research – UFZ
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Researcher profile

Main research interests: marine microorganisms, microbial processes, and geomicrobiology, with a focus on anaerobic processes carried out by sulfate-, nitrate- and metal-reducing bacteria and methanogenic archaea. I am particularly interested in hydrocarbon microbiology, cultivation of hydrocarbon-degrading anaerobic microorganisms, and their physiology and biochemical mechanisms. Microbe-microbe interactions, including syntrophic interactions, direct interspecies electron transfer, and interactions between archaea and bacteria. Corrosion of iron by anaerobic microorganisms. Development and correlative application of molecular biology methods like community profiling, metagenomics, or metaproteomics with high-resolution structural and chemical imaging and high mass resolution analytics.

Major recent achievements: (i) cultivate and identified anaerobic microorganisms able to oxidize ethane, identified the biochemical mechanism of ethane activation without oxygen, identified enzymes and genes of the ethane oxidation pathway; (ii) discovery of thermophilic archaea that oxidize gaseous hydrocarbons via formation of alkyl-coenzyme M; (iii) cultivation and phylogenetic identification of sulfate-reducing bacteria able to grow with gaseous hydrocarbons, resolved their biochemical mechanism of alkane functionalization; (iv) cultivated and identified nitrate- and sulfate-reducing bacteria able to oxidize cyclohexane, and resolved the oxidation pathway; and (v) cultivation and metabolic studies with sulfate-reducing bacteria oxidizing benzene and naphthalene as model aromatic hydrocarbons.

Identifiers & web profiles

ORCID ID: orcid.org/0000-0002-4240-3495
Scopus Author ID: 22935868900
Institution Homepage: <https://www.ufz.de/index.php?en=46032>
LinkedIn profile: <https://www.linkedin.com/in/florin-musat-170a3219/>
Google Scholar profile: <https://scholar.google.com/citations?user=XtuZ88kAAAAJ&hl=en>

Positions

2015 – present	Senior Research Scientist Helmholtz Centre for Environmental Research – UFZ, Germany
2021 – present	Collaborating scientific researcher Emil G. Racoviță Institute, Babes-Bolyai University of Cluj-Napoca, Romania
2013 – 2015	Research Assistant Helmholtz Centre for Environmental Research – UFZ, Germany
2007 – 2013	Scientist Max Planck Institute for Marine Microbiology, Germany
2005 – 2007	Postdoctoral fellow Max Planck Institute for Marine Microbiology, Germany

2001 – 2005	Doctoral candidate Max Planck Institute for Marine Microbiology, Germany
2000 – 2001	Assistant Lecturer Faculty of Biology, University of Bucharest, Romania
1997 – 2000	Assistant Researcher Faculty of Biology, University of Bucharest, Romania

Education

2001 – 2005	Ph.D. (Dr. rer. Nat.) in Marine Microbiology, <i>magna cum laude</i> Max Planck Institute for Marine Microbiology, Germany <i>Dissertation Advisor: Prof. Dr. Friedrich Widdel</i>
1999 – 2001	<i>Ph.D. candidate in Microbial Genetics, interrupted for Ph.D. programme in Marine Microbiology</i> <i>Department of Genetics, Faculty of Biology, University of Bucharest, Romania</i>
1997 – 1999	Master of Science in Genetics and Microbial Genetics Department of Genetics, Faculty of Biology, University of Bucharest, Romania Dissertation in Microbial Genetics <i>Dissertation Advisor: Prof. Dr. Ileana Stoica</i>
1993 – 1997	Bachelor of Science in Biological Sciences Faculty of Biology, University of Bucharest, Romania

Teaching Experience

2006 – 2013	Lecturer and instructor for practical courses for students of the Master of International Studies in Aquatic Tropical Ecology (ISATEC) Topic: Introduction in Marine Microbiology University of Bremen, Germany Teaching load: 5 h/year lecturing, 8 h/year practical course training
2007	Instructor for practical course (one semester) for undergraduate students Topic: General Microbiology University of Bremen, Germany
1997 – 2001	Lecturer and instructor for practical courses for undergraduate students of the Faculty of Biology, and graduate students of the Master Programme of Microbial Genetics & Biotechnology, and the Master Programme of Molecular Biology Courses taught: General Genetics, Microbial Genetics, Genetic Engineering, and Molecular Biology Methods Faculty of Biology, University of Bucharest, Romania Teaching load: 80 h/year lecturing, 160 h/year practical course training

Mentoring of master students, doctoral candidates, and postdoctoral fellows

Master students

Previous: Ostroveanu Anghelus (1999-2000), Ulrike Jaekel (2007-2008), Johannes Zedelius (2006-2007), Zane Zaleska (2007-2008), Aishwarya Paknikar

(2010-2011)

Doctoral candidates

Current: Marc Tamisier (2019-current), Sarah Haenelt (co-supervision, 2020-current), Gangan Wang (co-supervision, 2020-current)

Previous (time; current occupation): Ulrike Jaekel (2008-2011; government senior advisor); Sara Kleindienst (2008-2012; co-supervision, faculty); Gao Chen (2009-2014; researcher); Song-Can Chen (2016-2018; researcher); Jiaheng Ji (2019-2021; pharma staff); Alexei Remizovschi (2019-2020, visiting Ph.D. student; Ph.D. candidate), Federica Calabrese (2016-2021; co-supervision, researcher)

Postdoctoral scientists

Previous (time; current occupation): Song-Can Chen (2019-2021; researcher); Zhi-Yong Song (2016-2017; faculty)

Research Grants & Awards

2020 – 2021	Federal Institute for Geosciences and Natural Resources (BGR). PANORAMA II. Scientific evaluation of molecular biology analyses of samples from the Panorama exploration area (Part II). 73,280 EUR. Principal Investigator
2019 – 2020	Federal Institute for Geosciences and Natural Resources (BGR). PANORAMA I. Scientific evaluation of molecular biology analyses of samples from the Panorama exploration area (Part I). 155,356 EUR. Principal Investigator
2018 – 2020	Helmholtz Association of German Research Centres Award. ARCHYPROX. Archaeal hydrocarbon oxidation and pathway reversibility. 200,000 EUR. Principal Investigator
2008 – 2011	German Research Foundation (DFG). Microorganisms degrading cyclic and short-chain alkanes under anoxic conditions. 105,600 EUR. Principal Investigator
2005 – 2007	Max Planck Society Postdoctoral scholarship. 45,000 EUR. Principal Investigator

Publications

Metrics (June 2021)	WoS	Scopus	Google Scholar
Times Cited:	>1500	>1500	>2400
Average Citations per Item:	42	45	
<i>h</i> -index:	21	21	23

1. Tamisier, M., Schmidt, M., Vogt, C., Kümmel, S., Stryhanyuk, H., Musat, N., Richnow, H.-H., and **Musat, F.** (2021) Iron corrosion by methanogenic archaea characterized by stable isotope effects and crust mineralogy. *Environ Microbiol*, doi:10.1111/1462-2920.15658.
2. Chen, S.-C., Budhraj, R., Adrian, L., Calabrese, F., Stryhanyuk, H., Musat, N., Richnow, H.-H., Duan, G.-L., Zhu, Y.-G., and **Musat, F.** (2021) Novel clades of soil biphenyl degraders revealed by

- integrating isotope probing, multi-omics, and single-cell analyses. *The ISME Journal* **15**: 3508-3521.
3. Rotaru, A.-E., M.O. Yee, and **F. Musat**, *Microbes trading electricity in consortia of environmental and biotechnological significance*. *Current Opinion in Biotechnology*, 2021. **67**: p. 119-129.
 4. Chen, S.-C., G.-X. Sun, Y. Yan, K.T. Konstantinidis, S.-Y. Zhang, Y. Deng, X.-M. Li, H.-L. Cui, **F. Musat**, D. Popp, B.P. Rosen, and Y.-G. Zhu, *The Great Oxidation Event expanded the genetic repertoire of arsenic metabolism and cycling*. *Proceedings of the National Academy of Sciences*, 2020. **117**(19): p. 10414-10421.
 5. Chen, G., F. Widdel, and **F. Musat**, *Effect of energy deprivation on metabolite release by anaerobic marine naphthalene-degrading sulfate-reducing bacteria*. *Environ Microbiol*, 2020. **22**(9): p. 4057-4066.
 6. Gilbert, A., B. Sherwood Lollar, **F. Musat**, T. Giunta, S. Chen, Y. Kajimoto, K. Yamada, C.J. Boreham, N. Yoshida, and Y. Ueno, *Intramolecular isotopic evidence for bacterial oxidation of propane in subsurface natural gas reservoirs*. *Proc Natl Acad Sci U S A*, 2019. **116**(14): p. 6653-6658.
 7. Chen, S.C., N. Musat, O.J. Lechtenfeld, H. Paschke, M. Schmidt, N. Said, D. Popp, F. Calabrese, H. Stryhanyuk, U. Jaekel, Y.G. Zhu, S.B. Joye, H.H. Richnow, F. Widdel, and **F. Musat**, *Anaerobic oxidation of ethane by archaea from a marine hydrocarbon seep*. *Nature*, 2019. **568**(7750): p. 108-111.
 8. Calabrese, F., I. Voloshynovska, **F. Musat**, M. Thullner, M. Schlömann, H.H. Richnow, J. Lambrecht, S. Müller, L.Y. Wick, N. Musat, and H. Stryhanyuk, *Quantitation and Comparison of Phenotypic Heterogeneity Among Single Cells of Monoclonal Microbial Populations*. *Frontiers in Microbiology*, 2019. **10**(2814). doi:10.3389/fmicb.2019.02814.
 9. Vogt, C., **F. Musat**, and H.-H. Richnow, *Compound-Specific Isotope Analysis for Studying the Biological Degradation of Hydrocarbons*, in *Anaerobic Utilization of Hydrocarbons, Oils, and Lipids*, M. Boll, Editor. 2018, Springer International Publishing. p. 1-38.
 10. Stryhanyuk, H., F. Calabrese, S. Kümmel, **F. Musat**, H.H. Richnow, and N. Musat, *Calculation of Single Cell Assimilation Rates From SIP-NanoSIMS-Derived Isotope Ratios: A Comprehensive Approach*. *Frontiers in Microbiology*, 2018. **9**(2342).
 11. Rotaru, A.E., F. Calabrese, H. Stryhanyuk, **F. Musat**, P.M. Shrestha, H.S. Weber, O.L.O. Snoeyenbos-West, P.O.J. Hall, H.H. Richnow, N. Musat, and B. Thamdrup, *Conductive particles enable syntrophic acetate oxidation between Geobacter and Methanosarcina from coastal sediments*. *mBio*, 2018. **9**(3).
 12. Laso-Pérez, R., V. Krukenberg, **F. Musat**, and G. Wegener, *Establishing anaerobic hydrocarbon-degrading enrichment cultures of microorganisms under strictly anoxic conditions*. *Nature Protocols*, 2018. **13**(6): p. 1310-1330.
 13. **Musat, F.** and N. Musat, *Measuring the Impact of Hydrocarbons on Rates of Nitrogen Fixation*, in *Hydrocarbon and Lipid Microbiology Protocols; Activities and Phenotypes*, T.J. McGenity, K.N. Timmis, and B.N. Fernandez, Editors. 2017, Springer-Verlag Berlin Heidelberg. p. 81-97.
 14. **Musat, F.**, *Introduction to Activities and Phenotypes*, in *Hydrocarbon and Lipid Microbiology Protocols; Activities and Phenotypes*, T.J. McGenity, K.N. Timmis, and B.N. Fernandez, Editors. 2017, Springer-Verlag Berlin Heidelberg. p. 1-6.
 15. Vogt, C., C. Dorer, **F. Musat**, and H.H. Richnow, *Multi-element isotope fractionation concepts to characterize the biodegradation of hydrocarbons - from enzymes to the environment*. *Current Opinion in Biotechnology*, 2016. **41**: p. 90-98.

16. Rabus, R., M. Boll, J. Heider, R.U. Meckenstock, W. Buckel, O. Einsle, U. Ermler, B.T. Golding, R.P. Gunsalus, P.M.H. Kroneck, M. Krüger, T. Lueders, B.M. Martins, **F. Musat**, H.H. Richnow, B. Schink, J. Seifert, M. Szalaniec, T. Treude, G.M. Ullmann, C. Vogt, M. Von Bergen, and H. Wilkes, *Anaerobic microbial degradation of hydrocarbons: From enzymatic reactions to the environment*. Journal of Molecular Microbiology and Biotechnology, 2016. **26**(1-3): p. 5-28.
17. Musat, N., **F. Musat**, P.K. Weber, and J. Pett-Ridge, *Tracking microbial interactions with NanoSIMS*. Current Opinion in Biotechnology, 2016. **41**: p. 114-121.
18. **Musat, F.**, C. Vogt, and H.H. Richnow, *Carbon and hydrogen stable isotope fractionation associated with the aerobic and anaerobic degradation of saturated and alkylated aromatic hydrocarbons*. Journal of Molecular Microbiology and Biotechnology, 2016. **26**(1-3): p. 211-226.
19. Laso-Pérez, R., G. Wegener, K. Knittel, F. Widdel, K.J. Harding, V. Krukenberg, D.V. Meier, M. Richter, H.E. Tegetmeyer, D. Riedel, H.-H. Richnow, L. Adrian, T. Reemtsma, O.J. Lechtenfeld, and **F. Musat**, *Thermophilic archaea activate butane via alkyl-coenzyme M formation*. Nature, 2016. **539**(7629): p. 396-401.
20. Kümmel, S., R. Starke, G. Chen, **F. Musat**, H.H. Richnow, and C. Vogt, *Hydrogen Isotope Fractionation As a Tool to Identify Aerobic and Anaerobic PAH Biodegradation*. Environmental Science and Technology, 2016. **50**(6): p. 3091-3100.
21. **Musat, F.**, *The anaerobic degradation of gaseous, nonmethane alkanes - From in situ processes to microorganisms*. Computational and Structural Biotechnology Journal, 2015. **13**: p. 222-228.
22. Jaekel, U., J. Zedelius, H. Wilkes, and **F. Musat**, *Anaerobic degradation of cyclohexane by sulfate-reducing bacteria from hydrocarbon-contaminated marine sediments*. Frontiers in Microbiology, 2015. **6**:116: p. 1-11.
23. Kleindienst, S., F.-A. Herbst, M. Stagars, F. von Netzer, M. von Bergen, J. Seifert, J. Peplies, R. Amann, **F. Musat**, T. Lueders, and K. Knittel, *Diverse sulfate-reducing bacteria of the Desulfosarcina/Desulfococcus clade are the key alkane degraders at marine seeps*. ISME J, 2014. **8**(10): p. 2029-2044.
24. Jaekel, U., C. Vogt, A. Fischer, H.-H. Richnow, and **F. Musat**, *Carbon and hydrogen stable isotope fractionation associated with the anaerobic degradation of propane and butane by marine sulfate-reducing bacteria*. Environmental Microbiology, 2014. **16**(1): p. 130-140.
25. Jaekel, U., N. Musat, B. Adam, M. Kuypers, O. Grundmann, and **F. Musat**, *Anaerobic degradation of propane and butane by sulfate-reducing bacteria enriched from marine hydrocarbon cold seeps*. ISME J, 2013. **7**(5): p. 885-95.
26. Abed, R.M.M., N. Musat, **F. Musat**, and M. Mußmann, *Structure of microbial communities and hydrocarbon-dependent sulfate reduction in the anoxic layer of a polluted microbial mat*. Marine Pollution Bulletin, 2011. **62**(3): p. 539-546.
27. Widdel, F. and **F. Musat**, *Diversity and common principles in enzymatic activation of hydrocarbons*, in *Handbook of Hydrocarbon and Lipid Microbiology*, K.N. Timmis, Editor. 2010, Springer Berlin Heidelberg. p. 983-1009.
28. Widdel, F. and **F. Musat**, *Energetic and other quantitative aspects of microbial hydrocarbon utilization*, in *Handbook of Hydrocarbon and Lipid Microbiology*, K.N. Timmis, Editor. 2010, Springer Berlin Heidelberg: Berlin, Heidelberg. p. 729-763.
29. **Musat, F.**, H. Wilkes, A. Behrends, D. Woebken, and F. Widdel, *Microbial nitrate-dependent cyclohexane degradation coupled with anaerobic ammonium oxidation*. ISME J, 2010. **4**(10): p. 1290-301.
30. **Musat, F.**, A. Galushko, J. Jacob, F. Widdel, M. Kube, R. Reinhardt, H. Wilkes, B. Schink, and R.

- Rabus, *Anaerobic degradation of naphthalene and 2-methylnaphthalene by strains of marine sulfate-reducing bacteria*. Environ Microbiol, 2009. **11**(1): p. 209-19.
31. Halm, H., N. Musat, P. Lam, R. Langlois, **F. Musat**, S. Peduzzi, G. Lavik, C.J. Schubert, B. Singha, J. Laroche, and M.M.M. Kuypers, *Co-occurrence of denitrification and nitrogen fixation in a meromictic lake, Lake Cadagno (Switzerland)*. Environmental Microbiology, 2009. **11**(8): p. 1945-1958.
 32. **Musat, F.** and F. Widdel, *Anaerobic degradation of benzene by a marine sulfate-reducing enrichment culture, and cell hybridization of the dominant phylotype*. Environmental Microbiology, 2008. **10**(1): p. 10-19.
 33. Widdel, F., **F. Musat**, K. Knittel, and A. Galushko, *Anaerobic degradation of hydrocarbons with sulphate as electron acceptor*, in *Sulphate-reducing Bacteria: Environmental and Engineered Systems*. 2007, Cambridge University Press: Cambridge, UK. p. 265-303.
 34. Kniemeyer, O., **F. Musat**, S.M. Sievert, K. Knittel, H. Wilkes, M. Blumenberg, W. Michaelis, A. Classen, C. Bolm, S.B. Joye, and F. Widdel, *Anaerobic oxidation of short-chain hydrocarbons by marine sulphate-reducing bacteria*. Nature, 2007. **449**(7164): p. 898-901.
 35. **Musat, F.**, J. Harder, and F. Widdel, *Study of nitrogen fixation in microbial communities of oil-contaminated marine sediment microcosms*. Environmental Microbiology, 2006. **8**(10): p. 1834-1843.
 36. Alain, K., T. Holler, **F. Musat**, M. Elvert, T. Treude, and M. Krüger, *Microbiological investigation of methane- and hydrocarbon-discharging mud volcanoes in the Carpathian Mountains, Romania*. Environmental Microbiology, 2006. **8**(4): p. 574-590.
 37. **Musat, F.**, F. Widdel, A. Wieland, and F. Widdel, *Marine sediment with surface contamination by oil in microcosms for microbiological studies*. Ophelia, 2004. **58**(3): p. 217-222.
 38. Vassu, T., D. Smarandache, I. Stoica, E. Sasarman, D. Fologea, **F. Musat**, O. Csutak, A.-M. Nohit, O. Iftime, and R. Gherasim, *Biochemical and genetic characterization of Lactobacillus plantarum cmgb-1 strain used as probiotic*. Romanian Biotechnological Letters, 2002. **7**: p. 585-598.
 39. Vassu, T., I. Stoica, O. Csutak, and **F. Musat**, *Genetics of Microorganisms and Microbial Genetic Engineering. Course notes and laboratory techniques (in Romanian)*. Vol. 1. 2001, Bucharest: Petrion.
 40. Stoica, I., **F. Musat**, T. Vassu, I. Lazar, E. Sasarman, and O. Csutak, *Preliminary Studies on a Quinoline-Degrading Bacterial Consortium using a new Screening Technique*. Romanian Biotechnological Letters, 1999. **4**: p. 235-246.

Invited seminars and conference talks

- 2019 Gordon Research Conference – Archaea: Ecology, Metabolism, and Molecular Biology. Les Diablerets, Switzerland
- 2017 Gordon Research Conference – Archaea: Ecology, Metabolism, and Molecular Biology. Waterville Valley, USA
- 2016 Microbiological colloquium, University of Oldenburg and the Institute for Chemistry and Biology of the Marine Environment. Oldenburg, Germany

China-Germany Symposium – Microbial chemotaxis and bioremediation of environmental pollutants. Beijing, China

- 2015 EuCheMS International Conference on Chemistry and the Environment – ICCE. Leipzig, Germany
International Symposium on Applied Microbiology and Molecular Biology in Oil Systems – ISMOS. Stavanger, Norway
- 2012 Microbiological colloquium, University of Oldenburg and the Institute for Chemistry and Biology of the Marine Environment. Oldenburg, Germany
- 2011 The 51st Annual Scientific Session of the Institute of Biology, Romanian Academy of Sciences. Bucharest, Romania
International Society for Subsurface Microbiology Symposium. Garmisch-Partenkirchen, Germany
Reservoir Microbiology Forum. London, UK
- 2006 Association for General and Applied Microbiology (VAAM). Jena, Germany

Professional Service

Editorial positions

- 2019 – present Associate Editor, Microbiological Chemistry and Geomicrobiology, *Frontiers in Microbiology*
- 2016 – 2019 Review Editor for *Extreme Microbiology*, *Frontiers in Microbiology*
- 2014 – 2015 Guest Associate Editor for *Microbial Physiology and Metabolism*, *Frontiers in Microbiology*
Editor of the research topic *Living on gas*

Peer Reviewer

Nature Microbiology, Nature Communications, The ISME Journal, Environmental Microbiology, *Frontiers in Microbiology*, FEMS Microbiology Ecology, Biogeosciences, Environmental Research Letters, Environmental Science & Technology, Environmental Science and Pollution Research, Archives of Microbiology.

University Service

- 2020 Visiting Associate Professor, Evaluator for undergraduates in the final year of Biochemistry studies, Babes-Bolyai University of Cluj-Napoca, Romania
- 2019 Member of PhD committee panel, University of Southern Denmark, Odense, Denmark
- 2011 – 2015 Member of PhD committee panel, Max Planck Institute for Marine Microbiology and University of Bremen, Bremen, Germany

Scientific meetings

- 2015 Session organizer and convener: Isotopes in Geochemistry, Ecology and Microbiology. Goldschmidt, Prague, Czech Republic

Field experience and Research Expeditions

- 2018 On-board scientist, sediment microbiology team. Research Expedition in the Arctic, Greenland Sea and Wandel Sea with the RV Polarstern (Expedition PS115.1, duration 6 weeks). Sediment sampling using multi-corer, gravity corer and box corer. On-board work including processing of sediment cores, cultivation work, dissolved gas measurements
- 2004 Organizer and team member, sampling campaign Paclele Mici terrestrial mud volcanoes, Romania. On site measurements of physical-chemical parameters, sediment and gas sampling
- 2002 Organizer and team member, sampling of marine intertidal sediments of the Mediterranean Sea and North Sea

Public outreach

Press releases

- 2019 Knowledge gap closed in our understanding of degradation of ethane
Press release in response to publication Chen *et al.*, Nature 2019:
https://www.ufz.de/index.php?en=36336&webc_pm=15/2019
Mention in news and blogs:
<https://www.nature.com/articles/s41586-019-1063-0/metrics>
- 2016 Mystery of archaeal butane degradation solved
Press release in response to publication Laso-Perez *et al.*, Nature 2016:
https://www.ufz.de/index.php?en=36336&webc_pm=39/2016
Mention in news and blogs:
<https://www.nature.com/articles/nature20152/metrics>

Blogs

- 2019 **Musat F.** Candidatus Argoarchaeum ethanivorans – a decade-old quest for an anaerobic ethane degrader. Behind the paper blog @ Nature Microbiology Community
<https://microbiologycommunity.nature.com/posts/49957-candidatus-argoarchaeum-ethanivorans-a-decade-old-quest-for-an-anaerobic-ethane-degrader>

Communication of scientific news and publications from our group through my LinkedIn channel (443 followers):

<https://www.linkedin.com/in/florin-musat-170a3219/detail/recent-activity/shares/>

Scientific collaborations network

During my career I have built a network of collaborators with research interests similar or complementary to my own. Below a list of those currently most active:

Dr. Amelia Rotaru, Dept. of Biology, Univ. of Southern Denmark, Odense, Denmark

Topic: Direct interspecies electron transfer in anaerobic processes (hydrocarbon oxidation, methanogenesis, iron corrosion)

Common publications: Rotaru, A.E. et al., (2018). Conductive particles enable syntrophic acetate oxidation between *Geobacter* and *Methanosarcina* from coastal sediments. *mBio* 9.

Rotaru et al., (2021) Microbes trading electricity in consortia of environmental and biotechnological significance. *Current Opinion in Biotechnology* 67, 119-129.

Dr. Stefan Sievert, Biology Dept., Woods Hole Oceanographic Institution, Woods Hole, MA, USA

Topic: Genomics of anaerobic, marine microorganisms able to oxidize hydrocarbons

Joint Genome Institute: Sequencing the Genome of Strain BuS5, a Highly Specialized and Novel Bacterium Being Able to Degrade Propane and Butane under Anaerobic Conditions. PIs: Sievert S and Musat F.

Dr. Alexis Gilbert, Tokyo Institute of Technology, Tokyo, Japan

Topic: Position-specific stable isotope fractionation during anaerobic oxidation of hydrocarbons

Common publication: Gilbert, A. et al. (2019). Intramolecular isotopic evidence for bacterial oxidation of propane in subsurface natural gas reservoirs. *Proc Natl Acad Sci U S A* 116, 6653-6658.

Dr. Martin Krüger, Dept. Geomicrobiology, Federal Institute for Geosciences and Natural Resources – BGR, Hannover, Germany

Topic: Ecology of aerobic and anaerobic hydrocarbon degraders in Arctic sediments

Prof. Samantha Joye, Dept. of Marine Sciences, University of Georgia, Athens, GA, USA

Topic: Biogeochemistry of deep sea sediments

Common publications: Chen, S.C. et al (2019). Anaerobic oxidation of ethane by archaea from a marine hydrocarbon seep. *Nature* 568, 108-111.

Kniemeyer, O. et al (2007). Anaerobic oxidation of short-chain hydrocarbons by marine sulphate-reducing bacteria. *Nature* 449, 898-901.

Prof. Britta Planer-Friedrich, Faculty for Biology, Chemistry, and Earth Sciences, Univ. Bayreuth, Bayreuth, Germany

Topic: Sulfur species in archaeal-bacterial consortia (collaboration initiated 2019)

Prof. Horita Juske, Dept. of Geosciences, Texas Tech University, Lubbock, TX, USA

Topic: Position-specific isotope fractionation of light hydrocarbons during anaerobic biodegradation (collaboration initiated 2019)

Prof. Yong-Guan Zhu, Chinese Academy of Sciences, Beijing, China

Topics: Geomicrobiology of hydrocarbon oxidation in anoxic sediments; Origin and evolution of As-resistance mechanisms

Outcome: joint PhD coordination of Dr. S. Chen which received his PhD degree with honors from the Chinese Academy of Science

Common publications: Chen, S.C. et al (2019). Anaerobic oxidation of ethane by archaea from a marine hydrocarbon seep. *Nature* 568, 108-111.

Chen et al., 2020, The Great Oxidation Event expanded the genetic repertoire of arsenic

metabolism and cycling. PNAS 117, 10414-10421

Prof. Horia Banciu, Babes-Bolyai University of Cluj-Napoca, Cluj, Romania
Topic: Geomicrobiology of mud volcanoes

At the national level (Germany) I was part of a priority programme of the German Research Foundation, SPP 1319: Biological Transformations without Oxygen: From the Molecular to the Global Scale (<https://gepris.dfg.de/gepris/projekt/36065184?language=en>). I am currently maintaining active collaborations with most of the scientists of that network.